The Design and Success of Stock Options Plans for New Economy Firms in Germany

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Recommended Citation

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In recent years, the use of stock options as an incentive compensation scheme has evolved to be one of the most debated topics in the finance literature as well as in the corporate world. The investigations into the option granting practices at a number of U.S. firms, which were accused of fraudulent backdating options, as well as the compensation schemes of top

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bankers and other top executives during the current financial crisis, heated up this debate even more. Our study contributes to the empirical research on stock option plans (SOPs) by focusing on start-up or 'new economy' firms in Germany. For the 329 firms that went public at the 'Neuer Markt', a special stock market segment for young growth companies in Germany, we find a high popularity of stock options in that more than 90% of all IPOs implemented at least one stock option plan (SOP) at the time of the IPO or later on. These SOPs were broad-based and included rank and file employees as the options' recipients. Our empirical results reveal - at least with hindsight - that accepting stock options as part of an overall salary package did not pay off financially for employees during that time period. Furthermore, the success and performance of the investigated SOPs were influenced by their statutory design and the succession of three different lock-up periods. These made a profitable option exercise for employees very difficult. Our findings question the rationale behind the design, introduction and implementation of SOPs during the time of the 'Neuer Markt' in Germany at least from the perspective of non-executive employees.

I. Introduction

In recent years, the practice of granting stock options to executives and board members as part of performance-based incentive compensation has become one of the most debated topics in the finance literature and in the corporate world (Hall and Murphy, 2003; Murphy, 2003). At the center of these studies and investigations are often the potential conflicts of interest that exist between the different stakeholder groups such as shareholders and management. The empirical evidence so far suggests that stock options were not only issued at times when stock prices were temporarily depressed but in many cases also backdated so that the exercise price coincided with the lowest stock price (Yermark, 1997; Lie 2005; Heron and Lie, 2007). Obviously, such a strategy maximizes the benefits for the recipient. More recently, the granting of stock options to "rank and file employees" have gained importance as part of overall compensation plans (Mehran and Tracy, 2001; Oyer and Schaefer, 2005). In contrast to the compensation of executives, the offering of stock options to employees is often motivated by a different reasoning. Especially for start-up firms, the rationale is to attract qualified employees at initially low expenses. These schemes offer the employees the opportunity of high returns if the venture is successful but also exposes them to extreme risks. Whether such a strategy is successful for management and shareholders and also beneficial for its employees is an empirical question that is addressed in this study.

The objective of this research is to analyze the design and success of stock option plans (SOPs) for start-up firms that went public at the 'Neuer Markt' - the stock market segment for growth companies in Germany - during the period from 1997 to 2002. Our research reveals that SOPs were frequently used as a compensation scheme at new economy firms. Of the 329 IPOs at the 'Neuer Markt', 72% granted stock options at the time of the IPO and an additional 19% implemented an SOP later on. Interestingly, we observe a broad-based granting practice of stock options to the rank and file employees rather than to executives as the only beneficiaries in our sample. This observation is in contrast to the usual practice at large established firms and requires different explanations than the ones usually applied.

The standard managerial incentive versus windfall profit debate considers executives as the sole recipients of these options. In line with some previous research (Bergman and Jenter, 2007) our empirical results suggest that the employee's prediction of the up-side potential of stock prices and the option value was too optimistic at the time the option plans were

initiated. In fact, the 'Neuer Markt' was characterized by an immense stock price increase during the 1998-2000 hot issue market period which was then followed by a sharp stock price decline and cold issue market period that started in March 2000. The acceptance of stock options appeared to be very attractive during the hot issue market period, but they were mostly out of the money at the time they could be exercised (Bessler, Becker and Wagner, 2007). This is remarkable given the fact that the options' exercise price was often set equal to the issuing price and that the IPOs at the 'Neuer Markt' were in general tremendously underpriced. The first-day or initial return for the 329 IPOs was on average 48.9% (Kurth, 2005; Bessler and Kurth, 2007). Despite these substantial initial returns our empirical findings question the merits of such a compensation scheme for employees.

When interpreting these empirical findings it is important to analyze them in the context of the German regulatory environment. First of all, the legal environment during the time period of the 'Neuer Markt' required a lock-up period of at least two years for stock options issued by German firms (Bessler, Becker and Wagner, 2007). Moreover, there were two additional lock-up requirements that usually expired before the end of the two year lock-up period for stock options. The first lock-up period of six months was mandated by the rules and regulations of the 'Neuer Markt' and applied to the founding shareholders and early investors of the IPO who owned shares already before the IPO. The second one was a tax lock-up period of twelve months that applied especially to private, wealthy investors that often had privileged access to the investment bank and to IPO allocations. As documented in Bessler and Kurth (2005, 2006 and 2007) these two lock-up periods created severe agency problems. In fact, their studies provide empirical evidence of significant increases in trading volume as well as significantly negative stock price reactions around the expiration of each of these two lock-up periods. After controlling for these effects as well as for other factors, we find evidence that most of these stock options were out of the money at the time they could be exercised. Most importantly, however, the performance of firms with and without SOPs is quite different and highly sensitive to the expiration of the other lock-up periods. These results may question the rationale behind the acceptance of stock option compensation by employees in general but in particular in this unique environment. In fact, our results provide evidence of severe agency problems when two other stakeholder groups have the opportunity to exit earlier from their investment than the rank-and-file employees that had to keep their stock option for at least two years.

The rest of the paper is organized as follows. In the next section we provide insights into the regulatory and institutional environment which applied to the issuance of stock options during this 'new economy' and the 'Neuer Markt' period. The literature is reviewed in section III and the data and methodology are described in section IV. In section V we present and discuss our empirical findings while section VI concludes.

II. The Regulatory and Institutional Environment in Germany
1. 'Neuer Markt'

Historically, the German capital market was relatively small given the size of the German economy. Moreover, it did not offer great opportunities for start-up firms to go public and to raise new equity. Over the period from 1983 to 1997, the annual number of new listings was only between 9 and 33 per year (Bessler and Thies, 2007a). With the bull market and the 'new economy' boom in the late 1990s, IPOs suddenly became increasingly popular and an attractive financing source for start-up and high technology firms. One important event that

attracted public attention in Germany was the widely promoted IPO of the formerly state owned Deutsche Telekom, the German telecommunication services provider, which occurred just before the opening of the 'Neuer Markt' in 1997. The 'Neuer Markt' was created as a special stock market segment for start-up technology firms at the German Stock Exchange (Deutsche Börse). It was closed in 2003 due to some fraud cases but most importantly because of some regulatory problems. Since then, most companies are listed on other stock market segments.

The 'Neuer Markt' rules and regulation included specific requirements that were intended to help signal the quality of the IPOs at this new stock market segment. These rules were different from those applying to large and established firms trading in other market segments. First, firms were required to raise additional equity at the time of the IPO by issuing new shares. At least half of the issued shares had to be primary shares whereas the other half could be secondary shares. Second, IPOs were required to invest the money raised through the IPO into growth opportunities and innovation. They were not allowed to use the proceeds for repaying debt. Third, firms were not permitted to issue additional shares (seasoned equity offering) during the first six months after going public. In addition, existing shareholders had to commit to a mandatory lock-up period of at least six months (Bessler and Kurth, 2007). Although these rules and regulations seemed attractive at a first glance and adequate for reducing potential conflicts of interest, they created a variety of new agency problems (Kurth 2005; Bessler and Kurth 2007). Another interesting and important aspect that has been omitted in most studies was related to the German tax code. It imposed a capital gains tax only on profits from security trades that occurred within a holding period of less than 12 months (Bessler and Kurth, 2006). This made tax avoidance strategies quite attractive and economically profitable.

2. Stock Option Plans

In Germany the granting of stock options (SOP) has to be approved at the annual shareholder meeting (ASM), because the most common way to issue options is a contingent seasoned equity offering that requires 'authorized capital'. Before the approval detailed information about the SOP has to be made publicly available in a newspaper authorized by the stock exchange (e.g., Bundesanzeiger) 30 days before the ASM. At least some information about SOPs also has to be included in the companies' annual reports. Additional disclosures were not required. This situation changed with the introduction of the German Corporate Governance Codex (GCGC) on February 26, 2002. The GCGC requires an extensive disclosure of SOPs on the companies' website and a detailed explanation in the companies' annual reports.[1] Furthermore, stock options have to be disclosed in the equity section of the annual report. Moreover, the Companies Act (Aktiengesetz) and the Corporate Sector Supervision and Transparency Act (KonTraG)[2] limit the size and the group of persons eligible for stock options plans. During the time of our empirical study (1997-2002), stock options could be legally granted to a wide range of persons including members of the supervisory board.[3] After the approval of the stock option plan by the ASM the final decision about the

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[1] Regierungskomission Deutscher Corporate Governance Kodex [ed] (2005), p. 7.

[2] Became effective on May 1, 1998 and changed among other things the Companies Act (§192, Sec. 2, No .3) by introducing a lock-up period of at least two years (Bundesgesetzblatt, April 30, 1998, p .788.)

[3] This practice was ruled out by the Federal Court of Justice, the highest appellate court in Germany for civil and criminal cases, on February 16, 2004. The quoted reason for this decision given by the court was that SOPs

option recipients was delegated to management.[4] The German Companies Act limits the volume of authorized capital for SOPs of German public listed companies to 10% of the subscribed capital. Thus, the maximum volume of a SOP is restricted (AktG §192).

Finally, accounting rules determine the way stock options are reported in financial statements and annual reports.[5] IPOs at the 'Neuer Markt' were required to use either US-GAAP or IAS accounting rules.[6] According to US-GAAP two different valuation and accounting approaches were feasible for SOPs. Following the Accounting Principles Board Opinion No. 25 (APB 25), fixed SOPs (number of shares and exercise price are known in advance) are valued at the grant date at their intrinsic value. If the exercise price is higher or equal to the market price at the grant date, then the options' intrinsic value is zero. An alternative approach was subsequently introduced by the Statement of Financial Accounting Standards No. 123 (SFAS 123). This method determines the value of the option by applying a valuation model (e.g., Black-Scholes). The option value is then expensed over the period until the option is exercised. An exception applies if the grant date is before the measurement date. This is the date when the number and exercise price of the option are known. In this case, an intrinsic value approach is applied which then has to be restated every year.[7] Setting an exercise price equal or higher than the market price and applying APB 25 offered the opportunity of keeping the personnel costs induced by stock options off the financial statement. SFAS 123 offered at least a delay in reporting of these costs if the options' intrinsic value was initially zero.

III. Review of the Literature

For our analysis of stock option plans the theories and empirical findings from various research areas are relevant. In the first section we therefore discuss the literature with respect to the incentive structure for executive SOPs and then focus in the second section on the literature of broad-based SOPs for 'new economy' firms.

1. Executive Stock Options: Managerial Incentive or Windfall Profit?

One reason often given for performance-based compensation in the form of stock options is the reduction of potential agency problems between managers and shareholders which stem from the separation of ownership and control (Jensen and Meckling, 1976). Most often employee stock options are consequently granted to upper level employees as part of their compensation packages. The basic idea is that stock options should align the interests of managers and shareholders and should motivate executives to maximize shareholder value by creating a direct link between firm performance and executive compensation (Hall and Murphy, 2002). Moreover, accepting options instead of cash forces the manager to put his pay at risk. Arya and Mittendorf (2005), for example, find that firms employ SOPs to mitigate asymmetric information with respect to the managers' skills and abilities. Duncan (2001)

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could be influenced by the management within and beyond the law (Frankfurter Allgemeine Zeitung, 16.03.2004, p. 11). This legal case was pushed further by the German shareholder rights organisations SdK (Schutzgemeinschaft der Kapitalanleger e.V.) and DSW (Deutsche Schutzvereinigung für Wertpapierbesitz e.V.).

[4] With the exception that grants to the executive board itself have to be decided by the supervisory board.

[5] A comprehensive overview of accounting rules is provided by Dietz (2004), pp. 135-170.

[6] These regulations of the Deutsche Börse required that companies listed at the "Neuer Markt" had to follow in their accounting practices US-GAAP, IAS or German GAAP with a later transition to US-GAAP (Regelwerk Neuer Markt).

[7] Dietz (2004), p. 141-150.

suggests that one of the most effective ways to energize employees and managers is to 'make everyone an owner' of the enterprise.[8] Thus, the use of stock options may help firms to attract talented managers and staff members who are able to select and implement profitable investment projects more efficiently (Lazear, 2004). Moreover, stock options help a firm to sort and screen for high quality and performance oriented employees and to retain them by making compensation stagger with labor market conditions (Oyer and Schaefer, 2005).

In contrast to the potential positive effects of SOPs, Bebchuk and Fried (2003) view the design of executive compensation schemes as part of the agency problem itself. According to their 'managerial power' approach to executive compensation they argue that boards of publicly traded companies cannot be expected to negotiate at arms' length with managers. As a result of this imbalance, managers can substantially influence their own pay arrangements. Consequently, they are in a position to affect the size of their compensation packages and reduce the extent to which their payments are decoupled from their performance. Yermack (1997), Lie (2005), Sundaram, Brenner and Yermack (2005) and Heron and Lie (2007) provide evidence that stock options are frequently issued at times when stock prices are low and the upside potential for the beneficiaries is high. When looking at the timing and backdating of stock options which have been the focus of some recent investigations, the obvious shortcomings of these profit arrangements become quite obvious. Heron and Lie (2007), for example, find that 13.6% of all option grants in the US between 1996 and 2005 have been backdated or manipulated in one way or another. These results are supported by Bebchuk, Grinstein and Peyer (2007), who identify about 1,150 'lucky' option grants (grants given at the lowest stock price of the month) to CEOs. Investigations by the Wall Street Journal revealed that at the end of July 2007, 140 US firms were under Federal scrutiny for past option grants (Wall Street Journal, August 8, 2007). Collins, Gong and Li (2009) blame weak corporate governance structures as the main factor for the occurrence of backdating executive stock options. Moreover, the tendency to backdate is more pronounced when stock options are an important part of CEO compensation and when directors receive option grants on the same day as the CEO.

In addition, stock option may influence management behavior. One important aspect in corporate strategy is to choose an appropriate level of risk which managers and the company is willing to accept. The introduction of SOPs obviously will influence management behavior and the risk exposure of the firm. Thus, SOPs may have either a positive or a negative effect. Agrawal and Mandelker (1987) investigate this interaction between executive compensation and risk-taking and find that large stock and option holdings by managers induce them to select variance-increasing investments. In support of this view, DeFusco, Johnson and Zorn (1990) report that implied volatility as well as stock-return variances increase after the approval of executive SOPs. Chen, Steiner and Whyte (2006) also find evidence that the structure of executive compensation and stock option-based wealth induce managerial risk-taking. Their results favor a management risk-taking hypothesis over a managerial risk-aversion hypothesis. Coles, Daniel and Naveen (2006) provide empirical

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[8] Arguments for this thesis are that ownership adds the promise of extraordinary personal wealth creation to otherwise modest compensation programs. "Boring" compensation programs are complemented by an element of excitement and personal ownership makes it attractive for talented and mobile employees to stay with the company rather than bouncing from one job to another for higher base pay. Furthermore, ownership, particularly in case of incentive stock option programs, is an economically attractive way of rewarding employees for high performance (Duncan, 2001).

evidence that managerial compensation schemes with higher sensitivity to stock price volatility offer executives the incentive to both invest in riskier assets such as higher R&D spending as well as lower capital expenditures and to implement a more aggressive debt policy such as increasing leverage. In contrast, SOPs might have portfolio effects for managers as their human and financial capital is highly concentrated in one company, leading to a potential reduction in the chosen risk level of strategies (Jensen and Meckling, 1976).

Murphy (2002) finds that there is no significant relationship between the salary and bonus payments to a CEO and the industry-adjusted performance of the firm. The impact of managerial luck versus skill is documented by Bertrand and Mullainathan (2001). They find that cash compensation usually increases when a firm's profits rise, even when these are independent of the manager's efforts. These shortcomings are based on the fact that the design of SOPs often fails to account for industry- and market- wide increases in stock prices which are unrelated to the performance of the manager. Thus, conventional stock options fail first to correctly measure the outperformance that is directly attributable to the manager and second to reward him for his success appropriately (Bebchuk and Fried, 2003). Under optimal contract design, compensation that is due to windfall profits but not due to superior performance is therefore difficult to explain without referring to agency problems. Because of these possible shortfalls, different SOP structures were designed in order to reduce unwarranted windfall profits. One approach is to link the exercise price of the option to a market, industry or peer-group index (Rappaport, 1999). Another strategy is to condition the "vesting" of options on specific performance targets. These targets can be either linked to the stock price, to earnings per share, or to any other measure of firm performance (NCEO, 2002).

Another conflict of interest is apparent when managers use their position to influence financial reporting or to structure transactions altering financial reports (Healy and Wahlen, 1999). The objective is to either mislead some stakeholders about the firm performance or to influence contractual outcomes that are related to accounting figures (options or bonuses). Burns and Kedia (2006) find significant evidence that CEO compensation packages affect the adoption of aggressive accounting practices that often result in a restatement of announced accounting figures. In particular, CEOs with option portfolios that are more sensitive to the stock price are significantly more likely to misreport. To solve this aberration they claim that long-term incentive plans which make CEO compensation a function of longer-term firm value reduce the incentives of CEOs to misreport in order to boost short-term stock prices.

Additional problems of incentive compensation is highlighted in a study by Denis, Hanouna and Sarin (2006) who find that the likelihood of a company being the target of fraud allegations is positively related to the use of stock options. The main reason for this is the fraudulent manipulation of the companies' stock price. Yermack (1997) discovers positive abnormal stock returns after option grants and suggests that managers time the option grant prior to the release of good news. Aboody and Kaznik (2000) support this view that managers time the disclosure of information around fixed option grant dates. In fact, firms delay the disclosure of positive news and accelerate the release of bad news prior to stock option award periods. Focusing on a sample of IPO firms, Lowry and Murphy (2007) expect that if executives can influence the timing and terms of their stock options or the issuing price, there should be a positive relation between these 'IPO options' and the observable IPO underpricing. However, they do not find empirical support for this hypothesis. Kahle (2002) reports that firms expecting a favorable stock price reaction announce share repurchases when

executives have large numbers of options outstanding and when employees have large numbers of options currently exercisable. Therefore, management attempts to maximize its own wealth by using open market share repurchases to increase share prices. Although this strategy usually is effective for established companies, it was not successful for IPOs at the 'Neuer Markt' in Germany (Bessler, Drobetz and Seim, 2009).

2. New Technology Firms and Broad-based SOPs

Broad-based stock option plans have long been viewed as a vital mechanism through which technology-intensive startup companies with high intellectual capital can attract and retain the most talented employees (Jones, Kalmi and Mäkinen, 2006). Many argue that without such plans, young entrepreneurial firms would be severely hampered in their ability to create new technologies, products and wealth (Heesen, 2003). Dee, Lulseged and Nowlin (2005) examine SOPs at US internet firms and find that these firms are generally characterized by a high level of intangible assets, high growth opportunities, high volatility and a high level of innovation. Due to pronounced information asymmetries between management and shareholders they identify severe agency problems, which need to be properly addressed. One solution is to introduce performance-based compensation packages, which aim at motivating the CEOs to select projects which are consistent with the maximization of overall shareholder value. For a sample of 279 US internet firms, they found that pay performance sensitivity is positively related to risk.

Another important aspect is the granting practice. Oyer and Schaefer (2005) find that the use of stock option grants in compensation plans especially for middle- and lower-level employees has attracted considerable attention in recent years. Even after receiving a compensation for risk, performance oriented employees might be willing to accept a reduction in cash compensation when they receive attractive stock options as compensation. However, when examining 1,000 randomly selected publicly traded companies in the US, they cannot provide evidence for their initial hypothesis that broad-based SOPs are introduced because of incentive or retention reasons. In a study for Finland, Jones, Kalmi and Mäkinen (2006) find that the stock option boom coincided with the bull market of the late 1990s. They discovered that during the 1998 to 2000 period, broad-based stock options became very popular, especially for newly listed firms. After the stock market downturn the number of broad-based option schemes declined sharply. Very interestingly, they report that typically larger firms with dispersed ownership adopted selective plans, while small 'new economy' firms adopted broad-based plans. Thus, it appears that broad-based SOPs are observed when the firm output is human capital-intensive and the performance of employees is difficult to monitor. Selective SOPs are implemented when ownership is dispersed and the incentives for shareholders to monitor management are weak.

Callaghan, Stanford and Subramaniam (2006) examined whether there was a difference in the performance of firms that granted options to executives and to non-executive employees. They discovered that one dollar of options granted to top executives leads to future operating income (cash flow) of $2.58 ($2.36). In contrast, future operating income (cash flow) is only $0.40 ($1.15) for one dollar option value granted to non-executive employees. This suggests that broad-based option compensation plans result, on average, in a negative or no payoff to shareholders. At the same time, employees also do not profit. An additional problem of accepting option grants from the perspective of the employees is that the options' real value is overestimated by executives as well as by rank and file employees.

Bergman and Jenter (2007) argue that when employees are excessively optimistic about the company's value they are willing to overpay for options because rational option valuation is difficult and beyond their abilities. Instead of applying objective valuation techniques, these employees are likely to rely on heuristics and value options on the basis of their own or their peers' past experience with option payoffs. Furthermore, they discover that managers use option compensation for rank and file employees more aggressively when managers believe that their company's stock is overvalued. In a survey of stock options in the US, Lambert and Larcker (2001) find that middle-level employees assigned values to stock options that exceeded the Black-Scholes (1979) value by 50% to 200%. Thus, the stock option holder's expectations about the stock price distribution are different from that of the market. This is consistent with either systematically favorable private information or biased beliefs of the option holder.[9] If it is true that most option holders do not fully understand the underlying price distribution, they may also not correctly understand the incentives provided by an option.[10]

Another aspect is that stock options could be used by the company as a means of reducing personnel expenses to the disadvantage of the employees. Start-up firms typically lack positive net income and need funds to finance growth opportunities. Because under some circumstances options bear no accounting charge[11] and incur no direct cash outflow, Murphy (2002 and 2003) suggests that firms perceive the costs of option compensation as comparatively low and thus prefer options to cash compensation. In fact, paying employees through granting options means that companies are effectively borrowing from their employees. They receive employment services today in return for a contingent claim on shares in the firm (Hall and Murphy, 2003). Thus, employee option compensation can be beneficial especially for young growth companies because it lowers a firm's cash outflows at times when the firm is only marginally profitable and in which the owners need cash to implement strategic decisions (Inderst and Müller, 2004). In contrast, Ittner, Lambert and Larcker (2003) find no evidence that 'new economy' firms facing cash restrictions grant more options. Kedia and Rajgopal (2009) show that broad-based option plans are oftentimes related to the location of the particular company headquarter. They find that broad-based option grants are higher when the firm's stock price co-moves with stock prices of other firms located in the same Metropolitan Statistical Area (MSA) and when firms in their respective MSAs have enjoyed abnormally high stock returns in the past.

IV. Data and Methodology
1. Data

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[9] If the recipient of stock options can affect firm value through his investment decision, then the value he places on those options depends on his actions, meaning that the incentives and value provided by stock options also depends on the characteristics of the individual holding the options (Nohel and Todd, 2005).

[10] See also Meulbroek (2001), Hall and Murphy (2002), Drobetz, Pensa and Schmid (2007) and Hallock and Olson (2006). Benartzi (2001) shows that employees in the US invest a large fraction of their 401 (k) assets in their own firms' stock, which seems to be a suboptimal portfolio choice given their large human capital investment in the firm. An assumption or implication of these studies is that individuals do not understand the expected distribution of stock prices.

[11] This fact changed with the introduction of new regulations by the FASB and the IASB which should be virtually identical for both accounting standards. According, the options' value should be determined by an option-pricing model and expensed in the income statement over the vesting period. This change should enable a level playing field for all forms of compensation.

Our dataset includes 329 companies that went public at the 'Neuer Markt' during the 1997 to 2002 period. Detailed stock option data was hand-collected from annual reports and IPO offering prospectuses. This includes the starting date of the SOP, the maximal number of stocks, beneficiaries, performance benchmarks for the exercise as well as the type and exercise price of the option.[12] The exercise price is of special importance because it determines the success and performance of the stock option from the perspective of the recipient. Stock prices were provided by FactSet JCF and are adjusted for stock splits. Two IPOs (Mobilcom and EM.TV) with extremely high initial returns (outliers) were excluded from our analyses of stock prices. IPO information such as issuing date and offer size are from Deutsche Börse. Ownership data for the time of the IPO was hand-collected from IPO offering prospectuses.

In our analysis we differentiate between 'broad-based plans' and 'selective plans'. A plan is categorized as 'broad-based' if a significant percentage of options were dedicated to rank and file employees. An allocation to this group is often conditioned on management satisfaction with the professional record of the employee. The type of the option has the form of either a naked option issued by the company or of an option embedded in a convertible security. In our empirical analysis we exclude all convertible bond plans because of their different incentive structure. Instead, we focus on IPOs that offered naked options to their beneficiaries.

2. Methodology

Initial IPO returns (underpricing) are calculated by relating the first price in the secondary market to the issuing price. The long-run performance is measured by Buy-and-Hold-Returns (BHRs) which are calculated for a single stock as follows:

$$(1) \qquad BHR_{i,T} = \left[\prod_{t=1}^{T} (1 + R_{i,t}) \right] - 1$$

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 the returns are calculated as:

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

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. To calculate Buy-and-Hold-Abnormal-Returns (BHARs), the return of the benchmark is subtracted from the IPO return. The 'NEMAX All-Share' index is used as a benchmark which is a market weighted performance index that includes all companies that are listed on the 'Neuer Markt'.

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

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. Thus, BHARs compare real investment strategies over a defined period. Because some sample subgroups consist of less than 30 observations we use the skewness adjusted t-statistics (Lyon, Barber and Tsai, 1999) for testing the statistical significance of BHRs and BHARs:

$$(3b) \quad t = \sqrt{n}\left(S + \frac{1}{3}\hat{\gamma}S^2 + \frac{1}{6n}\hat{\gamma}\right), \text{ with } S = \frac{\overline{BHAR}}{\sigma(BHAR)}, \text{ and } \hat{y} = \frac{\sum_{i=1}^{n}(BHAR_i - \overline{BHAR})^3}{n\sigma(BHAR)^3}.$$

In order to distinguish between the motives for introducing an SOP and its volume we employ different regression models (Model 1 to 6). For the first group of models (Model 1 to 4) we use the ordinary least squares regression model. For Model 5 and 6 we use the binary logit regression model because the dependent variable is binary (zero-one variable).

V. Empirical Results

Based on the empirical data for the design of stock option plans (SOPs) our analysis focuses on three aspects. First we explore the success and performance of the stock options. Second, we aim at identifying the relevant factors for implementing a broad-based SOP. Third, we analyze the volume of the program. Our empirical analysis is divided into three sections. The first section includes the descriptive statistics for the sample, the second section analyzes the success of the SOPs and the third section the factors that influence the volume of the SOP.

1. Descriptive Statistics

The structure of our analysis and the different subsamples are presented in Figure 1. The data reveals a high adoption rate of SOPs at the 'Neuer Markt'. 236 companies or 72% adopted a stock option plan at the time of the IPO. After going public an additional 62 companies introduced an SOP. Thus, more than 90% of all IPOs enacted at least one SOP at or subsequent to the IPO.

In the subgroup of companies with an SOP at the time of the IPO there are 29 companies that issued options only in form of convertible bonds. Within the other 207 firms with naked options at the time of the IPO, 174 companies or 84% chose broad-based plans with the objective of granting options to rank and file employees. Thus, the number and design of SOPs at the 'Neuer Markt' appears at first relatively high and peculiar, but this is quite similar to the findings for new economy firms in Finland (Jones, Kalmi and Mäkinen, 2006). For the subgroup of companies with broad-based plans the standard two year lock-up period was the most common form used (130 firms or 75% of all firms in this subgroup). This two year period can be interpreted economically as being similar to the 6 months mandatory lock-up period for management and executives as well as to the 12 months tax lock-up period for investors who had shares allocated at the time of the IPO. Finally, we also include explicit performance benchmarks that had to be met before the option could be exercised. The most popular performance hurdle demanded that an absolute performance figure was met (60 out of all broad-based naked option programs). A relative hurdle was implemented in 26 programs and a combination of both in 16 programs.

Figure 2 presents the total number of IPOs and the number of IPOs with an SOP at the time of the IPO as well as the performance of the Nemax All Share Index from 1997 to 2002.

The chart reveals that stock options that were granted at the time of the IPO were popular over the entire IPO cycle. In our empirical analysis we first analyze the entire time period and then focus on the hot (1997-1999) and the cold issue period (2000-2002) separately.

2. Success and Wealth Effects of SOPs

We measure the success of the SOP by employing three different measures. Each takes the perspective of the recipients which are in most cases rank and file employees, but not executives. Obviously, the interpretation and conclusions would most likely reverse if we analyzed the data either from the perspective of management, the founding owners or other shareholders.

First, we calculate the intrinsic value of the option two years subsequent to the IPO. This is the first possible exercise date for options granted at the time of the IPO. Our sample contains 130 companies with a broad-based SOP and a two year lock-up period. The option value C is characterized by:

$$(4) \qquad\qquad C(X, S_t) = \max(S_t - X, 0).$$

The exercise price X is equal to the offering price and the stock price S_t is the market price two years after the IPO. This approach obviously disregards the existence of additional performance requirements such as profit and growth targets or a specific stock market benchmark. Nevertheless, an implicit performance hurdle could be implemented by setting an adequate and most likely higher exercise price. From the 130 firms analyzed the options of 114 firms were out of the money by the time they could be exercised (Figure 3). This is remarkable given the fact that the benefit of a high underpricing was offered to the recipients. For all 329 IPOs the average first-day or initial return at the 'Neuer Markt' was 48.9% (Kurth, 2005, Bessler and Kurth, 2007). This extreme profit opportunity at the time the program was initiated most likely convinced the participants to accept stock options as compensation instead of cash. After two years, however, these hopes did not materialize and the expected profitability almost disappeared. Extending the time period to four years does not change our results qualitatively.

Next, we calculate Buy-and-Hold-Returns (BHRs) over a three year period (750 trading days) beginning with the time of the IPO (Figure 4 and Table 1). We compare two groups: (1) firms with a broad-based SOP at the time of the IPO and a two year lock-up period[13] and (2) firms with no SOP at the time of the IPO. For the first group we construct a 'modified underpricing' measure based on the exercise price of the option as the first stock price. For the second group we use the offer price as the first price for calculating BHRs. It therefore also includes the underpricing.

At the end of the 6 months mandatory lock-up period (after 123 trading days) the first group of IPOs with broad-based SOPs and a two year lock-up period generated returns (BHR) of 73% compared to the statistically significant (10% level) higher BHR of 122% for the second group of IPOs without SOPs. Interestingly, before the expiration of the first lock-up period the BHRs of the group with SOPs performed well and started to decrease thereafter. At the end of the 12 months tax lock-up period (250 trading days) the BHR for the first group is lower, but still sums up to a 52% annual return. Although the BHRs were already decreasing

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[13] Staggered plans with the first options becoming exercisable after two years are included.

before the expiration of the second lock-up period, the BHRs start to decline noticeably just before the expiration date. In contrast, the BHR for the second group of IPOs without SOPs remains on a relatively high level (136%). After two years (500 trading days) the BHRs are minus 53% and 62% for the first and the second group, respectively. This indicates that the performance of the first group is very poor because the options are on average out of the money. In contrast, hypothetical stock options on the companies in the second group without SOPs were profitable after the expiration of the two year SOP lock-up period. The time period for a profitable option exercise, i.e. the option was in the money, nearly reaches three years (700 trading days). Because of the positively skewed return distribution, the median returns are always lower than the mean returns, but the ranking of the returns within a group of IPOs and between the two groups does not change.

These observed return (BHR) patterns provide some evidence that the expiration of the first two lock-up periods was used to realize capital gains especially by the shareholders of the first group of companies with SOPs. The founding shareholders and the management as well as venture capital firms, which owned shares before the IPO, complied with the mandatory lock up-period but sold their shares immediately at the expiration after 6 months (Bessler and Kurth, 2007). It seems that the end of the first 12 months period was the beginning of an additional share price decline. This may have been caused either by the expiration of a voluntary extended mandatory lock-up period from 6 to 12 months or by the expiration of the 12 months tax lock-up period. This tax lock-up period should not be that important for the founding shareholders because they invested in the firm much earlier and therefore were in a position to sell the shares prior to the expiration of the tax lock-up period that applied to other investors without paying the capital gains tax. In contrast, for the investor that had shares allocated at the time of the IPO the end of the 12 months holding period is important. An early exit or an exit as soon as possible appears to be more important for investors in this group of IPOs, because these firms had stock options outstanding that could be exercised later on. This may have a negative effect on earnings per share and on the share price. Obviously, these stock options were not value enhancing for their recipients. All in all this may be interpreted as one important factor for the overall negative performance after two years. Consequently, stock options allocated at the time of the IPO to rank and file employees were out of the money.

Focusing on the second group of IPOs without SOPs, it appears that for the investors who had shares allocated at the time of the IPO, the expiration of the tax lock-up period is an important event. In fact, these investors could have realized an average after tax annual return of 136% by having shares allocated at the time of the IPOs. Although we cannot provide empirical evidence due to the unavailability of data, it appears that there was no rush to sell shares of these IPOs at the end of the first 6 months period. One reason for this result may be that the locked-up investors expected that the share price continued to increase. Another possible explanation is that the shares at the time of the IPOs were allocated to a specific investor clientele for which the 12 months lock-up period was very important for tax avoidance reasons. It seems likely that the investment bank of the IPO provided some price support for a favorable exit to some investors, because the empirical evidence suggests that the analysts of the underwriter issued positively biased analysts reports as well as above average buy recommendations during the first year after the IPO (Bessler and Stanzel, 2006, 2009).

This raises the general question about the rationale behind the granting and holding of such options. These results also indicate that the agency problems already documented in Bessler and Kurth (2007) and in Bessler and Stanzel (2009) for IPOs at the 'Neuer Markt' have to be extended to include the conflict of interest between rank and file employees as option recipients and other stakeholders. It needs to be recognized, however, that the group of IPOs that did not issue SOPs at the time of the IPO also included IPOs that granted stock options after they went public.

In the next step we separate the sample of IPOs without SOPs at the time of the IPO into the group of IPOs with SOPs after going public and IPOs without any SOPs at all. The results are presented in Figure 5. The first group consists of firms that enacted a SOP later on ('SOP after IPO') and the other group contains firms without any SOP at all (up to the end of 2004). The performance of the group of firms that enacted an SOP after the IPO is superior relative to the other group of IPOs without an SOP for the entire period up to the end of the two year lock-up period. Subsequently, there are only minor differences. Thus, it appears that there are no substantial differences in the BHRs in the long run. However, within the first two years after going public we find significant differences in performance, especially around the mandatory lock-up period as well as at the end of the tax lock-up period. After 6 months the BHRs for the two groups are 155% and 51%, respectively. Apparently, the BHRs differ throughout the whole period. The difference begins with the higher underpricing and continues with extremely positive BHRs for the companies that enacted SOPs later on, but only until the expiration of the mandatory lock-up period. After 12 months the BHR are 161% and 84% in favor of the group of IPOs that have granted stock options after going public. One possible explanation of the later initiation of an SOP is that management as well as employees did not expect this extremely high initial stock market performance after going public at the 'Neuer Markt'. Attracted by the apparent profitability of stock based compensation schemes and an overly optimistic market environment these companies initiated an SOP in response.

In addition, it appears the early and extremely positive performance of IPOs during the new economy period and the success of SOPs at other firms may have served as a kind of 'best practice' motive to prevent the loss of talented employees to competing 'new economy' firms. After two years both groups of IPOs still have on average positive mean BHRs of 72% and 40%. In needs to be recognized, however, that for those companies that did not enact an SOP at the time of the IPO, the two year period is only a lower bound for the expiration of the later SOP lock-up period. Only options initiated and granted very shortly following the IPO may become exercisable soon after this point in time. An analysis of the median BHR, however, reveals that the performance after two years is on average negative for the majority of firms in both groups. The group of IPOs with SOP realized on average a return (BHR) of minus 47% compared to the other group that has a BHR of minus 61%. At the time of the expiration of the mandatory and the tax lock-up periods the ranking of the two groups continues to remain the same but the median BHR are always lower compared to the mean BHR, indicating a positively skewed return distribution.

It has been well documented in the literature that there is a significant difference in the long-run performance of IPOs between hot and cold issue market periods (Bessler and Kurth, 2005; Bessler and Thies, 2007b). As presented in Figure 2, the 'Neuer Markt' in Germany was characterized by an extreme hot issue market period (1997-1999) and a devastating cold issue market period (2000-2002). The different exit behavior of venture capitalists and other founding shareholders at the end of the 6 months mandatory lock-up period and the tax lock-

up period is well documented in a study by Bessler and Kurth (2007). Obviously, these findings should apply to the two year lock-up period of SOPs in an even stronger form. It becomes immediately evident in Figure 6 and Table 3 that the high BHRs of the overall sample with a broad-based SOP at the time of the IPO (see Figure 4) are due to the 44 IPOs that went public during the hot issue period. The BHRs for this group of IPOs at the end of the mandatory lock-up period, the tax lock-up period and the option lock-up period are 186%, 201% and minus 14%, respectively. The group of IPOs in the cold issue market period just breaks even after 6 months and has negative returns of minus 45% and minus 78% after 12 and 24 months, respectively. Nevertheless, for both groups the outlook for in-the-money stock options after two years is on average very poor. Interestingly, both subgroups exhibit a high underpricing of 74% and 48%, respectively. Initially, this may have been viewed as an excellent opportunity for rank and file employees to participate in the SOP at the time of IPO.

So far we concentrated on the absolute performance (BHR) of the various groups of IPOs. We may gain additional insights, however, by analyzing the relative performance of these IPOs. We therefore address the question of what would have happened if a relative performance requirement had been introduced. This performance is measured by the firm's stock price relative to the Nemax All Share Index. In Figure 7 and Table 4 we present the results of our Buy-and-Hold-Abnormal-Returns (BHAR) analysis. Again the two subgroups are firms with a broad-based SOP at the time of the IPO and a two year lock-up period and firms without any SOP at the time of the IPO. As presented in Figure 7, the BHARs of the first group of IPOs were 27%, 18% and minus 1% for the mandatory, the tax and the option lock-up periods, respectively. The results for the other group are 32%, 32% and minus 5% for the three periods. This indicates that the companies with SOPs were on average not able to beat a relative performance hurdle based on the Nemax All Share Index as benchmark. It should be noticed, however, that the two groups of IPOs were able to achieve an outperformance after 6 months as well as after 12 months. This may indicate profitable exit opportunities for the two other stakeholder groups of founding shareholders and wealthy investors. Of particular interest are the drastically declining BHRs of the subsample with SOPs after the expiration of the 12 months tax lock-up period. We interpret these as evidence of downward price pressure caused by massive exits of early shareholders and investors.

So far we concentrated on the relative performance of the IPOs in the secondary market. One of the major sources for the abnormal performance of IPOs, however, is the underpricing or initial return of the IPO. We extend our analysis in that we now include the initial returns in the calculation of the BHARs. For this we include the underpricing for the group without SOP and a modified underpricing for the group with SOPs (Figure 8 and Table 5). This adjustment is important because for most options the exercise price was equal to the offering price. The BHARs for the first group are 82% and 66% at the end of the 6 months mandatory and the 12 months tax lock-up periods, respectively. This suggests that the other two stakeholder groups who were able to exit earlier could benefit from the higher relative performance after 6 and 12 months. As usual, the stock prices declined afterwards, even on a relative basis. It is interesting to note, however, that in the case of stock options and a two year lock-up period, even the higher initial returns would not ensure that the stock price exceeded the exercise price even on a relative performance basis. The BHARs are only 13% after 500 trading days. Thus, there was hardly any chance for the employees to benefit from the first year's performance of the IPO.

For the second group an as-if-scenario with SOPs would have resulted in a different outcome. The BHARs were 100% and 102% for the mandatory and the tax lock-up periods, respectively. A stock-option lock-up period was not relevant because there were no stock options at the time of the IPO.

Thus, these results confirm our previous findings that nearly all groups of IPOs have positive BHR at the end of the 6 and 12 months periods and also outperform the market index on a relative basis after 6 and 12 months. Thus, founding shareholders and management as well as wealthy investors most likely all benefited from the performance of the IPOs in the 'Neuer Markt' over the first year after going public. As the employees were able to exercise their stock options only after a two year lock-up period, they could not participate in the early success of these IPOs. Instead, they experienced that most of the options were out of the money and therefore economically worthless at the time they could eventually be exercised for the first time.

3. Determinants of SOP Success

We extend our analysis in this section by investigating the factors that might influence the returns of the SOP. For this we construct regression models that use as explanatory variables either the number of stock options in relation to the number of issued shares excluding the Greenshoe option (*SOPVOL*) or a dummy variable for the presence of an SOP at the time of the IPO (*SOP*). The latter takes a value of one, if the firm had an SOP at the time of the IPO, and zero otherwise. Moreover, we use the following control variables: To control for the home country of the IPO, we employ a dummy variable (*FOR*) that takes a value of zero if the IPO is a German firm and a value of one if the IPO is headquartered in a foreign country. To measure the degree of innovative activities of the firms we use the number of patents that the firm applied for during the period from two years before the IPO to two years after the IPO. Bessler and Bittelmeyer (2007, 2008) find that IPOs with patents significantly outperformed IPOs without patents over the first two years after going public. We use the patent data to construct a dummy variable (*INOV*) that takes the value of zero if the firm has none or one patent and a value of one if the firm has more than one patent in the period around the IPO. The idea behind this analysis is that we expect that more innovative or new economy firms have a higher demand for highly qualified personnel and thus may be in direct competition with established 'old economy' firms. This competition and the fact that start-up technology firms should use most of their funds for investing in growth opportunities suggests that one reason for the introduction of a stock based compensation scheme is to offer attractive compensation packages to their employees.[14]

To measure the impact of corporate insider activity on performance we include three more dummy variables: The impact of the management ownership is captured by the variable *MNG* (presence of management ownership) which takes a value of zero if the percentage of shares held by the management or the supervisory board members is below or equal to 50 percent and a value of one if this stake exceeds 50 percent. The cut-off point is chosen at this level to account for a simple majority of voting rights. The percentage of shares owned by

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[14] One disadvantage of this measure is that in line with the patent grant the technology firm becomes less vulnerable to employee fluctuation than before. Admittedly, the causality between compensation and innovation could be reversed. Lerner and Wulf (2007) for example find a positive relationship between increasing long-term incentives (e.g., stock options and restricted stock) for R&D officers and an increase in heavily cited patents among US-firms with centralized R&D organisations.

management after the IPO appears with a mean of 40% and a median of 41% at first glance remarkably high. However, this observation is not surprising in light of the mandatory 6 months lock-up period for the 'Neuer Markt' and the tremendous underpricing of close to 50%. An exit after the expiration of the lock-up period compared to a sale at the time of the IPO appeared much more attractive given the capital market environment at that time. Moreover, management ownership is usually used to signal the quality of the IPO (Bessler and Kurth, 2007). The variables *VC* (Venture Capital) and *BANK* (Banks) capture the impact of an additional corporate governance mechanism and take a value of zero if no venture capital company or bank is listed as a shareholder and a value of one if a venture capital companies or a banks held equity in the firm. Finally, we use a dummy variable for the market phase (*HOT*) that has the value of zero if the market can be characterized as a cold issue market and a value of one if it can be characterized as a hot issue market.

Because the patent data used to construct *INOV* is restricted to registrations at the German patent office and because there are national differences in the patenting behavior we do not test the influence of *INOV* and *FOR* simultaneously. This results in two sets of regression approaches for *SOP*:

$$(5) \qquad SOP_i = \alpha + \beta_1 FOR_i + \beta_2 MNG_i + \beta_3 VC_i + \beta_4 BANK_i + \beta_5 HOT + \varepsilon_i \text{ and}$$

$$(6) \qquad SOP_i = \alpha + \beta_1 INOV_i + \beta_2 MNG_i + \beta_3 VC_i + \beta_4 BANK_i + \beta_5 HOT + \varepsilon_i.$$

Respectively, the equations for SOPVOL are:

$$(7) \qquad SOPVOL_i = \alpha + \beta_1 FOR_i + \beta_2 MNG_i + \beta_3 VC_i + \beta_4 BANK_i + \beta_5 HOT + \varepsilon_i \text{ and}$$

$$(8) \qquad SOPVOL_i = \alpha + \beta_1 INOV_i + \beta_2 MNG_i + \beta_3 VC_i + \beta_4 BANK_i + \beta_5 HOT + \varepsilon_i.$$

In Equations (5) to (8) the subscript *i* denotes the cross-section of the data. The models that are based on Equations (7) and (8) are tested with all available observations (Model 1 and Model 3). We also test a reduced sample where we include only the firms with a broad-based SOP at the time of the IPO (the sample size consists of 174 companies including foreign companies and 151 companies excluding foreign companies). We do this in order to test for the influence of our variables conditional on the fact that the firm decided to introduce an SOP at the time of the IPO (Model 2 and Model 4). The results for the linear regression models are presented in Table 6 and the results of the binary logit models are presented in Table 7.

The dummy *FOR* has a positive and significant impact at the one-percent-level in Model 1 and Model 2 while it is statistically insignificant in Model 5. Consequently, the attribute 'foreign IPO' seems to positively influence the introduction of a SOP and the volume of the program. The *INOV* dummy variable is insignificant in all models where this variable is included. This is initially surprising, but could be due to the shortcomings of patent counts as a proxy for the demand for highly qualified employees. The *MNG* dummy variable constantly has a negative impact, but its influence is insignificant. Interestingly, the coefficients for the *VC* and *BANK* dummies are positive, but only the impact of the *BANK* dummy is significant in Model 1 (10% level), Model 3 (5% level) and Model 4 (10% level). This result may

suggest some influence of these shareholders with respect to the introduction of SOPs. The coefficient for the *HOT* dummy is negative in most models and significant at the 1% and 5% levels. For the models with *SOPVOL* as the dependent variable this can be interpreted in two ways. On the one hand, it could be a numerator effect and be explained by the managements' reluctance to introduce high volumes of options (based on the affirmation of the shareholder meeting) during market phases where it is more likely that the option is in the money at the time of its exercise. On the other hand, it could be a denominator effect caused by a decreasing IPO volume offered in the cold issue period. It is possible that management or existing shareholders expected a market turnaround and an increasing option value.

VI. Conclusions

The objective of this research was to investigate the design and success of stock option plans (SOPs) for 'new economy' firms that went public at the 'Neuer Markt' in Germany during the period from 1997 to 2002. We provide empirical evidence that SOPs were frequently employed as a compensation scheme in these new economy firms in that 91% of all IPOs granted stock options either at the time they went public or later on. Interestingly, we observe a broad-based granting intention including employees rather than executives as the primary beneficiaries of the stock options. This observation for 'new economy' firms is in sharp contrast to the usual practice at established firms and requires a different explanation. In line with previous research (e.g., Bergman and Jenter, 2007), our empirical results suggest that the prediction of the upside potential of the stock price and the option value was too optimistic at the time the stock option plans were initiated. Because the 'Neuer Markt' was characterized by an immense stock price increase during the period from 1998 to 2000 (hot issue market) followed by a sharp stock price decline that started in March 2000 (cold issue market), almost all of the options were out of the money at the time they eventually could be exercised.

When searching for explanations for these empirical results it is important to do this in the context of the German legal environment. We find that the design of these stock options suffers from an unfavorable succession of lock-up periods rendering a profitable option exercise for the rank and file employee as very difficult. The regulations of the 'Neuer Markt' required a lock-up period of at least two years for stock options for German firms. Moreover, there were two other lock-up periods that usually expired before the two year stock option lock-up period. This was first the mandatory lock-up period of 6 months that applied to the founding shareholders of the IPO and second the tax lock-up period of 12 months that applied especially to the private more wealthy shareholders that had shares allocated at the time of the IPO. The end of the SOP lock-up period was 12 months later or overall after 24 months. Thus, the threat of stock price dilution by stock options was relatively distant for the other two groups but it was rational to exit before a stock option exercise was possible. Thus, the option holder had to settle for what was left after the downward price pressure caused by the exit of other shareholders and the burst of the 'new economy' stock market bubble. As the option exercise is only profitable if the stock price exceeds the exercise price, option holders were left with no profits. Another possible explanation is that the IPOs just followed the 'fashion' common among 'new economy' firms to implement an SOP. From an employee's point of view the tremendous underpricing promised a high profitability of stock options at the time of the IPO. However, the expected profits did never materialize.

REFERENCES

Aboody, D., and R. Kasznik (2000), CEO Stock Option Awards and the Timing of Corporate Voluntary Disclosures, *Journal of Accounting and Economics*, 29, 73-100.

Agrawal, A., and G. N. Mandelker (1987), Managerial Incentives and Corporate Investment and Financing Decisions, *Journal of Finance*, 42, 823-837.

Arya, A., and B. Mittendorf (2005), Offering Stock Options to Gauge Managerial Talent, *Journal of Accounting and Economics*, 40, 189-210.

Bebchuk, L. A., and J. M. Fried (2003), Executive Compensation as an Agency Problem, *CEPR Discussion Paper No. 3961*.

Bebchuk, L. A., Y. Grinstein, and U. Peyer (2007), Lucky CEOs, *Harvard Law School Discussion Paper No. 566*.

Benartzi, S. (2001), Excessive Extrapolation and the Allocation of 401(k) Accounts to Company Stock, *Journal of Finance*, 56, 1747-1764.

Bergman, N. K., and D. C. Jenter (2007), Employee Sentiment and Stock Option Compensation, *Journal of Financial Economics*, 84, 667-712.

Bertrand, M., and S. Mullainathan (2001), Do People Mean What They Say? Implications for Subjective Survey Data, *American Economic Review*, 91, 67-72.

Bessler, W., and C. Becker (2007), Initial Public Offering (IPO), in: Thießen, F. (ed.), *Enzyklopädisches Lexikon für das Geld-, Bank- und Börsenwesen*, Fritz Knapp Verlag, Frankfurt, 1-28.

Bessler, W., C. Becker and D. Wagner (2007), Ausgestaltung und Anreizwirkung von Aktienoptionsplänen für Mitarbeiter junger innovativer Unternehmen - Eine empirische Untersuchung für den Neuen Markt, in: Langenohl, A. and K. Schmidt-Beck (eds.), *Die Markt-Zeit der Finanzwirtschaft*, Metropolis Verlag, Marburg, 187-218.

Bessler, W. and C. Bittelmeyer (2007), Performance and Survival of Technology Firms: The Impact of Intellectual Property, in: Dowling, M. and J. Schmude (eds.), *Empirical Entrepreneurship in Europe: New Perspectives*, Edward Elgar, Cheltenham, 155-176.

Bessler, W., and C. Bittelmeyer (2008), Patents and the Performance of Technology Firms: Evidence from Initial Public Offerings in Germany, *Financial Markets and Portfolio Management*, 22, 323-356.

Bessler, W., W. Drobetz, and M. Seim (2009), Motives and Valuation Effects of Share Repurchase Announcements in Germany: A Comparison of Established Firms and Initial Public Offerings, Working Paper, Justus-Liebig-University Giessen.

Bessler, W., and A. Kurth (2005), Exit Strategies of Venture Capitalists in Hot Issue Markets: Evidence from Germany, *Journal of Entrepreneurial Finance and Business Ventures*, 10, 17-51.

Bessler, W., and A. Kurth (2006), Die Auswirkungen der Spekulationssteuer auf die Verkaufsentscheidungen der Anleger in Deutschland: Eine Untersuchung von IPOs des Neuen Marktes, *Zeitschrift für Bankrecht und Bankwirtschaft*, 1, 1-15.

Bessler, W., and A. Kurth (2007), Agency Problems and the Performance of IPOs in Germany: Venture Capital, Lock-up Periods and Bank Ownership, *European Journal of Finance*, 13, 29-63.

Bessler, W., and M. Stanzel (2006), Die Rolle der Wertpapieranalysten am Neuen Markt, in: Bessler, W. (ed.), *Börsen, Banken und Kapitalmärkte, Festschrift für Hartmut Schmidt zum 65. Geburtstag*, Duncker & Humblot, Berlin, 227-261.

Bessler, W., and M. Stanzel (2009), Conflicts of Interest and Research Quality of Affiliated Analysts in the German Universal Banking System: Evidence from IPO Underwriting, *European Financial Management*, Forthcoming.

Bessler, W., and S. Thies (2007a), Initial Public Offerings, Subsequent Seasoned Equity Offerings, and Long Run Performance: Evidence from IPOs in Germany, *Journal of Entrepreneurial Finance and Business Ventures*, 2007, 1-37.

Bessler, W., and S. Thies (2007b), The Long-Run Performance of Initial Public Offerings in Germany, *Managerial Finance Journal*, 33, 420-441.

Black, F., and M. Scholes (1979), The Pricing of Options and Corporate Liabilities, *Journal of Political Economy*, 81, 637-654.

Bundesgesetzblatt (April 30, 1998), Gesetz zur Kontrolle im Unternehmensbereich (KonTraG).

Bundesgesetzblatt (September 6, 1965), Aktiengesetz (AktG), last modification by: Art. 1 G 9/22/2005 I 2802.

Burns, N., and S. Kedia (2006), The Impact of Performance-Based Compensation on Misreporting, *Journal of Financial Economics*, 79, 35-67.

Callaghan, S. R., M. H. Stanford, and C. Subramaniam (2006), Do Broad-Based Option Compensation Plans Improve Future Firm Performance for Technology and Non-Technology Firms?, *Working Paper, Neeley School of Business, Texas Christian University*.

Chen, C. R., T. L. Steiner, and A. M. Whyte (2006), Does Stock Option-Based Executive Compensation Induce Risk-Taking? An Analysis of the Banking Industry, *Journal of Banking and Finance*, 30, 915-945.

Coles, J. L., N. D. Daniel, and L. Naveen (2006), Managerial Incentives and Risk-Taking, *Journal of Financial Economics*, 79, 431-468.

Collins, D. W., G. Gong, and H. Li (2009), Corporate Governance and Backdating of Executive Stock Options, *Contemporary Accounting Research*, Forthcoming.

Dee, C. C., A. Lulseged, and T. S. Nowlin (2005), Executive Compensation and Risk: The Case of Internet Firms, *Journal of Corporate Finance*, 12, 80-96.

DeFusco, R. A., R. R. Johnson, and T. S. Zorn (1990), The Effect of Executive Stock Option Plans on Stockholders and Bondholders, *Journal of Finance*, 45, 617-627.

Denis, D. J., P. Hanouna, and A. Sarin (2006), Is There a Dark Side to Incentive Compensation?, *Journal of Corporate Finance*, 12, 476-488.

Dietz, S. (2004), Aktienoptionsprogramme und Corporate Governance, Deutscher Universitätsverlag, Wiesbaden.

Drobetz, W., P. Pensa, and M. M. Schmid (2007), Estimating the Cost of Executive Stock Options: Evidence from Switzerland, *Corporate Governance: An International Review*, 15, 520-534.

Duncan, J. W. (2001), Stock Ownership and Work Motivation, *Organizational Dynamics*, 30, 1-11.

Frankfurter Allgemeine Zeitung (March 16, 2004), Keine Aktienoptionen für Aufsichtsräte, 11.

Hall, B. J., and K. J. Murphy (2002), Stock Options for Undiversified Executives, *Journal of Accounting And Economics*, 33, 3-42.

Hall, B. J., and K. J. Murphy (2003), The Trouble with Stock Options, *Journal of Economic Perspectives*, 17, 49-70.

Hallock, K. F., and C. Olson (2006), The Value of Stock Options to Non-Executive Employees, *NBER Working Paper*.

Healy, P. M., and J. M. Wahlen (1999), A Review of the Earnings Management Literature and Its Implications for Standard Setting, *Accounting Horizons*, 13, 365-383.

Heesen, M. (2003), Hearing of the Senate Banking Subcommittee on Securities and Investment on FASB and Small Business Growth, November 12, 2003.

Heron, R. A., and E. Lie (2007), Does Backdating Explain the Stock Price Pattern Around Executive Stock Option Grants, *Journal of Financial Economics*, 83, 271-295.

Inderst, R., and H. M. Müller (2004), A Theory of Broad-Based Option Pay, *Working Paper, NYU Stern School of Business*.

Ittner, C. D., R. A. Lambert, and D. F. Larcker (2003), The Structure and Performance Consequences of Equity Grants to Employees of New Economy Firms, *Journal of Accounting and Economics*, 34, 89-127.

Jensen, M. C., and W. H. Meckling (1976), Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure, *Journal of Financial Economics*, 3, 303-360.

Jones, D. C., P. Kalmi, and M. Mäkinen (2006), The Determinants of Stock Option Compensation: Evidence from Finland, Industrial Relations: *A Journal of Economy and Society*, 45, 437-468.

Kahle, K. M. (2002), When a Buyback isn't a Buyback: Open Market Repurchases and Employee Options, *Journal of Financial Economics*, 63, 235-261.

Kedia, S. and S. Rajgopall (2009), Neighborhood Matters: The Impact of Location on Broad Based Stock Option Plans, *Journal of Financial Economics*, 92, 109-127.

Kurth, A. (2005), Agency Probleme und Performance von Initial Public Offerings: Eine Empirische Untersuchung von Unternehmen des Neuen Marktes, Deutscher Universitätsverlag, Wiesbaden.

Lambert, R. A., and D. R. Larcker (2001), How Employees Value (Often Incorrectly) Their Stock Options, http://knowledge.wharton.upenn.edu/article.cfm?articleid=363.

Lazear, E. P. (2004), Output-Based Pay: Incentives, Retention or Sorting?, *Research In Labor Economics*, 23, 1-25.

Lerner, J., and J. Wulf (2007), Innovation and Incentives: Evidence from Corporate R&D, *The Review of Economics And Statistics*, 89, 634-644.

Lie, E. (2005), On the Timing of CEO Stock Option Awards, *Management Science*, 51, 802-812.

Lowry, M., and K. J. Murphy (2007), Executive Stock Options and IPO Underpricing, *Journal of Financial Economics*, 85, 39-65.

Lyon, J. D., B. M. Barber, and C.-L. Tsai (1999), Improved Methods for Tests of Long-Run Abnormal Stock Returns, *Journal of Finance*, 54, 165-201.

Mehran, H., and J. Tracy, (2001), The Impact of Employee Stock Options on the Evolution of Compensation in the 1990s, *Economic Policy Review*, Federal Reserve Bank of New York, Dec, 17-34.

Meulbroek, L. (2001), The Efficiency of Equity-Linked Compensation: Understanding the Full Cost of Awarding Executive Stock Options, *Financial Management*, 30, 5-44.

Murphy, K. (2002), Explaining Executive Compensation: Managerial Power versus the Perceived Cost of Stock Options, *University of Chicago Law Review*, 69, 847-869.

Murphy, K. (2003), Stock-Based Pay in New Economy Firms, *Journal of Accounting and Economics*, 34, 129-147.

NCEO (The National Center for Employee Ownership) (2002), Performance Stock Options in Broad-Based Plans for Employees, http://ww.nceo.org/library/performance_options.html.

Nohel, T., and S. Todd (2005), Compensation for Managers With Career Concerns: The Role of Stock Options in Optimal Contracts, *Journal of Corporate Finance*, 11, 229-251.

Oyer, P., and S. Schaefer (2005), Why Do Some Firms Give Stock Options to all Employees?: An Empirical Examination of Alternative Theories, *Journal of Financial Economics*, 76, 99-133.

Rappaport, A. (1999), New Thinking on how to Link Executive Pay with Performance, *Harvard Business Review*, March-April, 91-101.

Regelwerk Neuer Markt (2002), Section 2, No. 7.3.2.

Regierungskomission Deutscher Corporate Governance Kodex [ed.] (2005), Deutscher Corporate Governance Kodex as amended on June 2, 2005.

Statement of Financial Accounting Standards No. 128 (February 1997), Earnings per Share, Financial Accounting Standards Board.

Sundaram, R. K., M. Brenner, and D. Yermack (2005), On Rescissions in Executive Stock Options, *Journal of Business*, 78, 1809-1835.

Wall Street Journal (August 8, 2007), Brocade Ex-CEO Found Guilty In Backdating Case - Criminal Trial Victory For U.S. Likely To Serve As Model for Prosecutors, August 8, 2007.

Yermack, D. (1997), Good Timing CEO Stock Option Awards and Company News Announcements, *Journal of Finance*, 52, 449-476.

Figure 1
Sample Split-up

All 329 IPOs were split up into subgroups by differentiating the time of SOP introduction, the options' recipients, the lock-up period and the market sentiment (hot and cold issue markets). The bold framed boxes indicate the subgroups we analyzed later using buy-and-hold returns. SOPs using only convertible bonds at IPO were excluded from further analysis because of their different incentive effect. The subgroup "Broad-based plan" may include additional selective plans. The subgroup "Naked options at IPO" may include additional convertible plans. Two firms, namely Mobilcom and EM.TV, were treated as outliers because of their immense stock performance and were not analyzed.
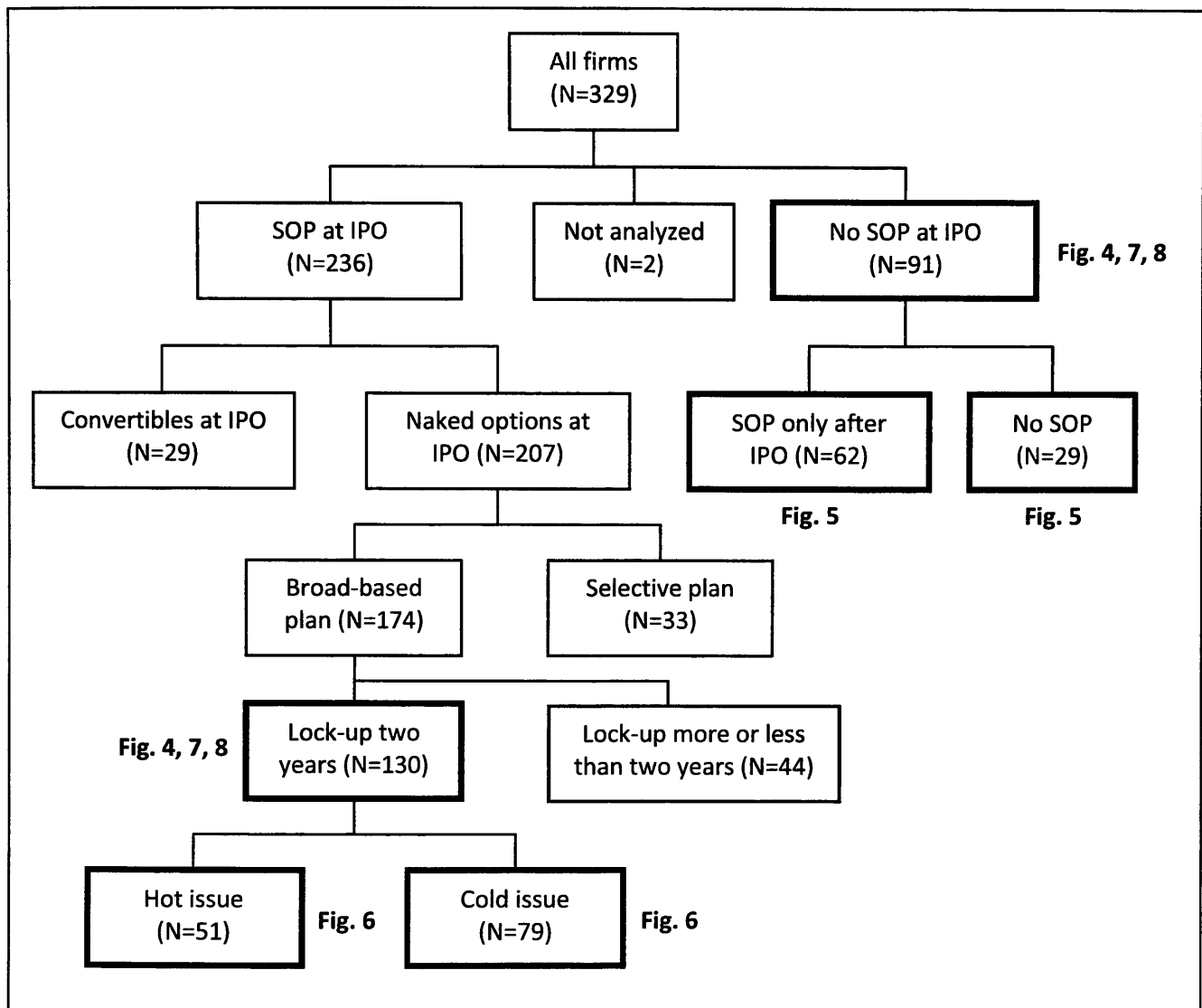
Figure 2
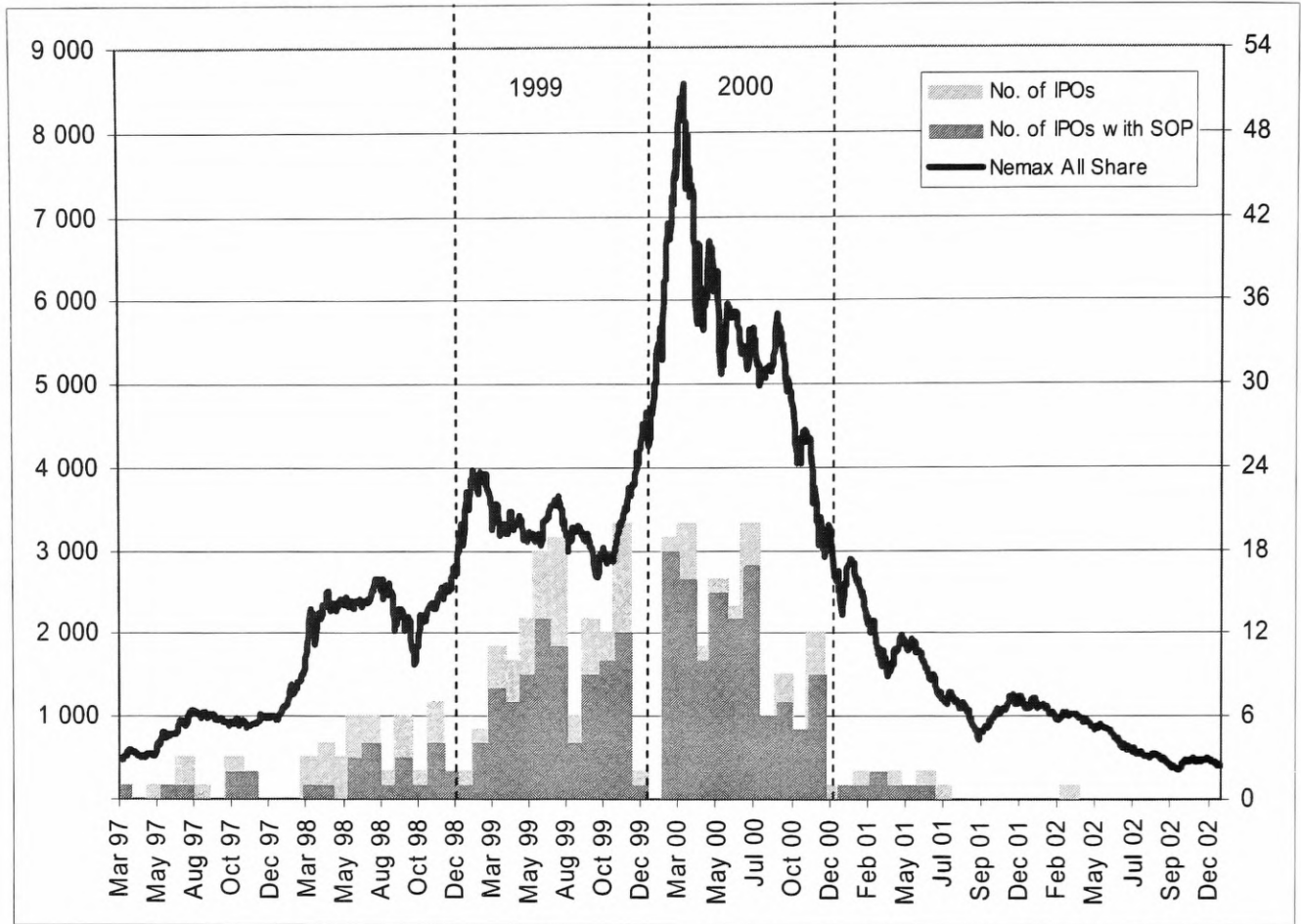**Nemax All Share Index, the Total Number of IPOs and the Number of IPOs with SOP at IPO Date**

Figure 3
The Options' Value after Two Years

To calculate the options' value after two years the options' exercise price was set equal to the issuing price. The sample includes 130 IPOs.
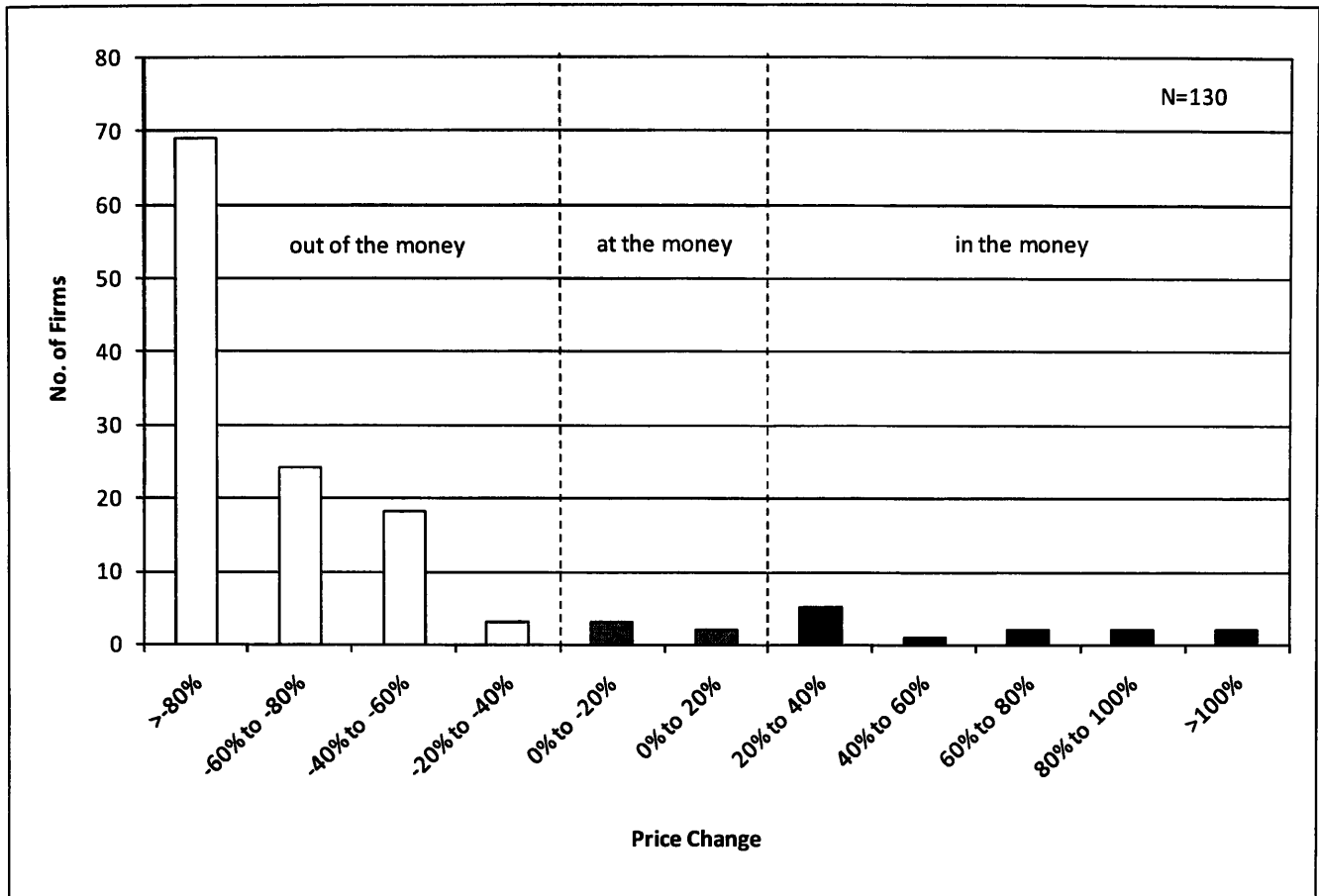
Figure 4
IPOs with SOP and without SOP at Time of IPO

The BHRs are calculated for firms with broad-based naked option SOPs at IPO and a two year lock-up period or a staggered lock-up period beginning with two years ("Broad-based SOP with 2Y lock-up"). The comparison group are firms with no SOP at IPO ("no SOP at IPO", may have designed an SOP later). The first price of the firms with an SOP is determined by the options' exercise price as described by the plan (usually the exercise price was set equal to the issuing price). For the group without an SOP the first price equals the issuing price (BHR includes underpricing).

Figure 5
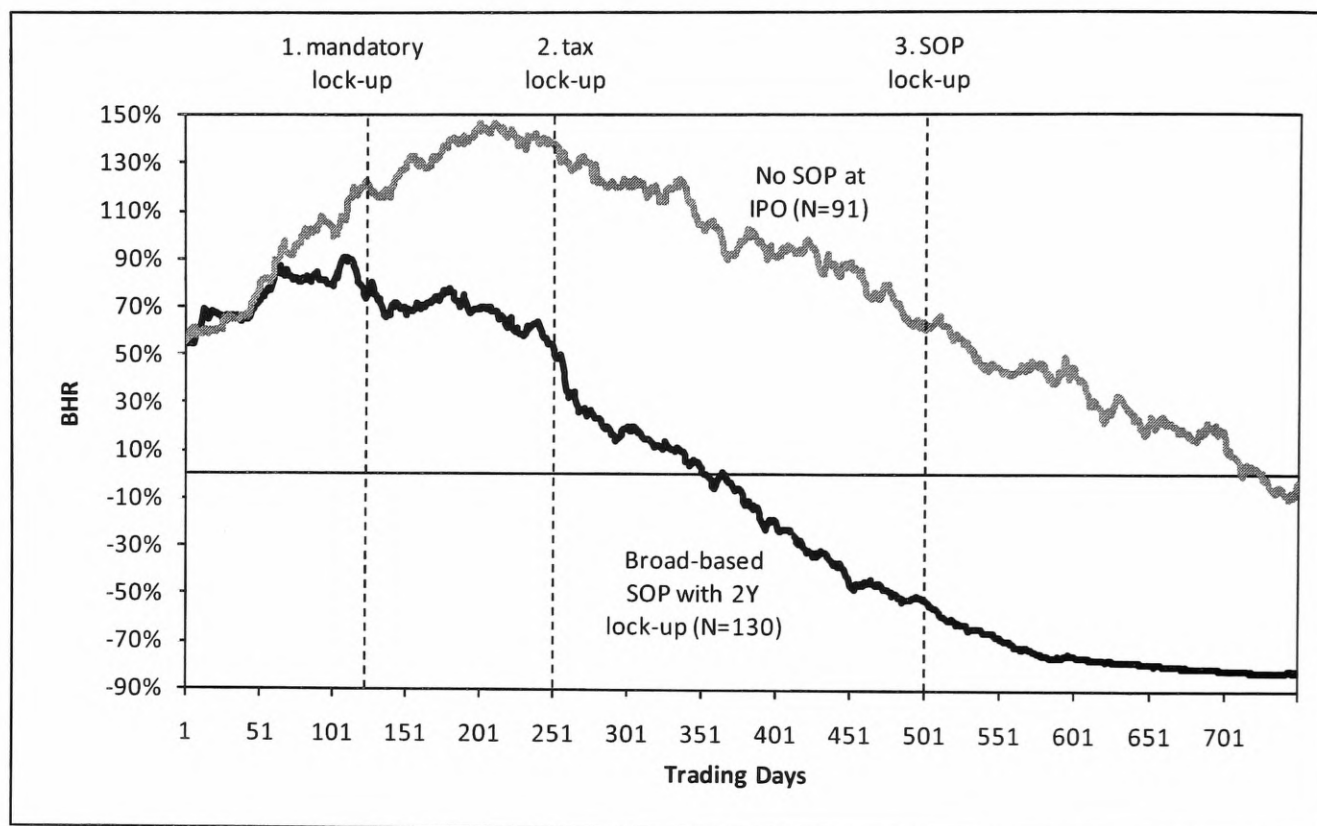**IPOs with SOPs after IPO and no SOPs**

The subset of firms with no SOP at IPO in Figure 4 (N=91) is divided into two further subgroups. "SOP after IPO" represent the firms that introduced an SOP later on and 'no SOP' represents the firms never designed an SOP (the period under observation starts with the IPO and ends in 2004). For both groups the first price equals the issuing price (BHR includes underpricing).
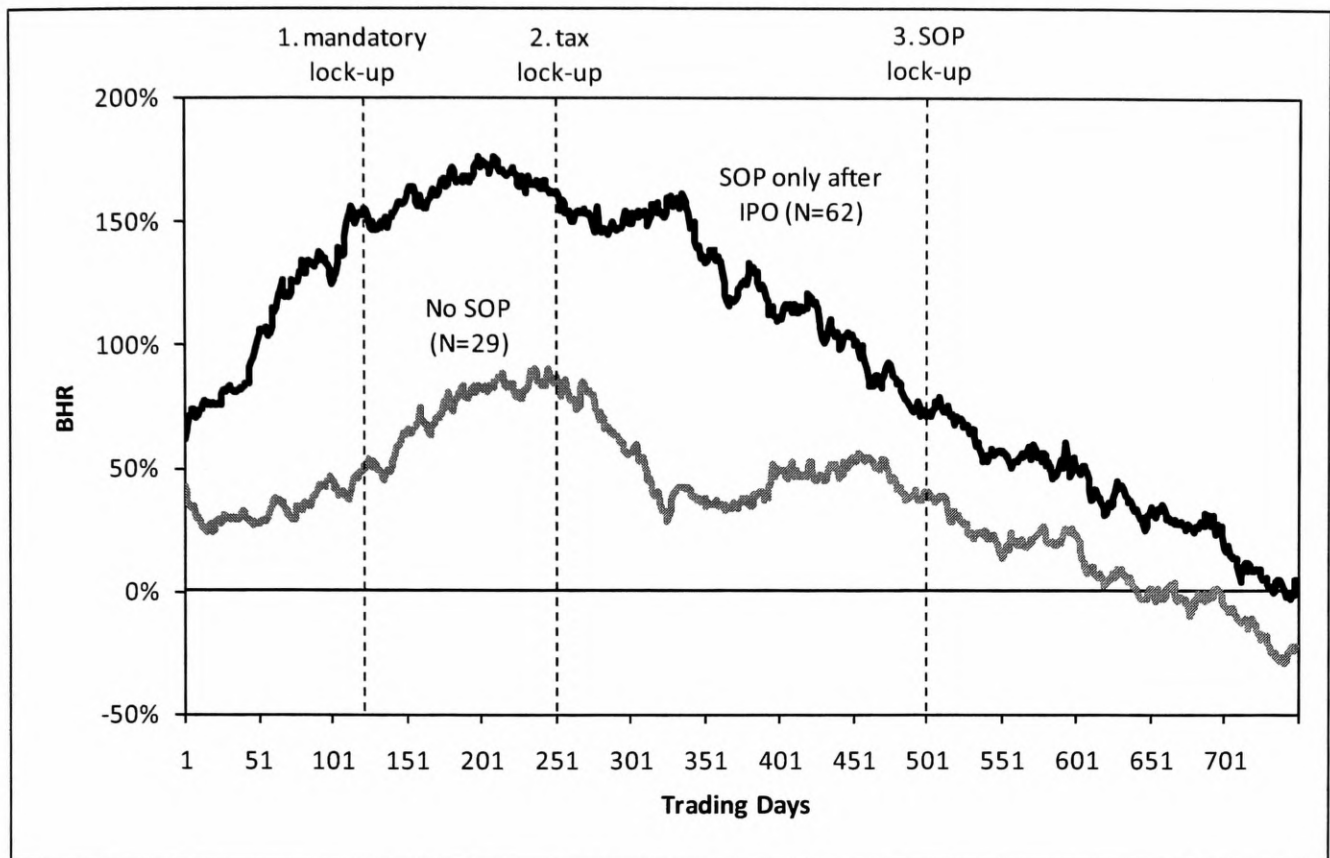
Figure 6
Hot and Cold Issue Market

The subset of firms with broad-based naked option SOPs at IPO with a two year lock-up period in Figure 4 (N=130) is divided into two subgroups distinguishing between firms that went public in the hot issue market (IPO before January 1, 2000) ("Broad-based SOP with 2Y lock-up hot issue") and firms that went public in the cold issue market (IPO after December 31, 1999) ("Broad-based SOP with 2Y lock-up cold issue").

Figure 7
BHARs for "no SOP at IPO" and "Broad-based SOP
with 2Y lock-up" excluding Underpricing

The BHARs (excluding underpricing) are calculated for firms with broad-based naked option SOPs at IPO and a two year lock-up period or a staggered lock-up period beginning with two years ("Broad-based SOP with 2Y lock-up"). The comparison group are firms with "no SOP at IPO" (may have designed an SOP later). The Nemax All Share Index is used as the market index.
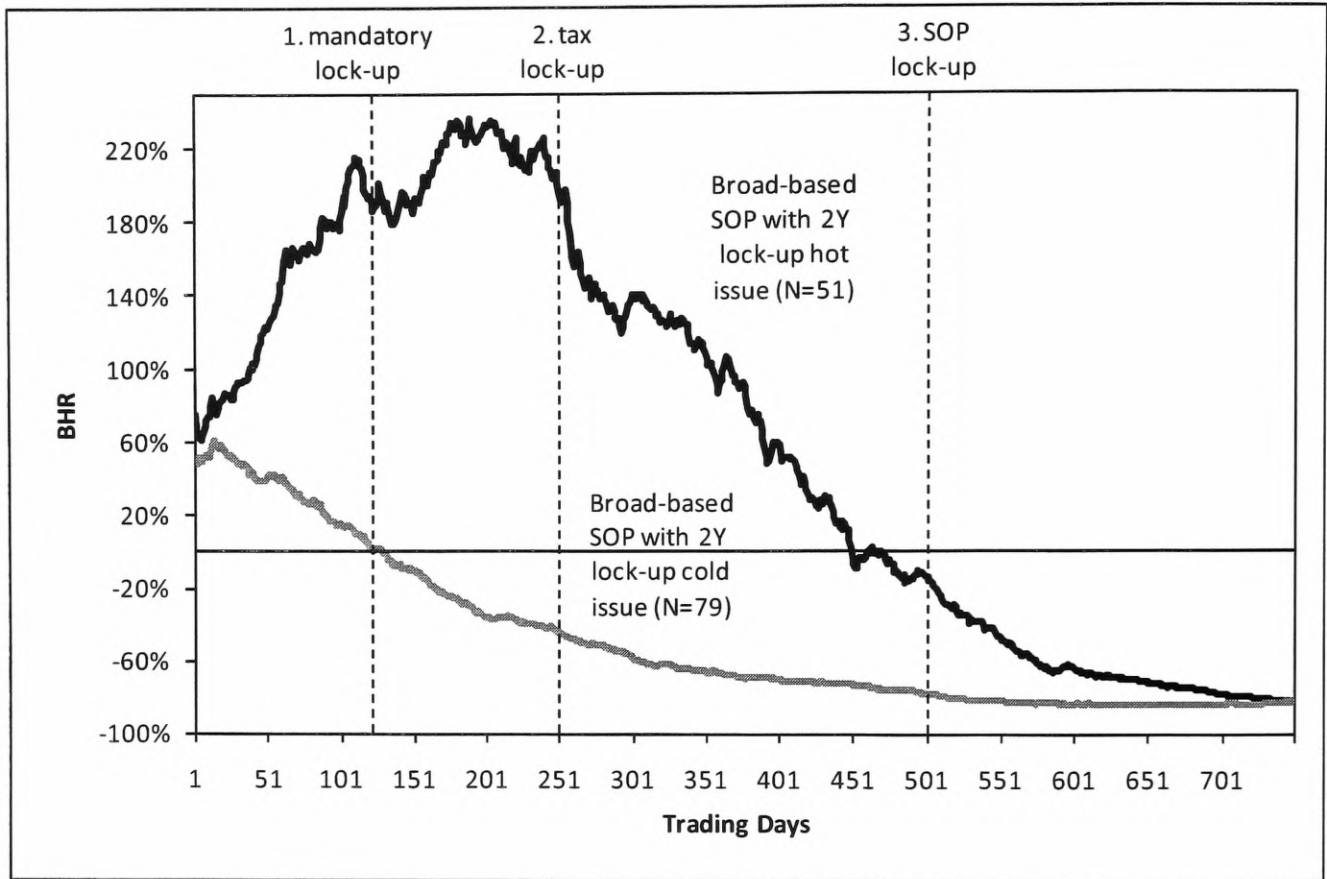
Figure 8
BHARs for "no SOP at IPO" and "Broad-based SOP
with 2Y lock-up" including Underpricing

The BHARs (including underpricing) are calculated for firms with broad-based naked option SOPs at IPO and a two year lock-up period or a staggered lock-up period beginning with two years ("Broad-based SOP with 2Y lock-up"). The comparison group are firms with no SOP at IPO ("no SOP at IPO", may have designed an SOP later). The Nemax All Share Index is used as the market index.
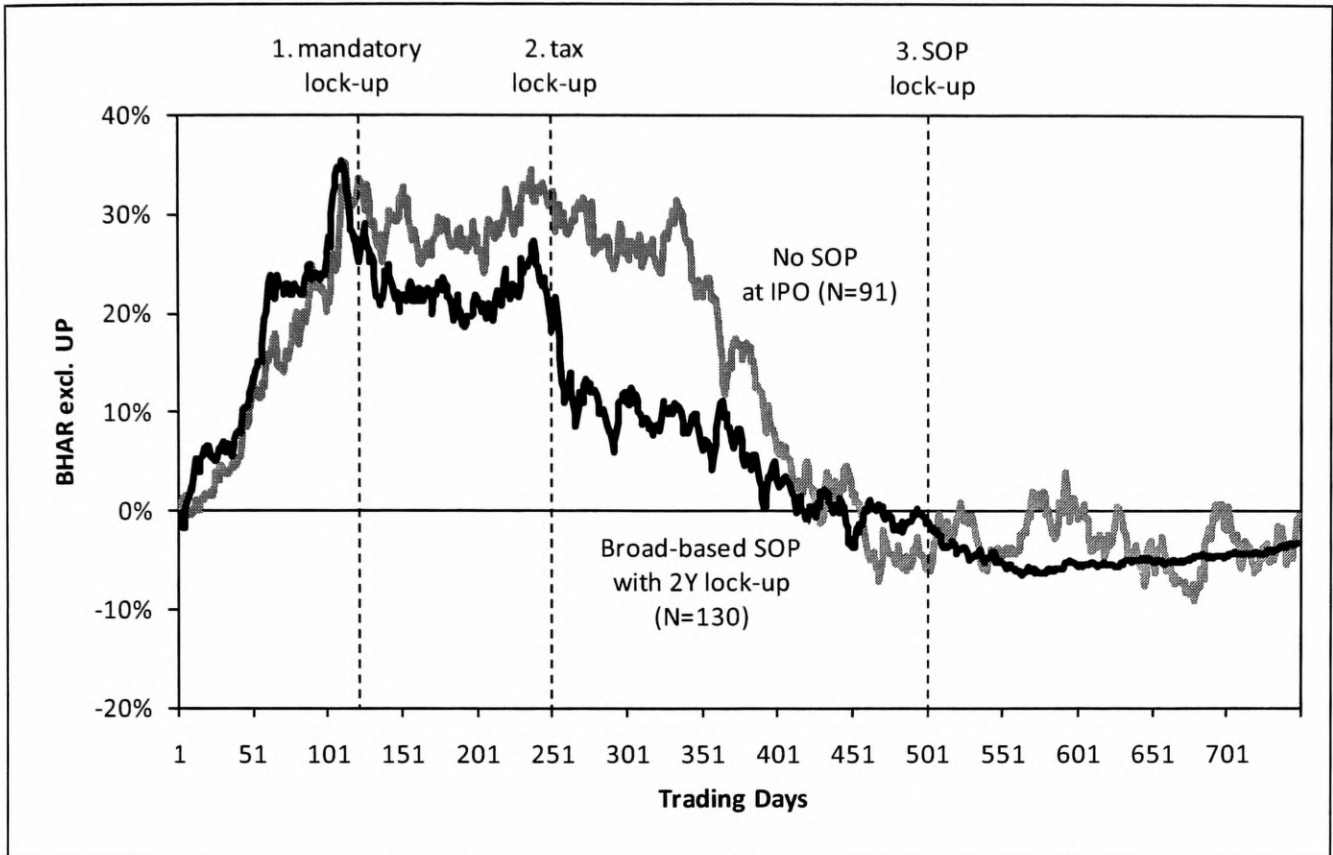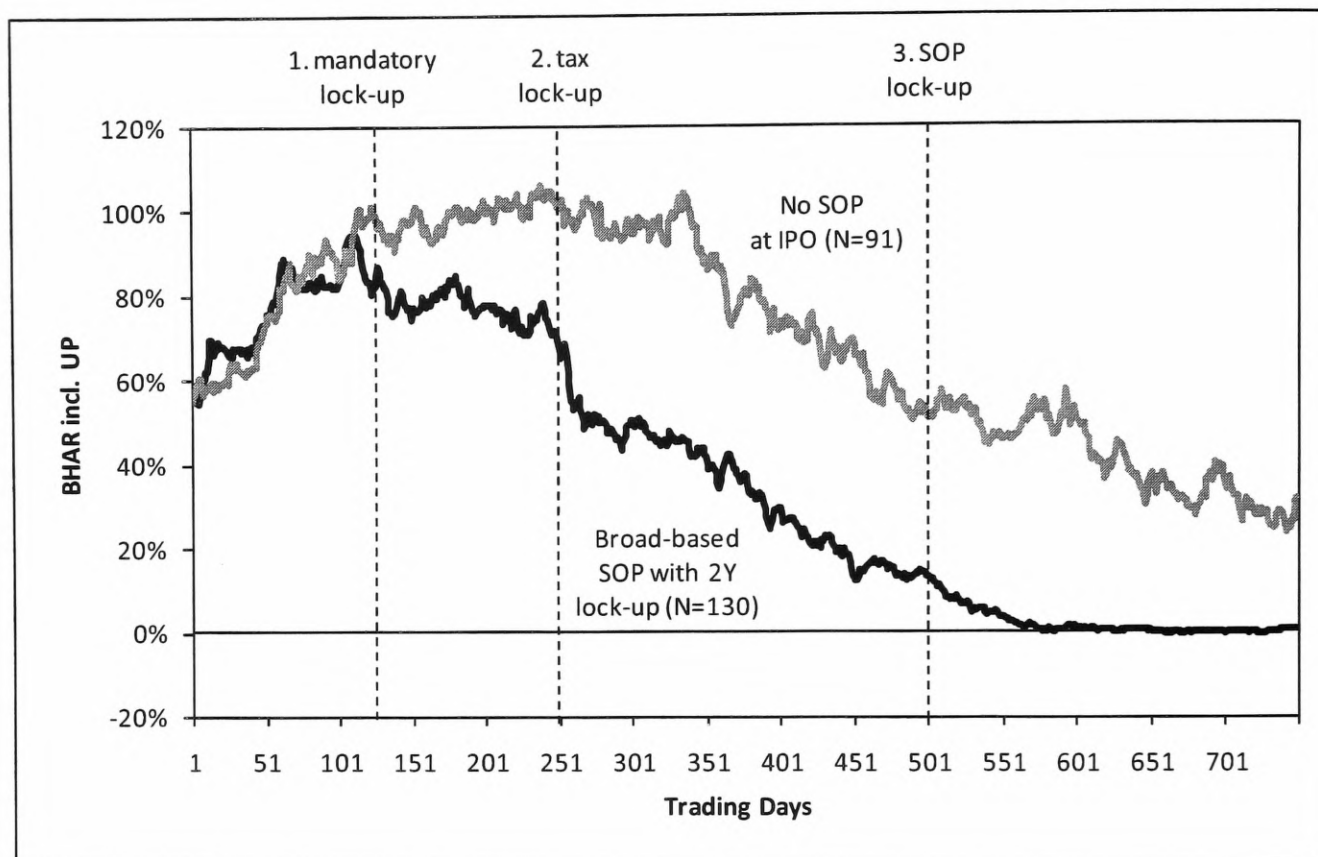
Table 1
IPOs with and without an SOP at Time of IPO

BB_SOP_IPO_2Y and NO_SOP_IPO are IPOs with a broad-based SOP at IPO with a two year lock-up requirement and IPOs with no SOP at IPO, respectively. N denotes the sample size, STD the standard deviation, t (adj.) and t (Means) the t-values from a skewness-adjusted t-test and a t-test for differences of means, respectively. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	N	Mean	Median	STD	t (adj.)		t (Means)
			BHR 123				
BB_SOP_IPO_2Y	130	73.33%	24.86%	164.98%	7.06	***	-1.94 *
No_SOP_IPO	91	121.76%	52.92%	205.86%	8.02	***	
			BHR 250				
BB_SOP_IPO_2Y	130	51.63%	-32.27%	243.68%	3.36	***	-2.62 ***
No_SOP_IPO	91	136.29%	59.17%	225.06%	7.64	***	
			BHR 500				
BB_SOP_IPO_2Y	130	-52.76%	-81.11%	108.34%	1.37		-4.17 ***
No_SOP_IPO	91	61.89%	-49.22%	285.91%	2.59	***	

Table 2
IPOs with SOPs after IPO and no SOPs

AFTER_IPO and NO_IPO are IPOs with a SOP after the IPO and no SOP, respectively. N denotes the sample size, STD the standard deviation, t (adj.) and t (Means) the t-values from a skewness-adjusted t-test and a t-test for differences of means, respectively. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	N	Mean	Median	STD	t (adj.)	t (Means)
			BHR 123			
After_IPO	62	154.95%	78.99%	229.98%	7.51 ***	2.30 **
No_SOP	29	50.80%	20.50%	115.50%	3.10 ***	
			BHR 250			
After_IPO	62	160.74%	66.55%	234.77%	7.04 ***	1.53
No_SOP	29	84.00%	52.31%	196.41%	3.21 ***	
			BHR 500			
After_IPO	62	72.10%	-46.66%	295.04%	2.45 **	0.50
No_SOP	29	40.05%	-60.75%	269.04%	1.08	

Table 3
Hot and Cold Issue Market

HOT and COLD are IPOs with a broad-based SOP at IPO with a two year lock-up requirement and an IPO date before January 1, 2000 and after December 31, 1999, respectively. N denotes the sample size, STD the standard deviation, t (adj.) and t (Means) the t-values from a skewness-adjusted t-test and a t-test for differences of means, respectively. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	N	Mean	Median	STD	t (adj.)	t (Means)
			BHR 123			
HOT	51	185.95%	129.20%	201.10%	10.76 ***	7.46 ***
COLD	79	0.62%	-16.67%	73.77%	0.11	
			BHR 250			
HOT	51	200.96%	95.06%	332.24%	7.80 ***	6.43 ***
COLD	79	-44.78%	-52.65%	58.79%	-0.82	
			BHR 500			
HOT	51	-13.67%	-68.76%	164.48%	-0.40	3.44 ***
COLD	79	-77.99%	-85.13%	20.64%	35.03 ***	

Table 4
BHARs for "no SOP at IPO" and "Broad-based SOP
with 2Y lock-up" excluding Underpricing

BHR_BB_SOP_IPO_2Y and BHR_NO_SOP_IPO are IPOs with a broad-based SOP at IPO with a two year lock-up requirement and IPOs with no SOP at IPO, respectively. N denotes the sample size, STD the standard deviation, t (adj.) and t (Means) the t-values from a skewness-adjusted t-test and a t-test for differences of means, respectively. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	N	Mean	Median	STD	t (adj.)		t (Means)
			BHAR 123				
BB_SOP_IPO_2Y	130	26.75%	0.66%	95.95%	4.04	***	-0.37
No_SOP_IPO	91	32.19%	-5.54%	123.08%	3.21	***	
			BHAR 250				
BB_SOP_IPO_2Y	130	18.07%	-5.57%	148.81%	1.76	*	-0.67
No_SOP_IPO	91	31.94%	-4.45%	156.82%	2.23	**	
			BHAR 500				
BB_SOP_IPO_2Y	130	-1.20%	-6.38%	65.73%	-0.13		0.28
No_SOP_IPO	91	-5.40%	-12.21%	152.55%	-0.33		

Table 5
BHARs for "no SOP at IPO" and "Broad-based SOP
with 2Y lock-up" including Underpricing

BHR_BB_SOP_IPO_2Y and BHR_NO_SOP_IPO are IPOs with a broad-based SOP at IPO with a two year lock-up requirement and IPOs with no SOP at IPO, respectively. N denotes the sample size, STD the standard deviation, t (adj.) and t (Means) the t-values from a skewness-adjusted t-test and a t-test for differences of means, respectively. ***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

	N	Mean	Median	STD	t (adj.)		t (Means)
			BHAR 123				
BB_SOP_IPO_2Y	130	81.57%	44.89%	135.83%	10.72	***	-0.88
No_SOP_IPO	91	99.91%	46.37%	172.57%	7.74	***	
			BHAR 250				
BB_SOP_IPO_2Y	130	66.23%	12.43%	204.04%	5.95	***	-1.26
No_SOP_IPO	91	101.81%	20.86%	209.44%	5.96	***	
			BHAR 500				
BB_SOP_IPO_2Y	130	13.45%	-1.48%	86.89%	2.50	**	-1.59
No_SOP_IPO	91	50.81%	-7.51%	247.24%	2.35	**	

Table 6
Linear Regression Models

***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

Variable	Model 1	Model 2	Model 3	Model 4
FOR	0.1351 ***	0.2503 ***		
INOV			-0.0044	0.0126
MNG	-0.0283	-0.0235	-0.0090	-0.0132
VC	0.0217	0.0266	0.0282	0.0349
BANK	0.0569 *	0.0622	0.0638 **	0.0605 *
HOT	-0.0704 ***	0.0259	-0.0477 **	0.0661
Const.	0.1681 ***	0.2281 ***	0.1455 ***	0.2030 ***
Obs.	329	174	286	151
Adj.R2	0.0821	0.1467	0.0340	0.0444
Prob(F-stat.)	0.0000	0.0000	0.0117	0.0403

Table 7
ML Binary Logit Models

***, **, and * denote 1%, 5%, and 10% significance levels, respectively.

Variable	Model 5	Model 6
FOR	0.0202	
INOV		-0.1442
MNG	-0.1661	-0.0567
VC	0.1144	0.1218
BANK	0.3794	0.5010
HOT	-1.3134 ***	-1.3965 ***
Const.	0.8511 ***	0.8652 ***
Obs.	329	286
McFadden R2	0.0821	0.0797
Prob(LP stat.)	0.0000	0.0000