How Do Investment Patterns of Independent and Captive Private Equity Funds Differ? Evidence from Germany

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Abstract: *The positive contribution of private equity providers to the development of their portfolio companies, which results from a combined provision of capital and management support, has been emphasized by a wide range of empirical literature. The aim of this paper is to show that these results, which are based mostly on U.S. data of independent closed-end private equity funds, cannot be generalized since the private equity industry should not be treated as homogenous. We argue that it is necessary to distinguish between different types of private equity providers since their differing governance structures, strategic goals and experience have a decisive influence on their value-adding activities. Using a data set of 179 German private equity-backed companies the results are consistent with the conjecture that independent and corporate private equity providers tend to have a more pronounced role in corporate governance and monitoring of the companies they finance than bank-dependent and governmental funds, which often serve only as bridge investors.*

Keywords: Private Equity, IPO, Heterogeneity
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1 Introduction

The positive impact of private equity financing has been shown on both the company and the aggregated level by a wide range of recent empirical literature, based mostly on U.S. data. On the company level, the studies document the contribution of private equity investors to the creation of start-ups (e.g. *Gompers et al., 2003*), the companies' growth (e.g. *Hellmann and Puri, 2000*), their professionalization (e.g. *Hellmann and Puri, 2002*), better performance (e.g. *Jain and Kini, 1995*) and the certification of their quality (e.g. *Lin and Smith, 1998*; *Megginson and Weiss, 1991*). Above this, on the aggregated level, private equity has a positive impact on innovative activity (e.g. *Kortum and Lerner, 2000*) and employment (e.g. *Wasmer and Weil, 2000*; *Belke et al., 2001*; *Belke et al., 2003*).

The strength of private equity results from the combined provision of money, management support and monitoring. Whereas the majority of literature deals with the private equity industry as being homogenous, in this paper we test whether various types of private equity providers (independent, bank-based, corporate-based and government-based) differ in their investment strategies and hence in the value they add to their portfolio companies. In Europe this issue is particularly relevant since banks and the public sector play an important role as private equity providers. We believe that – due to differences in governance structures, strategic goals and experience – various types of private equity investors behave differently and play differing roles in their portfolio companies. Therefore, our goal is to find out whether there are systematic differences in the investment and divestment patterns of private equity investors due to their institutional background. Concretely, for different

types of private equity providers we examine the features of their investments, their exit-timing and their selling activities in the course of IPOs.

Whereas cross-country differences are analyzed in several papers (e.g. *Jens and Wells, 2000*; *Black and Gilson, 1998*; *Armour and Cumming, 2005*; *Cumming et al., 2004*), little is known about the impact different types of private equity providers have on the investment and divestment patterns within one country, which is the focus of this paper. This may be due to several reasons but one must almost certainly be the lack of data for private equity firms and their investments / divestments.

A natural playing field for this kind of analysis is the German private equity market with its wide variety of fund types. First, traditionally and as a result of overall economic policy, there is a large proportion of private equity organizations which are basically owned or controlled by the state or public agencies. Second, as a result of the rapid growth of the private equity market, a considerable proportion of independent private equity investors are from abroad. Third, in the 1990s many players in the banking industry established their own private equity subsidiaries. Finally, we observe several corporate private equity firms.

For the purpose of this paper, namely the investigation of the differences between various types of private equity investors, we hand-collected a database of all private equity-backed companies that went public on Germany's *Neuer Markt*, a market segment for young innovative companies. The enormous increase in activities of private equity investors in Germany came along with the launching of this market segment in March 1997. Many new private equity firms were founded and a considerable number of private equity investors from abroad entered the German market.

Our results are consistent with the conjecture that independent and corporate private equity investors tend to have a more pronounced role in corporate governance and monitoring of the companies they finance than bank-dependent and governmental private equity providers, who are often only bridge investors.

The remainder of this paper is divided into five parts: A set of testable hypotheses is derived in Section 2. Our data is described in Section 3. Summary statistics are presented in Section 4. Multivariate results are discussed in Section 5. Finally, Section 6 concludes.

2 Our hypotheses

Differing behavioral patterns of different types of private equity funds may result from differing incentives of their managers that again are induced by different corporate governance structures of these funds. Furthermore, also differing strategic goals of different types of private equity providers may lead to differing investment and divestment strategies.

Captive (= dependent) private equity funds have other governance and organizational arrangements and, thus, incentives than independent funds. Managers of captive funds act as employees of the mother company rather than as partners of an independent fund. Independent private equity funds employ higher powered incentive structures than captive funds (see e.g. *Lerner et al., 2005*). Empirical evidence for the German market can be found in *Weber and Dierkes (2002)*. They show that independent private equity firms in Germany employ performance-based compensation of their managers whereas other types of private equity firms use incentive

components to a much lesser extent, or not at all. As a consequence, we conjecture that managers of independent private equity firms put forth more effort and, thus, these funds create larger additional value for their portfolio companies.

Private equity firms that belong to corporations are particularly involved in exploring opportunities in markets that are closely related to the business of the corporation (see e.g. *Gompers and Lerner, 2001*). Via their mother company, they have contacts to potential clients and suppliers. Also independent private equity firms typically concentrate on a particular industry and establish networks there (see e.g. *Barry, 1994*; *Sahlman, 1990*). This specialization allows private equity managers to gain a better understanding of the strengths and weaknesses of their portfolio companies, the market and the competitive environment.

Bottazzi et al. (2004) demonstrate that the extent to which a private equity firm provides services and monitoring critically depends on how specialized it is. *Gompers et al. (2005)* show that private equity providers with a higher degree of specialization tend to be more successful. Moreover, *Fulghieri and Sevilir (2004)* show in a theoretical model that a high level of specialization increases the incentives of the private equity firm to exert effort. In line with this research we conclude that the specialization and network creation of corporate and independent private equity firms enables them to offer more competent monitoring and support and, thus, increase the value of their portfolio companies more than it would be the case with bank-based and governmental funds. Moreover, we conjecture that independent private equity funds should be more efficient than corporate funds because the former tend to have higher powered compensation structure on general. In this respect,

e.g. *Bottazzi et al. (2004)* show that independent private equity providers are more actively involved in their portfolio companies than bank-based and governmental private equity firms.

Furthermore, we argue that the duration of the private equity investment depends on the management contribution of the private equity provider. The better the management support, the longer the investment duration during which the portfolio company can profit from the unique knowledge of the investor. On the contrary, if the potential management contribution of the private equity fund is not very large, his skill set is exhausted rather quickly. After a relatively short time, this private equity provider is no longer in a position to create considerable additional value. So, he prefers to exit sooner (for a theoretical model of the "value adding hypothesis" see *Tykvová, 2003*).

Thus, we conjecture that private equity firms that are able to create larger additional value, i.e. independent (and corporate) ones, aim at having longer-term relationships with their portfolio companies. On the contrary, bank-based and governmental private equity firms on general want to exit earlier since, after a certain period, their comparative advantage to potential new investors is not very high. They prefer to turn their shares into cash and invest it in other companies to which they can add more value. The value adding hypothesis indicates that bank-dependent and governmental private equity firms are typically bridge investors who provide money shortly before the IPO and who want to exit quickly, at best directly at the IPO. This results in their shorter holding periods and more intensive exits (lower post-IPO retention rates). Independent (and corporate) private equity firms create larger

additional value not only before but after the IPO as well and, thus, we conjecture that they finance their portfolio companies for longer periods and prefer to retain a larger fraction of their shares beyond IPO, in order not to lose their influence on the company's management.

A further argument for shorter holding periods and more intensive exits of private equity funds from (private and public) banks is that banks want to build relationships for their core lending activities (for the "relationship hypothesis" see *Hellmann et al., 2003*). Thus, compared to other types of private equity providers of a comparable size, these funds want to participate in more companies in order to expand the group of potential future clients for the mother company. To achieve this goal, those private equity funds that belong to private and public banks are expected to take lower equity positions for a shorter period of time than other types of funds. They are assumed to have lower retention rates.

Since early stage financing bears higher agency costs (e.g. *Gompers, 1997*) and is more information-intensive (e.g. *Bottazzi et al., 2004*) than late stage financing, we expect that bank-based and governmental private equity firms, which on general tend to be less intensively involved in the management and monitoring of their portfolio companies, prefer investing in the later stages. Another relevant explanation for such behavior is offered by *Fulghieri and Sevilir (2004)*. They argue that a high level of focus allows the private equity firm to reallocate its resources from one investee to another if one of the portfolio companies fails. Since failure rates are higher for younger firms, only specialized private equity firms – thus, in our consideration, more likely corporate and independent ones – will invest in the early stages whereas less

specialized private equity firms will typically finance later stage deals. Furthermore, *Leleux and Surlemont (2003)* argue that captive private equity firms tend to favor later stages since they prefer "assets in place rather than growth opportunities".

All these issues lead us to the following hypothesis:

H1: *Compared to independent (and, eventually, corporate) private equity firms, bank-dependent and governmental private equity firms invest at later stages, take lower equity positions, take their companies public more rapidly and retain a lower fraction of their holdings beyond the IPO.*

According to the "grandstanding" phenomenon (see *Gompers, 1993 and 1996*), the reason why some private equity firms take their portfolio companies public too early (after short financing periods) is that these private equity firms want to increase their reputation in order to be able to attract capital for new funds. Particularly independent private equity firms strongly care about their reputation because they have to raise funds from independent investors. Their main aim is to ensure a positive return to their capital providers. Thus, independent private equity funds feel increased pressure to carry out an exit. *Barry (1994)* concludes that captive funds, who do not have to raise funds from third parties, do not have incentives to grandstand. They can count on their controlling companies whereas independent private equity providers can only survive by exhibiting a track record of successful exits. Hence, contradictory to what is stated by *H1* with respect to the duration of the pre-IPO financing:

H2: *Compared to other types of private equity firms, independent private equity firms take their companies public more rapidly.*

3 Data set

Compared to other studies that deal with private equity financing and the Germany's *Neuer Markt* (e.g. *Franzke (2003)* who looks into the differences in underpricing of private equity-backed and non private equity-backed IPOs or *Audretsch and Lehmann (2002)* who analyze differences in growth between both groups of firms), the unique feature of our database is the collection of detailed data on

1. the pre-IPO financing from the listing prospectuses of each single company from the *Neuer Markt* and

2. the private equity firms (and their types) from several sources: the *VentureXpert* database, the directories of German, European and U.S. venture capital and private equity associations (*BVK*, *EVCA*, *NVCA*) and webpages of private equity firms.

Furthermore, we use IPO-data from the *German Stock Exchange*. A description of all the variables used in the paper is shown in Table 1.

Such detailed data enables an analysis of issues pertinent to private equity finance that have not been the subject of previous academic study.[1] One shortcoming of

[1]Unfortunately, it is not possible to document the development of the capital structure after the IPO with high accuracy. The available databases are very imprecise and contain gaps. We have randomly chosen a sample of 20 companies and compared for them the data on the shareholder structure in two major databases of German companies, the *Markus Datenbank* and the *Hoppenstedt Aktienführer*. We were surprised to find enormous differences. These databases rely on information provided either by companies themselves or by private equity firms on the one hand and on the other hand on investigations in diverse registers. Obviously, these methods lead to results that are full of many gaps and time lags. To our knowledge it is impossible to find out how the divestment process of private equity firms in Germany continues after the IPO and the expiration of the lock-up period. Therefore, we concentrate on the investigation of the pre-IPO private equity financing and the behavior of private equity firms at the IPO, which is documented in issuing prospectuses and in the archives of the *German Stock Exchange*.

our approach is that we have data from only one country. However, using just the German *Neuer Markt*, we have the benefit of having good diversity in the types of private equity firms, with all the cross-country factors (such as cultural, legal, financial issues, etc.) controlled for. Another limitation is that we do not include those private equity-backed IPOs that took place before 1997 in our analysis. However, both the private equity and IPO activities in the German market were very low in the pre-*Neuer-Markt*-period.

There were 327 IPOs on the *Neuer Markt*, 179 of them were private equity-backed. The private equity firm that held the largest share of the equity prior to the IPO was labeled the lead private equity firm. We divided the IPOs into four subgroups depending on the type of lead private equity firm (governmental, bank-dependent, independent and corporate). Further, we distinguished between German and foreign private equity firms. The group of governmental private equity firms in our sample consisted of the subsidiaries of German *Sparkassen* and *Landesbanken*. In these banks namely, public authorities have a large impact. Thus, the group of bank-dependent private equity firms in our sample contained only subsidiaries of private commercial banks.

The correlations between the four types of private equity firms and their nationality (German vs. foreign), which are very high, are reported in Table 2. Governmental and bank-based private equity firms are generally German whereas foreign private equity firms are usually independent.

4 Summary statistics

Summary statistics for variables associated with the characteristics of the portfolio company and its IPO, the pre-IPO private equity financing and the private equity funds' behavior at the IPO are depicted in Table 3.

Independent private equity firms bring about significantly larger market values and issue sizes as well as significantly lower book-to-market ratios of their portfolio companies compared to other private equity-backed firms.

As expected (*H1*), governmental, bank-based and German[2] private equity firms engage in later stages whereas independent and corporate private equity firms finance their portfolio companies in earlier development phases.

Foreign and independent private equity firms retain a significantly larger fraction of their shares beyond the IPO whereas bank-based private investors firms sell a significantly larger fraction at the IPO, which is consistent with *H1*. Independent, corporate and foreign private equity firms take significantly larger equity positions whereas bank-based and governmental private equity firms hold significantly smaller stakes, as expected. Bank-based, governmental and German private equity firms take their portfolio companies public faster while independent and corporate private equity firms finance them longer before the IPO. This finding complies with *H1* and seems to contradict *H2*, the grandstanding hypothesis (for independent private equity firms).

[2]Who typically are governmental or bank-based.

5 Multivariate analyses

Next, in a multivariate regression approach we explore the duration of pre-IPO private equity financing and the retention rate by private equity firms. We first use separate estimations for the duration of the pre-IPO private equity financing (see Section 5.1) and for the retention rate by the private equity firms (see Section 5.2). In a next step, we take into account that private equity firms probably choose the IPO-timing and the retention rate simultaneously. Therefore, in order to count for the potential endogeneity, we analyze these issues in a simultaneous equation framework using the three-stage least squares method (see Section 5.3).

5.1 Duration of the private equity pre-IPO financing

We conduct a hazard rate analysis to model the duration between the first private equity provider's equity holdings and the IPO, employing two commonly used parametric models (Weibull and exponential models) and one semi-parametric model (Cox proportional hazard model). All three models deliver very similar results. It is a good indicator of the robustness of these estimations. Hence, we report only the outcomes of one of the models (Weibull).

We regress the duration of the pre-IPO financing on the book-to-market ratio and a set of dummy variables for industries, private equity firm types and the start-up dummy. Since there probably are differences in the demand for private equity providers' consulting services, we expect differing lengths of the pre-IPO private equity financing periods among industries. Furthermore, we assume that financing starting in an earlier development stage of an investee lasts longer because a portfo-

lio company must reach a certain maturity before it can be taken public. Thus, the coefficient on START-UP should be negative (= the hazard rate decreases). Moreover, according to the value adding hypothesis discussed earlier, "growth stocks", which have a higher potential then "value stocks", should be taken public later. As a consequence, BTM is expected to have a positive coefficient (= the hazard rate increases).

However, our major interest is to analyze the impact of different types of private equity firms on the IPO-timing. From *H1*, we should expect a positive coefficient on BANK, GOV and GERMAN whereas the coefficients on INDEP (and, eventually, CORP) should be negative. However, according to the grandstanding hypothesis (*H2*), INDEP should have a positive coefficient because independent private equity firms rush their firms into the market in order to shine in front of their investors and, thus, be able to obtain from them capital for further funds.

We report regression outcomes in Table 4. Our results provide evidence for the differing behavior of various types of private equity firms. The dummy variables INDEP and CORP have negative coefficients and those are statistically significant. BANK, GOV and GERMAN always have positive coefficients that are (with one single exception) significant. Thus, we conclude that due to the differences in the private equity providers' corporate governance, strategic goals and experience, independent and corporate private equity firms finance their portfolio companies for longer periods of time than other private equity firms before they take them public. This behavior is in accordance with the relationship and the value adding considerations (see *H1*). It contradicts the grandstanding hypothesis (see *H2*). A possible

explanation for the latter result may be that the group of independent private equity firms is very heterogenous. A large fraction of it consists of large renowned private equity firms from abroad who already have established their reputation and, thus, do probably not need to grandstand. However, in this paper we have not tested for the differences between young and established funds and, thus, the impact of reputation on grandstanding.

Furthermore, companies that belong to branches in which the management support is less essential are financed for significantly shorter periods. The coefficients on INTERNET and MEDIA & ENTERTAIN are positive and statistically significant. The investment in a start-up company and a company with a high book-to-market ratio leads to longer financing periods. The second result contradicts our predictions. Obviously, promising companies are rushed into the market.

5.2 Retention rate by the private equity firms

Private equity firms maintain their investment beyond the IPO. In this section, we model the extent of their exit in the course of the IPO at the company and the private equity firm level. At the company level, the pre-IPO holdings of the group of private equity firms are taken as a benchmark. The dependent variable is the fraction of these holdings retained beyond the IPO. It lies between 0% (when all private equity firms sell their complete shareholdings at the IPO and, thus, the fraction of old shares retained is 0%) and 100% (when none of the private equity firms sells any shares). At the private equity firm level, we estimate the fraction of retained shares for each single private equity firm.

We use Tobit regressions to explore the determinants of the fraction of shares retained. We are primarily interested in the impact of the private equity firm type. We control for the IPO market situation, portfolio company characteristics and for the reputation of designated sponsors[3] and lead underwriters.

The potential new investors expect that private equity firms as insiders retain a fraction of their shares in order to signal the quality of the firm (e.g. *Allen and Faulhaber, 1989*). Hereby, factors that reduce uncertainty and diminish the information asymmetry or increase the optimism of the potential new investors with respect to the future stock price development should decrease the fraction retained by the private equity firms. Thus, the higher the opacity of the firm, the greater the uncertainty and the lower the optimism of potential new investors, the larger the fraction retained by the private equity firms.

The opacity of the firm, for which the width of the bookbuilding range, the book-to-market ratio, firm size and age are used as proxies (a wider bookbuilding range, a lower book-to-market ratio, smaller or younger firm imply a larger opacity), should have a positive impact on the fraction of shares retained. Longer private equity financing, a high reputation of designated sponsors and underwriters may certify the firm quality and thus diminish the uncertainty (e.g. *Booth and Smith, 1986*). Therefore, the necessity to signal the investee quality should be reduced and, thus, the impact on the fraction of shares retained by the private equity firms should be negative.

[3]Each share on the *Neuer Markt* had to have at least two designated sponsors. Their main task was to provide liquidity for the trading of this security.

Moreover, a hot issue market may induce larger selling activities due to the increasing optimism of investors. Alternatively, if the private equity firms expect the returns on the stock market to be sufficiently high, they may prefer to profit from rising prices and, thus, not to sell their shares. Hence, hot issue market may induce them to retain a larger fraction of their old shares.

This paper focuses on the differences in the behavior of various types of private equity firms. *H1* implies that bank-based and governmental private equity firms are more or less bridge investors who ante up the money for an IPO and who dispose of a large fraction of their holdings directly at the IPO. Independent (and, eventually, corporate) private equity firms who have a comparative advantage in management support aim at longer relationships during which they increase the firm value and, thus, their future revenues. Thus, we should expect positive coefficients on INDEP (and, eventually, CORP) and negative coefficients on BANK, GOV and GERMAN.

Table 5 provides the results of Tobit regressions for the determinants of the fraction of old shares retained by the group of all private equity firms in a company (1-3) and by single private equity firms (4-6) beyond the IPO. In equations 4-6 the variables that label the private equity firm type refer to the single private equity firm, not the company (i.e. lead private equity firm) level.

The different impact of various private equity firm types is confirmed and our results comply with *H1*. If the lead private equity firm is independent, the private equity firms as a group sell a significantly lower fraction of their shares compared to bank-based lead private equity firms. Moreover, for lead private equity firms from Germany, the retention rate is significantly lower than that of foreign private equity

firms. These differences are found at the single private equity firm level as well. In addition, at the single private equity firm level corporate private equity firms retain a significantly larger fraction of their old shares.

In regressions 4-6 we also analyze the differences in the behavior of lead and other private equity firms at the IPO. However, no significant differences are found. But, we detect differences in the behavior of the private equity firms who initiated the financing in the respective company (BEGIN) and other private equity firms. Even if we control for the pre-IPO shareholdings, BEGIN has a significantly negative impact on the post-IPO shareholdings. Thus, the private equity firms who started the financing sell more of their old shares at the IPO.

Moreover, our results indicate that when private equity firms expect rising share prices (in hot issue markets) and a high liquidity (having designated sponsors with a high reputation), they retain a significantly larger fraction of shares. In young companies the fraction sold by private equity firms at the IPO is smaller, as expected. We also find support for the conjecture that high-quality underwriters certify the companies and allow the private equity firms to sell a significantly larger fraction already at the IPO.

5.3 Simultaneous equations

In the multivariate analyses of the foregoing sections, a problem with endogeneity came up. Private equity firms probably choose the retention rate and the IPO-timing simultaneously. Therefore we use the three-stage least squares (3 SLS) method to check the robustness of our previous outcomes.

The results of the simultaneous estimations of "DURATION" and "RETAINED, All" are depicted in Table 6. All signs comply with those of the separate estimations (see Tables 4 and 5).[4] Moreover, all significant coefficients on PE-related variables remain significant. To conclude, the results from the former separate estimations can be confirmed through simultaneous estimations.

6 Conclusion

In the German market, independent and corporate private equity firms typically have differing investment patterns from bank-dependent and governmental private equity firms. Moreover, the behavior of the former two types of private equity firms is more similar to that of U.S. private equity funds as described in the literature (for an overview see e.g. *Barry, 1994*; *Sahlman, 1990*). Independent and corporate private equity firms tend to have a more pronounced role in corporate governance and monitoring of their portfolio companies. They usually take larger equity positions, invest at earlier stages and finance their companies for longer periods of time. In comparison, bank-dependent and governmental private equity firms often act only as bridge investors. Such behavior results from different governance structures, experiences as well as differing strategic goals of these types of investors.

We have made an important distinction between four different types of private equity providers. Our results indicate that the impact of various types of private equity firms differs and is worthy of further analysis. Future research should examine the

[4]For "RETAINED, All" all signs remain the same; for "DURATION" all coefficients have the opposite sign. These different signs result from the fact that in hazard rate models (see Table 4) a positive coefficient implies an increase in the hazard rate and, thus, a shorter period whereas a positive coefficient in 3 SLS models (see Table 6) means an increase in the duration.

governance structures and the fundraising process of various types of private equity firms in detail and explore the further consequences on their investment activities. Moreover, the impact of reputation is worth studying.

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Table 1: Definitions of the variables

This list contains definitions of all variables that are used in the paper. All variables, except **BEGIN**; **LEAD**; **RETAINED, Single** and **Pre-IPO SHARE, Single** that apply to the private equity firm level (PE firm-related variables), belong to the company level. The dummy variables that are listed in the first part of the table have a value of 0 if false.

AGE	Age of the company (years)
BOOKSPAN	Width of the bookbuilding span; upper value minus lower value divided by the middle value
BTM	Book-to-market ratio; BV / MV
BV	Book value at the IPO (Mill. euro)
DURATION	Length of the pre-IPO private equity financing (years)
DSRANK MIN	Rank of the designated sponsor[a] with the lowest rank[b], the value is between 1 and 10 (1 is the best rank)
ISSUE	Issue size (Mill. euro), without greenshoe
LOCKDUR	Duration of the lock-up period of the lead private equity firm (months)[c]
MV	Market value at the IPO (Mill. euro)
Post-IPO SHARE, All	Private equity firms' share (= all private equity firms) immediately after the IPO (in %)
Pre-IPO SHARE, All	Private equity firms' share (= all private equity firms) before the IPO (in %)
Pre-IPO SHARE, Single	Private equity firm's share (in %) before the IPO *(PE firm-related variable)*
RETAINED, All	Fraction retained by the private equity firms (= all private equity firms) after the IPO (in %); the pre-IPO share of this group is labeled as 100%
RETAINED, Single	Fraction retained by the private equity firm after the IPO (in %); the pre-IPO share of this private equity firm is labeled as 100% *(PE firm-related variable)*
STAGE	Development stage of the company: start-up / seed (0), expansion (1), bridge (2)[d]
UNDRANK MIN	Rank of the lead underwriter with the lowest rank[e], the value is between 1 and 10 (1 is the best rank)

Table 1 – cont.

BINARY VARIABLES	
BANK	One, if the lead private equity firm is a private bank / an insurance company or their subsidiary, resp. if these hold more than 50% on the lead private equity firm
BEGIN	One, if the private equity firm participated in the first PE financing round in the company *(PE firm-related variable)*
CORP	One, if the lead private equity firm belong to an industrial corporation; resp. if a (non-financial) company holds more than 50% on the lead private equity firm
GERMAN	One, if the lead private equity firm has its headquarters in Germany
GOV	One, if the lead private equity firm is state-owned (*Sparkassen* and *Landesbanken* are included), resp. if the (federal or local) government or a public bank holds more the 50% on the lead private equity firm
HOT ISSUE	One, if the firm went public during the hot issue period (between March 1, 1999 and November 30, 2000)
INDEP	One, if the lead private equity firm is independent (not BANK, GOV or CORP)
INTERNET	One, if the firm belongs to internet industry
LEAD	One, if the investor is the lead private equity firm *(PE firm-related variable)*
MEDIA & ENTERTAIN	One, if the firm belongs to media & entertainment industry
START-UP	One, if the private equity financing begins in the start-up- or seed-phase (up to two years since the setting up of the company)

[a] Each share on the *Neuer Markt* had to have at least two designated sponsors. Their main task was to provide liquidity for the trading of this security.

[b] The ranks are based equally on the number of their mandates on the *Neuer Markt* and on their rating by the *German Stock Exchange* in the preceding period (=quarter).

[c] As prescribed by the *Rules and Regulations Neuer Markt*, old investors are not allowed to sell their retained shares during the period of 6 months beyond the IPO. They, however, often commit themselves to hold their shares for periods longer than this requirement.

[d] *Start-up / seed* – period till two years since the setting up of the company; *bridge* – period of one year in front of the IPO; *expansion* – neither start-up / seed nor bridge.

[e] The rank depends on its activities as the lead underwriter (the number of new issues on the *Neuer Markt* and their volume in the previous year).

Table 2: Correlation between the nationality and the institutional background of the lead private equity firm

This table shows the Spearman-rank correlation coefficient.
Three asterisks indicate significance at the 1% level or better.

	GOV	**BANK**	**INDEP**	**CORP**
GERMAN	0.26***	0.32***	-0.47***	0.50

Table 3: Summary statistics

This table provides summary statistics for variables associated with the characteristics of the investee and its IPO (PANEL A), the pre-IPO private equity financing (PANEL B) and the private equity providers' behavior at the IPO (PANEL C). The companies are divided into subgroups depending on the type of the lead private equity firm. We conduct a standard two-sided t-test (allowing for unequal variances) to test for differences in means between two subgroups: the certain type (e.g. governmental) and the rest. Additionally, we use the Wilcoxon-Mann-Whitney test to analyze the equality of medians. One, two and three asterisks indicate significance at the 10%, 5% and 1% level or better.

VARIABLE		Obs.	Mean	p-value (mean)	p-value (median)
PANEL A: Characteristics of the portfolio companies and their IPO					
MV (Mill. euro)	GOV	15	195.1	0.1018	0.1018
	BANK	57	265.3	0.7689	0.1765
	INDEP	86	313.0	0.1882	0.0341**
	CORP	20	229.1	0.2982	0.9339
	NON-GERMAN	75	331.4	0.0705*	0.0038***
	GERMAN	103	239.7		
BTM ($\cdot 10^3$)	GOV	15	32.1	0.4169	0.2614
	BANK	57	29.8	0.2840	0.4096
	INDEP	86	21.8	0.0485**	0.0369**
	CORP	20	31.3	0.4162	0.2730
	NON-GERMAN	75	26.1	0.9194	0.4411
	GERMAN	103	26.5		
ISSUE (Mill. euro)	GOV	15	29.0	0.0000***	0.0112**
	BANK	57	48.1	0.3702	0.0576*
	INDEP	86	59.9	0.0964*	0.0268**
	CORP	20	58.1	0.6007	0.1251
	NON-GERMAN	75	65.9	0.0059***	0.0002***
	GERMAN	103	44.1		

Table 3 – cont.

PANEL B: Pre-IPO private equity financing

STAGE	GOV	11	1.64	0.0239**	0.1030
	BANK	47	1.51	0.0040***	0.0040***
	INDEP	76	1.12	0.0421**	0.0404**
	CORP	16	0.81	0.0246**	0.0174**
	NON-GERMAN	59	1.05	0.0138**	0.0102**
	GERMAN	91	1.37		

PANEL C: Behavior of the PE providers at the IPO

DURATION (years)	GOV	11	0.81	0.0023***	0.1788
	BANK	47	1.10	0.0086***	0.0031***
	INDEP	76	1.79	0.3059	0.0455**
	CORP	16	3.06	0.0509*	0.0189**
	NON-GERMAN	59	2.10	0.0106**	0.0001***
	GERMAN	91	1.34		
RETAINED, All	GOV	15	65.67	0.2931	0.4382
	BANK	57	65.12	0.0012***	0.0002***
	INDEP	86	84.41	0.0002***	0.0012***
	CORP	20	79.37	0.6384	0.3047
	NON-GERMAN	75	81.21	0.0393**	0.0837*
	GERMAN	103	71.87		
Post-IPO SHARE, All	GOV	15	10.18	0.0004***	0.0298**
	BANK	57	14.51	0.0146**	0.0032***
	INDEP	86	21.04	0.0584*	0.0060***
	CORP	20	27.06	0.0656*	0.0542*
	NON-GERMAN	75	23.42	0.0009***	0.0004***
	GERMAN	103	15.28		

Table 4: Hazard rate models: Duration of the pre-IPO private equity financing

This table depicts the results of the Weibull hazard rate model (ML estimation) for the length of the pre-IPO private equity financing. If the estimated coefficient is higher than 0, then this variable increases the hazard ratio, and vice versa. The industry dummy variables are indicated in the table only if their coefficients are significant at least at the 15% level. One, two and three asterisks indicate significance at the 10%, 5% and 1% level. An asterisk in brackets points to significance at the 15% level.

Dependent Variable: **DURATION**

	1	**2**	**3**
	Industry		
INTERNET	0.44(*)	0.70**	0.44(*)
MEDIA & ENTERTAIN	0.76**	0.74**	0.76**
	Firm and financing characteristics		
START-UP	-0.65***	-0.81***	-0.65***
BTM	-5.36*	-5.04*	-5.36*
	PE type		
GOV	0.14		0.77**
INDEP	-0.63***		
CORP	-1.12***		-0.48(*)
BANK			0.63***
GERMAN		0.51***	
# obs.	150	150	150
p-value of the model	0.0000***	0.0000***	0.0000***

Table 5: Tobit regressions: Fraction retained by the PE firms beyond the IPO

This table shows the results of the Tobit regression (ML estimation) for the fraction of the pre-IPO holdings retained after the IPO by the group of private equity firms (estimation 1-3) / by single private equity firms (estimation 4-6). Instead of the usual ML estimator of the variance, two versions of the robust Huber-White-sandwich estimators are used. In the first case, no specific structure of dependencies within the sample is suggested. In the second case, we assume that the observations are dependent within certain clusters, which are based on the industry and market conditions and independent between these clusters (we combine nine industries with the hot issue dummy so that we get 18 clusters). One, two and three asterisks indicate significance at the 10%, 5% and 1% level. An asterisk in round brackets points to significance at the 15% level. The number of asterisks (alternatively: the value of the *Wald* χ^2 and the p-value of the model) in edged brackets shows the result of the second robust estimation in case there are differences between the both.

	1	**2**	**3**	**4**	**5**	**6**
Dependent variable:	**RETAINED, All**			**RETAINED, Single**		
Market conditions						
HOT ISSUE	12.12(*)[**]	12.83*[**]	12.83*[**]	17.46***	19.15***	13.64**
Company characteristics / Uncertainty						
BTM	-52.60	-22.10	-22.10	-162.40*[(*)]	-136.00(*)[ ]	-85.10
MV$(\cdot 10^{-3})$	12.38	15.52(*)[*]	15.52(*)[*]	-0.01	-0.01	-0.01
AGE	-0.35*[ ]	-0.26	-0.26	-0.34(*)[ ]	-0.22	-0.54**
BOOKSPAN	45.34	35.98	35.98	33.95	35.37	11.96
Signaling / Certification						
DSRANK MIN	-2.80**[***]	-2.24**[***]	-2.24**[***]	-3.48***	-2.93***[**]	-3.49***
UNDRANK MIN	1.84	1.78	1.78	4.37***	4.33***	4.11***
LOCKDUR	2.38**[***]	2.23**[***]	2.23**[***]	3.03***	2.84***	2.59***
Pre-IPO private equity financing / PE fund characteristics						
DURATION	1.53	1.14	1.14			
Pre-IPO SHARE, All	-0.13	-0.12	-0.12			
Pre-IPO SHARE, Single				-0.06	-0.12	-0.07
GERMAN	-11.75**[*]			-10.16**		
GOV		-11.23	9.28		-7.74	6.94
BANK		-20.51***			-19.80***	
INDEP			20.51***			14.27***
CORP		-8.41	12.10		3.50	17.76*
BEGIN				-13.50**[***]	-11.52**	
LEAD						-6.93
# obs.	146	146	146	329	329	394
Wald χ^2	30.96 [1877.31]	39.47 [36639.89]	39.47 [36639.89]	63.71 [315.25]	72.79 [957.90]	69.06 [1660.05]
p-value of the model	0.0011 [0.0000]	0.0003 [0.0000]	0.0003 [0.0000]	0.0000	0.0000	0.0000

Table 6: 3 SLS estimations: Duration of the pre-IPO private equity financing and fraction retained by the PE firms

This table depicts the results of simultaneous 3 SLS estimations for the length of the pre-IPO private equity financing (**DURATION**) and the fraction retained by the private equity firms after the IPO (**RETAINED, All**). The choice of regressors is the same as in the single equations that are shown in Tables 4 and 5. Industry dummies are not depicted. One, two and three asterisks indicate significance at the 10%, 5% and 1% level. An asterisk in brackets points to significance at the 15% level.

	1	**2**	**3**
Dependent variable: **DURATION**			
BTM	9.81*	9.10*	9.10*
START-UP	1.21***	1.03***	1.03***
GERMAN	-0.75***		
GOV		-0.94*	-0.30
BANK		-0.65**	
INDEP			0.65**
CORP		0.89**	1.54***
p-value	0.0000***	0.0000***	0.0000***
Dependent variable: **RETAINED, All**			
HOT ISSUE	10.71**	11.19**	11.19**
BTM	-24.40	-8.33	-8.33
MV	10.49	13.67(*)	13.67(*)
AGE	-0.26	-0.19	-0.19
BOOKSPAN	15.20	9.86	9.86
DSRANK MIN	-2.54***	-2.19***	-2.19***
UNDRANK MIN	1.43(*)	1.36(*)	1.36(*)
LOCKDUR	1.61***	1.47***	1.47***
DURATION	1.93	1.96	1.96
Pre-IPO SHARE, All	-0.06	-0.05	-0.05
GERMAN	-8.92*		
GOV		-6.45	8.05
BANK		-14.50***	
INDEP			14.50***
CORP		-7.28	7.22
p-value	0.0000***	0.0000***	0.0000***
# obs.	146	146	146