An analysis of the ownership structure in regards to the phenomenon underpricing for German IPOs

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Abstract

This quantitative paper investigates to what extend the phenomenon underpricing effects outside blockholdings of German IPOs in a timeframe from 2005 until 2015. Previous literature gave different explanations why firms underprice their shares in regards to the ownership structure. While some argue that underpricing and the associated oversubscription of shares leads to an allocation to small investors and thereby reduces outside blockholdings, other argue that having outside blockholders is desired. Data that covers 82 firms listed on the Frankfurt Stock Exchange/ Xetra is used to examine the relationship between underpricing and outside blockholding at the end of the year in which the IPO took place. The results however do not support the expectations that underpricing affects the fraction of outside blockholdings. Factors such as pre-IPO inside blockholding seem to be better predictors of outside blockholding, especially for a country like Germany in which a high degree of inside ownership is existent whereas these shareholders tend to retain control through the holding of large blocks post-IPO.

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1.Introduction

Initial Public Offerings (IPOs) or sometimes also called stock market launches are always considered as an exciting event in the world of finance. It occurs when a privately held company is selling stocks to the general public for the first time and is thereby turning into a public company. An IPO is an effective way to raise equity capital for further growth or big investments and to create a public market in which founders and other investors can convert their wealth into cash at a future date. However, it also comes with its risk since no one can anticipate how a stock will perform the first time it is being sold on the market.

A phenomenon which plays a major role in IPOs is the concept of underpricing. It is defined as a IPOs issue price which is below fundamental value of the stock, subsequently the price of the stock will go up in the short run. According to Engelen and Van Essen (2010), "underpricing is usually estimated as the percentage difference between the price at which shares were sold to investors during the offering period and the price at which shares trade afterwards in the secondary market. It has been research in multiple countries and the results are that it is a worldwide occurring phenomenon."

The concept of underpricing was first documented by Ibbotson (1975) who found an increase from the offer price to the first trading day closing price. There are several theories explaining why issuing companies 'leave money on the table' which are going to be explained in more depth in the conceptual framework of this thesis.

In recent years more emphasize has been put on how IPOs are allocated and how their shares trade. "A firm doing an IPO is arguably in the best position to determine the ownership structure of the firm" (Field & Sheenan, 2004).

Especially it has been investigated how issuing firms can achieve a desired ownership structure through the allocation of shares due to oversubscription which enables a company to discriminate against certain investors.

This paper is aiming at analyzing the effect of underpricing on ownership structure for German IPOs in the last years in order to provide insights on this topic which are up-to-date. The primary research question is whether IPO underpricing reduces blockholder ownership as proposed by Brennan and Franks (1997) or increases blockholder ownership (Stoughton and Zechner, 1998). Even though the foundation of this goes back to the late 90s, it is still a relevant topic nowadays since still no clear evidence exists about what the effect of underpricing on ownership structure is, as well about what the desired ownership structure is. In their paper on underpricing effect on outside blockholding, Field and Sheenan (2004) found that IPOs in the US having blockholder in place before the IPO is the norm, so they suggest if companies trying to influence the amount of blockholdings post-IPO they already lost the battle before. In addition, they concluded that underpricing has only a small influence on blockholdings. In addition to this, Elston & Yang (2010) who studied German IPOs post ownership structure with regards to underpricing found support for the agency cost argument by Stoughton & Zechner (1998), due to the large insider holdings following the IPO.

This paper contributes to the existing literature by analyzing the effect of underpricing on ownership structure for German IPOs, whereas firms which recently went public will be analyzed. The research question is:

"What effect does IPO underpricing have on the ownership structure of a firm?"

Previous studies were conducted for US, Australian and UK firms and do not show recent trends due to the times from which the samples were collected. In conclusion, policy implication for German companies engaging in IPO will be provided on basis of the findings. In case, a correlation between IPO underpricing and outside blockholding can be identified it can have important implications for a company to use underpricing as a mechanism to control for post-IPO ownership structure. Furthermore, insights will be gained on whether the *reduced monitoring hypothesis* by Brennan & Franks still remains valid in nowadays in the context of German IPOs.

2. Literature Review

In the following section the conceptual framework, including an explanation of the relevant theories and a literature review will be developed. First, it will be identified which characterizes the institutional environment of the German IPO market. Moreover, it will be explained how IPOs are priced in Germany and compare it to the studies which were conducted in different countries to see whether there are differences and what its consequences will be. Further on, it is going to be elaborated what reasons exist for underpricing and what types of shareholder can be defined with in order to be able to conclude on how ownership structure might change through the IPO and to create a common understanding of it throughout the paper. Finally, insights on previous research on this topic will be provided, on which bases the research goal of this thesis is outlined and the hypotheses will be developed.

2.1 IPOs in Germany

Since there are different outcomes in research about the effect of underpricing on ownership structure, which can be affiliate among others to the different IPO pricing processes in different countries, it is important to look at how IPOs are priced in Germany and determine whether there are country specific characteristics which can influence the IPO underpricing. Until the mid-90s the common method to price German IPOs was the so called fixed-price procedure in which a fixed price is determined at which shares are sold to investors. The price will be agreed between the issuer and the bank consortium and oriented oneself on the calculated fair value. Nowadays however, the issue price for German IPOs is determined in majority of the cases through the so called book building process. The stocks are not going to be offered to a fixed price, but the issuing company is giving a price band in between which potential investors can place bids. They have to indicate the amount of shares they want to buy at which price. At the end of the process, the final price is concluded on basis of this biding. (Grossmann & Schatzschneider, 2013). Regarding the German context, there are several aspects which need to be taken into account and to which will be referred in the discussion section. First of all, Germany can be characterized as a typical bank-based system with a relatively high concentration of ownership (especially insider ownership), stronger role of banks and relatively weaker role for equity markets compared to Anglo-Saxon countries. Moreover, Germany is a country with a relatively poor investors protection of minority shareholder which could explain that ownership concentration is relatively high (Elston & Yang, 2010). Therefore, it can be argued that higher underpricing is needed to provide investors an incentive to invest in IPOs and thereby reduce blockholding. Due to this, it is highly relevant to see what effect underpricing has on blockholdings, which is going to be investigated in this paper.

2.2 Underpricing of IPOs

In previous research, a lot of discussion took place to conclude on the phenomena of 'underpricing'. The most common explanation which is underpinned by empirical evidence is that underpricing is occurring due to information asymmetry, which has been discussed a lot in the past. According to Akerlof (1970), information asymmetry exists in a situation in which one party has more valuable information about the fair value of an asset than another party. In the IPO, it is about information disparity between different actors involved in the IPO process.

In their conceptual review on 'underpricing' Khan et al (2016) summarized papers which provide different explanation for underpricing with regards to information asymmetry. They outline that according to different studies following actors are involved in IPO information asymmetry:

Between issuer and underwriter: underwriter are having better information about market conditions and therefore underwriter are trying to achieve optimal selling target through underpricing (Baron, 1982).

Between different types of investors: Rock (1986) distinguishes between uninformed and informed investors, in which informed investors have more information about the IPO and are therefore only bidding for underpriced issues whereas uninformed investors bid for both, over- and underpriced issues (also called *Winner's curse hypothesis).* Since only a limited number of shares are issued, attractive share will be oversubscribed. Because of this, uninformed investors will receive all unattractive shares and only a small fraction of the attractive shares. As a consequence, uninformed investors get a return below average or even a negative return. With negative return, uninformed investors would not bid for any IPO anymore. Therefore, underpricing is needed to stimulate demand also of uninformed investors, since demand of informed investors alone is not sufficient.

Another hypothesis to explain underpricing is the *ex-ante uncertainty hypothesis,* which extends the Winner's curse hypothesis and was proposed by Beatty and Ritter (1986). It assumes that the more investors become informed, the more uncertainty there will be about the valuation which leads to higher underpricing.

Another reason for underpricing on which foundation this research is build was proposed by Brennan and Franks (1997). The so called *reduced monitoring hypothesis* assumes that underpricing results in an oversubscription for the IPO through which the issuer can ration the allocation of shares and to discriminate between applicants to reduce the amount of new blockholdings post-IPO. Large applicants are discriminated in order to protect companies' insiders against hostile change of control. Mello and Parsons (1998) support this by arguing that the optimal allocation strategy should favor small investors.

2.3 Shareholder Definitions

In order to conclude on the effect of underpriced IPOs on blockholder ownership, it is important to identify the dimensions of shareholder structure.

The terminology employed throughout the paper refers to the followings shareholder definitions, as suggested by Hill (2006).

a. Blockshareholder

A blockholder is defined as a shareholder who holds more than 5% of the issued share capital of the company post issue. Because of the relatively large amount of fraction held by a blockholder it is assumed that they have more incentive to monitor management (see also Agency Cost Theory). The issuing company is required to declare any interest of which it is aware which will be over 3% of the ordinary share capital post issue. In Germany, companies need to disclose when a holder excesses the 3%, as stated in the Amended Transparency Directive. So all director shareholdings and most other insider shareholdings will be stated in the IPO prospectus as well as in the annual reports, whether they are in excess of 3%.

b. Inside Shareholder

Inside shareholders are shareholders which have a direct interest in the company, which are: Directors, managers, the company ESOT (employee share ownership trust), employees, trusts in which directors have an interest and family members.

c. Outside Shareholder

An outside shareholder is defined as someone who is not an insider. For instance, a institutional investors, a corporate venture or trading partner, trusts unrelated to directors or individuals who are not family members.

d. New Shareholder

New shareholders are shareholder with no equity claim over the pre-IPO assets, they do arise after buying shares in the IPO process.

e. Existing Shareholder

An existing shareholder is the opposite of a new shareholder; it is defined as a post-IPO shareholder with an equity claim over the pre IPO assets of a company. Note that existing shareholder include those who shareholdings which arise as part of the consideration for an acquisition, since these shareholders are considered to had an equity claim of the post IPO assets pre IPO.

2.4 Underpricing and Ownership Structure

The underlying theory of this research is that underpricing can be used to affect post-IPO ownership structure. In case an IPO is underpriced, investors are more likely to oversubscribe for the offering. Therefore, the issue can be intentionally underpriced to foster oversubscription through which the underwriter can allocate shares to investors in order to achieve a desired ownership structure for the company (Zheng & Li, 2008).

However, previous literature gave different explanations what the desired ownership structure is. Basically there are two notions which type of ownership structure IPOs favor: concentrated ownership including a high percentage of blockholding or dispersed ownership including a low percentage of blockholding.

2.4.1 Underpricing and Blockholder Ownership

Booth and Chua (1996) argue that the intentionally underpricing of IPOs can help to achieve dispersed ownership which in turn increases secondary-market liquidity. Increased liquidity reduces the required return to investors and thus a higher equilibrium price for the firm's shares, which makes a dispersed ownership structure even more attractive for investors. In addition, it has been outlined that a dispersed ownership is the desired ownership structure for IPOs since it reduces incentives for new shareholders to monitor current management. The reason for this is that small investors have less incentive and possibilities to monitor than investors who own large blocks of the companies shares. Directors want to remain their control after the IPO in order to avoid the possibility of a hostile takeover.

If therefore IPO companies intend to improve market liquidity or managers want to remain control including reduced

monitoring, underpricing is assumed to be used as a mechanism to achieve a dispersed ownership structure including low blockholder ownership. Shares will be therefore allocated to small investors which results in a low degree of blockholder ownership.
On the other hand, Stoughton and Zechner (1998) proposed a different perspective: IPO companies use underpricing to achieve a more concentrated ownership. According to them, a more concentrated ownership is maximizing firm value since large investors have more incentive to monitor the managers and therefore the risk of 'free-riding' shareholders can be decreased. If managers hold large stocks of a company, agency costs they carry might outweigh private benefits of managers. In such a case it might be in their interest to be monitored by others.
As one can an issue which highly matters in the context of IPOS is whether firms want to maintain control and reduce outside blockholdings or the other way around by obtaining blockholdings.

2.4.2 Other Determinants of post-IPO Ownership Structure

In order to estimate the change in post-IPO ownership structure accurately, also other influencing factors need to be taken into account. In their study about the pre-IPO ownership structure on the IPO process, Alavi et al. (2008) show that different pre-IPO ownership structures result may result in different managerial incentives to retain control post-IPO. It is documented that managers are trying to retain control through offer size and share allocation. This indicates that it is important to check whether inside shareholder hold blocks pre-IPO and whether this changes after the IPO. Assuming that inside shareholder are trying retain control there should be a significant difference in the amount of outside blockholding post IPO in case an inside blockholder is in place pre-IPO.
Moreover, the presence of a venture capital (VC) has played a major role in the discussion about IPO valuation in previous research. Lin and Smith (1998) find that VC-backed IPOs exhibit less underpricing which supports the assumption that VCs can play a certification role by signaling quality to potential investors. It has been argued that VCs certify the true value of a firm and therefore reduce underpricing while at the same time providing inventive for investors to invest in the IPO. Basically, Venture Capitals tend to bear the costs of higher underpricing. Lee and Wahal (2001) on the other hand find that underpricing for VC-backed IPOs is higher and thereby supporting the so called grandstanding hypothesis. Even though Elston & Yang (2010) could not find a significant relationship between underpricing and venture capital for German IPOs we will still take it into consideration due to the market differences in the data sample. [1]Other determinants of ownership structure are common firm and offer characteristics, as suggested and confirmed by Field & Sheenan (2004), which are firm size, volatility of returns, leverage, operating expenses, operating expenses and tangible assets. According to Demsetz and Lehn (1985) and Himmelberg et al. (1999) ownership is a function of firm sized whereas the above mentioned variables all display firm size in various ways. Besides the mentioned aspects also an equity carve-out can have a significant influence on post-IPO ownership structure. "An equity-carve out is the sale by a public firm of a share of one of its subsidiaries common stock through an initial public offering" (Anslinger et al., 1997). So far literature on IPO ownership did not discuss equity carve-out in its full existence. However, it can be argued that equity carve-outs are linked to blockholdings since parent companies spin out their subsidiaries and will therefore probably maintain holding a large amount of the company's stocks.

3. Hypothesis

Based on the conceptual framework and the literature review the following hypothesis has been developed to test the effect of IPO underpricing on ownership structure. Note that different viewpoints were taken into account.

Hypothesis: IPO Underpricing effects the amount of outside blockholder ownership post-IPO and at the end of the year.

Booth and Chua (1998) argue that IPOs are underpriced to achieve a dispersed post-IPO structure including a low degree of blockholdings which in turn second-market liquidity. They imply that underpricing is negatively related to the level of blockholder ownership. These implications are also supported by Brennan and Franks (1997) who argue that a low degree of blockholding is desired to reduce control upon management. It is assumed that a greater proportion of equity sold is purchased by small investors, e.g. non-blockholder due to underpricing. Also the counter argument needs to be taken into account, which is supported by Stoughton and Zechner (1998). They suggest a positive relationship between underpricing and blockholder ownership to maximize firm value due to the monitoring role of blockholder. The most recent studies, which we are aware of and which was conducted for German IPOs also supports the findings of Stoughton and Zechner stating that blocks tend to arise post-IPO with regards to underpricing (Elston & Yang, 2010).

4. Methodology

In order to test the impact of the independent variable underpricing on the dependent variable outside blockholdings, we are going to conduct two parts of analysis. First of all we will break down the sample in different groups and compare the average degree of underpricing using simple *t*-tests. Later a linear regression is to determine the quantitative impact of underpricing while controlling for other variables which tend to explain ownership structure. The dependent variable will be operationalized as the total fraction of outside blockholding at at the end of the year following the IPO. The variable will be regressed on market capitalization, ratio of property plant and equipment to total assets, pre-inside blockholding, leverage ratio (total debts to assets) and underpricing as our variable of interest. Moreover on dummy variables, venture capital backed, carve out and year. The linear regression model will be explained in more depth in the later part of this thesis.

5.Data and Descriptive Statistics

In order to elaborate on the extend of underpriced IPOs in Germany a sample of 103 firms which were issued on the *Frankfurt Stock Exchange* and *Xetra* between 2005 and 2015 has been taken. [2] In order to prevent from bias due to different market conditions on different stock exchanges, only IPOs from these exchanges are considered, whereas IPOs issued on other markets have been excluded. Also companies must have had ownership structure information available (in annual reports at the end of the year).

[1] The authors analyzed firms listed from Germany's Neuer Markt (NM), while we deploy a sample from the Frankfurt Stock Exchange/ Xetra.

[2] *Xetra* is a market segment which belongs to the *Frankfurt Stock Exchange* and according to their website, Xetra accounts for around 90% of all stock trades in Germany.

Table 1: Descriptive Statistics of Transformed / Adjusted Variables

Variable	N	Mean	Std. Deviation	Maximum	Minimum	Skewness	Kurtois
UNDERPRICING (%)	82	4.17	12.06	39.35	-23.08	0.85	1.44
MARKETCAP_ln (€)	82	19.49	1.56	22.60	16.54	0.27	-0.76
PPE-RATIO	82	21.38	23.92	96.48	0.03	1.65	2.29
PRE-INSIDEBLOCK (%)	82	39.40	39.59	100	0	0.33	-1.59
LEVERAGE_ln	82	2.46	1.28	4.58	0.03	-0.359	-0.87

The variables are computed as follows: Underpricing as the difference between issue price and first day closing price/ by issue price; market capitalization as the natural logarithm of the outstanding shares times the closing price; PPE-ratio as the fixed assets divided by the total assets; pre-inside ownership as the fraction of inside blocks as in place of the IPO and finally the leverage as the natural logarithm at the short-term debt and long term debt divided by total assets times 100 plus the 1 (in order to avoid negative values).

Furthermore, for the linear regression model data for the market capitalization, the ratio of property plant and equipment to total assets and the leverage ratio were collected from the *Orbis* database. In case a company has is not listed in Orbis, the data is collected from the annual report published and the end of the IPOs year. For the variable pre-inside blockholding the data has been collected from the website of the stock exchange from which all pre-IPO ownership data stem from. We excluded 18 firms since no data for these information could be gathered, which decreases our sample to a number of 85. Due to the fact that several variables are not normally distributed which can be concluded from their Skewness and Kurtosis, the observations require further adjustment and transformation. Therefore observation have been excluded according to following criteria:

a.) IPOs with a degree of underpricing of -30% and less;
b.) Firms with a leverage of >1.

In total three outliers have been excluded based on these criteria, decreasing our sample to a final sample size of 82 firms. With this sample, we cover around two-thirds of all German IPOs between 2005-2015.[3]

Furthermore, the variables MARKETCAP and LEVERAGE require some sort of transformation since on basis of Skewness and Kurtosis they are not normally distributed and therefore cannot be used in the linear regression model in the later analysis. The variable MARKETCAP is transformed using a natural logarithm obtaining a Skewness of 0.27 and a Kurtosis of -0.76 and can therefore be included in the linear regression model. For the LEVERAGE_ln we transformed the original variable using a natural logarithm, added the value 1 to avoid negative numbers multiplied it by the value 100 to obtain percentages.

The dataset with the was requested from the *Commerzbank AG* and adjusted to the need of this research. The data regarding the ownership structure before the IPO are hand-collected from the official website of the *Frankfurt Stock Exchange.* Moreover, annual reports provided the data on how ownership structure has changed at the end of the year in which the IPO took place. Companies acquiring shareholders with >3% of the stocks are obliged to announce that in their financial statements, which allows us to follow changes in blockholder ownership.

Working with annual reports however, does not allow us to determine when a new blockholder comes into the firm. It can only be observed whether a certain public is present pre-IPO and whether he is still listed by the time of the annual report or whether a new blockholder bought into the firm. It is possible that some blockholder will be missed this way; in case a blockholder arises and sells out in between the IPO and by the time of the annual report. However, due to the short existence of these blockholder it can be denied that they are in a good position to monitor the firms, which has been also stated by Field & Sheenan (2004). In the dataset, the companies name, the issue price and the price at the end of the first trading day can be found.

To determine the degree of underpricing as a percentage, the initial return as a percentage, equals the difference between the issue price of an IPO and the first trading day closing price on the secondary market divided by the issue price (Gregoriou, 2005).

$$IR_i = (P_i - E_i) / E_i$$

IR_i means the initial return (IR) of the share (i); P_i is the trading price (P) of the share (i) at its first trading day closing price on the secondary market and E_i is the issue price (E) of the share (i).

These data allowed us to determine the accurate degree of underpricing for different German IPOs issued between 2005 and 2015.

In **Table 1** one can see that from a total amount of 82 firms, the average degree of underpricing is 4.17%. Compared to other studies which have been conducted for German IPOs, we find that the overall degree of underpricing is relatively low. Goergen et al. (2009) found an average degree of underpricing for the *Neuer Markt* of 52,89% which is much higher compared to what we found for IPOs listed on the *Frankfurt Stock Exchange/Xetra* and also to the 10,57% what Ljungqvist (1997) reported in his study.

The *Neuer Markt* as analyzed in previous studies has been a consequence for the increasing demand for equity investments in 1997 and to create a channel capable of channeling funds to into the development of small high-tech firms. One explanation for the relatively high amount of underpricing in the *Neuer Markt* is that it contained many small high growth technology firms which seem to be riskier. Therefore, it can be argued that underpricing was needed to compensate investors for taking the risk of these risky investments.

[3] According to *Statista.com (2016),* a total of 128 went public between 2005 and 2015 in Germany.

6.Results

6.1 Blockholdings at the IPO and at the end of the year

Both streams that we consider are concerned with concentration of ownership. In particular, it is the existence of blockholder which highly matter when discussing ownership concentration because blockholder have the incentive and the the capabilities to monitor management, which can either be seen as a cost or on the other hand as an advantage. For our analysis, we simply consider two types of blockholder: outside blockholder, inside blockholder. From the last category we expect monitoring abilities to be highest since they often represent the current management or have a seat in the supervisory board which task it is to monitor the executive board of the company (by auditing the firm's financial statements but also other publications, such as annual reports).
As described earlier we will also put emphasize on inside blockholdings and thereby extend Field and Sheehan's analysis, since for managers and family members a high desire to retain control about the company's assets is assumed.

6.2 New outside blockholder and existing outside blocks

In the analysis so far, it has not been investigated whether the blockholder(s) are new. To see whether new blocks arise the annual reports of the firms have been examined and checked whether new blocks (>5%) appear at the end of the year. In **Figure 1**, a breakdown of the findings is provided with regards to the degree of underpricing at the IPO. From the figure, one can see that having an outside blockholder in place is common for our firms, since 68 firms (*82.93%*) of the firms have an outside blockholder pre-IPO, whereas only 14 firms (*17.07%)* do not have an outside block in place. This observation is to a certain extend in line with what we discussed earlier, namely that in Germany a high ownership concentration is present and outside blockholding can be interpreted as an indicator for this.

Furthermore, from the firms that have an outside blockholder in place 20 firms (*29.41%)* obtain a further blockholder at the end of the year and 48 firms *(70.59%)* do not. On the other side of the figure, from the 2 *(14.29%)* out of the 14 firms obtain a new block, whereas 12 firms *(85.71%)* do not. When comparing the degree of underpricing in regards to whether a new blockholder was acquired between the groups, it can be observed that firms with no outside block in place but acquiring a new one are more underpriced, which is supportive for Stoughton and Zechner, implying that underpricing higher underpricing is used to achieve a concentrated ownership structure by obtaining blockholder at the end of the year from the IPO. One the other hand firms which have an outside block in place as of the IPO and obtain no new one have higher underpricing, which is supportive for Brennan & Franks. However, both differences in the degree of underpricing are statistically not significant as a *t*-test yields a *p*-value of 0.92 for the side where no blockholder was in place and 0.90 where a blockholder was in place.
Furthermore, one can observe that firms that already have an outside blockholder in place underprice less (*3.29%),* compared to firms with an outside blockholder in place (*8,38%).* A possible interpretation for this is that firms with no blockholder pre-IPO are aiming at acquiring a blockholder or keeping blockholder out through the underpricing of their stocks, whereas is is ambiguous which one is more reasonable due to the previous observation which are supportive for both Stoughton and Zechner but also Brennan and Franks. Note, that the *t*-test shows that this difference in the means in the degree of underpricing between the two groups is statistically not significant yielding a *p*-value of 0.10 but showing a trend towards significance.

6.3 New outside blocks and inside blockholdings at the IPO

Since previous literature on IPO ownership structure outlined that the pre-IPO ownership structure is of high relevance. This seems to be especially managerial ownership (in this paper classified as inside ownership along with family members) due to their desire to maintain control about the companies' assets after the IPO. Again, we split our sample in two groups (see **Figure 2** (Appendices)), whereas there are 52 firms (*63.41%)* with an inside blockholder in place and 30 firms (*36.59%)* which do not have an inside blockholder in place. The degree of underpricing for the first group is *3.42%* and for the second it is *5.45%.* A reasonable interpretation for this is that firms with an inside blockholder in place underprice less in order to retain control through a desired allocation of shares in order to avoid the acquisition of new blocks after the IPO. This would be supportive for Alavi et al. (2008) who state that pre-IPO ownership by managers influences their incentive to maintain control, through share allocation which can be achieved through underpricing. From the firms which have an inside block in place as of the IPO, eleven firms *(21.15%)* obtain a new outside blockholder at the end of the year with an average degree of underpricing of -*3.02%,* whereas from the 41 firms (*78.84%)* which do not obtain an outside blockholder by the end of the year the average degree of underpricing is *5.15%.* For the firms that do not have an inside block in place, also eleven (*36,67%)* firms obtain a new outside block at the end of the year with an average degree of underpricing of *9.99%* and 19 firms *(63.33%)* that do not obtain a new block the average degree of underpricing *2.81%.* First of all, we can observe that almost two-thirds of the firms in our sample have an inside blockholder in place pre-IPO. This is in line with the findings of Goergen et al. (2009) who found that 70.85% of the firms that went public have a family or individual as their shareholder. With our observation, we can underline their findings and it can be said that in Germany a high degree of inside ownership is existent pre-IPO. Moreover, for this breakdown it can be observed that no clear pattern between underpricing and the existence of new blocks exists, especially for firms which have an inside block in place as of the IPO. For the firms with no inside in place is much higher (with *9,99%* compared to *2,81%)* in regards to whether they obtain a new blockholder at the end of the year. Again this is supportive for the theory of Stoughton and Zechner saying that higher underpricing is deployed to achieve a more concentrated ownership including more blockholdings. With a *p*-value of 0,072, assuming a difference between the two groups in regards to the average degree of underpricing, it is close to being statistically significant and shows a trend. For the group, in which an inside blockholder was preexistent the eleven firms which obtained a new outside blockholder had an average degree of underpricing of -*3,02%* and for 41 which did not the average was *5.15%.* One can argue that the firms underpricing more have a smaller chance in obtaining an outside blockholder by the end of the year in case an inside blockholder is present. However, the difference in means is not statistically significant with a *t*-test yielding a *p*-value of 0.075.

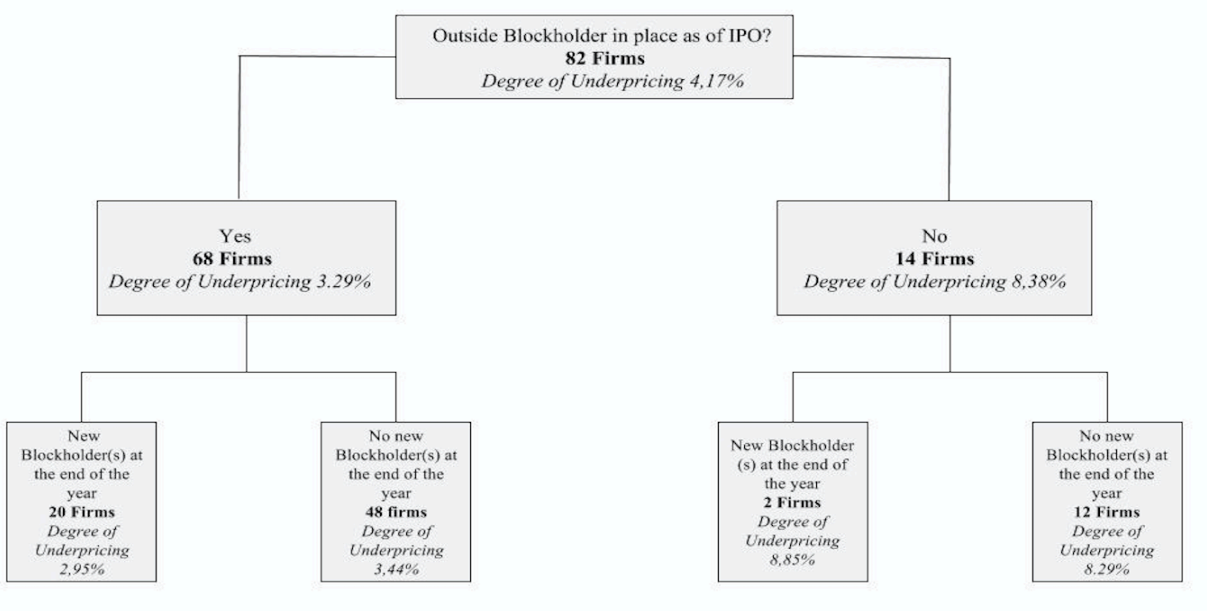

Figure 1: Average degree of underpricing for a sample of 82 initial public offerings between 2005-2015, classified by whether a blockholder exists prior to the IPO and at the end of the year. Degree of underpricing is measured as from the offer price to the first closing price on the secondary market; p-value (as described in the text) are given for for testing the hypothesis that differences in degree of underpricing between groups are zero.

6.4 Regression Model

The observations so far indicate that the association between underpricing and the subsequent ownership of blocks is relatively weak and requires further investigation. In the next step, we extend the analysis and develop a regression model through which the effect of underpricing ownership structure is examined. It will be statistically tested via a linear regression model whether there is correlation between the degree of underpricing and outside blockholding post -IPO and at the end of the year from the IPO. The purpose of this is to estimate the effect of underpricing on outside blockholdings in a quantitative way and in addition to see whether the univariate results from our previous analysis is altered when additional variables are considered. To capture the effect of underpricing on *blockholder ownership,* we will measure blockholder ownership as the fraction of total ownership at the end of the year in order to also gain insights about whether IPO underpricing also has a longer lasting effect on ownership structure Afterwards the variables will be regressed on underpricing. As described earlier it is likely that firm and offer characteristics affect both block ownership and underpricing which need to be included in the multiple regression models. We follow Field & Sheenan (2004) and regress ownership on *firm size* (measured as market value of equity) and the *debt ratio* (as measured as the ratio of total debts to assets). Additional variables which serve as proxies for agency costs are the ratio of property, plant and equipment to total assets. Also dummy variables, which relate to the IPO itself will be included, such as whether the firm is a carve-out or has a venture capital involved. The last variable we will control for is year. Previous research did not take year into account when analyzing ownership structure, however as discussed earlier in the years of the financial crisis higher levels of outside blockholding is assumed due to the riskiness in this period which should especially affect small and uninformed investors. From findings in previous studies we expect the relationships of the mentioned variables on outside blockholdings to be as follows: degree of Underpricing can either be positive or negative, depending on which theory applies for our sample. A firm's market capitalization at the IPO is according to Field & Sheenan (2004) slightly positive impacting the fraction of outside blockholders. No explanation for this is delivered in their paper, but it can be argued that market capitalization displays firm size and therefore larger firms are more attractive for outside blockholdings which are mostly held by corporate investors who are in a better financial position to raise these amounts of money to acquire blocks of large companies which are more expensive than smaller companies. Regarding the ratio of property, plant and equipment to total assets (as a proxy for agency costs) a slightly negative relationship is assumed as indicated. Firms with a value in PPE should tend to not acquire large blockholdings. Regarding the leverage measured as total debts to assets a slightly positive coefficient is expected which can be explained through the fact that firm with more debts could be seen as to risky for uninformed small investors. Unfortunately, most of the firms in our sample do not provide data on how much they spent on research and development, that is why we excluded this variable from our model, assuming that it will not have strong influence on the model with regards to the findings of Field & Sheenan (2004). As described in the literature review the pre-IPO ownership structure, especially the inside ownership can matter for the IPO process and tends to effect post-IPO ownership structure. We will therefore include pre-IPO blockholding as the % of total ownership in the model assuming that it will have a negative sign towards outside blockholding, since inside blockholder want to retain control after the IPO. Finally, the degree of underpricing will be included in the model, which leads us to the following model. The dummies VC backed and carve out should be positive since the often represent blockholdings. And least, the dummy variable year should be positive.

$$OUTSIDEBLOCK_i = \alpha_0 + \beta_1 \text{UNDERPRICING}_i + \beta_2 \text{MARKETCAP\_LNi} + \beta_3 \text{PPE-RATIO}_i + \beta_4 \text{PRE-INSIDEBLOCKi} + \beta_5 \text{LEVERAGE}_i + \beta_6 \text{VENTURECAPITAL}_i + \beta_7 \text{CARVEOUT} + \beta_7 \text{YEAR\_crisis} + \varepsilon$$

The results from the linear regression (with the dependent variable End of the Year Outside Blockholdings) (**Table 4)** below show a rather small standardized coefficient beta for the degree of underpricing, stating that it tends to increase the amount of outside blockholdings at the IPO end of the year with 0.02. The outcome also shows that it is not statistically significant with a *p*-value of 0.80. Furthermore, as assumed MARKETCAP_ln has a positive direction with a beta of 0.16 and is statistically significant with with a *p*-value of 0.05. The leverage ratio, total debts to assets, has a positive sign, which was expected (with a *p*-value of 0.31 is statistically not significant). The same can be seen from the ratio of property, plant, equipment to total assets. The next variable in the model is pre-IPO inside blockholding, which is highly significant with a *p*-value of 0.00. The standardized coefficient is negative as expected with a value of -0.65 and can be interpreted as our strongest predictor from our dependent variable. The venture capital backed dummy has the expected positive sign for its coefficient (0.04) but the variable is not valid with a *p*-value of 0.61. The next variable in our model is the carve out dummy, it is the second strongest predictor in our model with a standardized beta of 0.30 which is in line with what we expected in our previous discussion. It is also statistically significant with a *p*-value 0.00. The last dummy variable year also has the expect sign in its coefficient with 0.09 tending to increase outside blockholding, which underlines that assumption that in years of the financial crisis outside blockholding tends to be lower due to uncertainty which especially small investors deter from buying shares. However, it is not significant with a *p*-value of 0.29.

The model has moreover has a r-square of 0.572 which is relatively high and states that the model explains *57%* of the variability of the responses data around its mean, however this should be mainly attributed to the variables PRE-INSIDEBLOCK and the CARVEOUT dummy. From the model we can see that those variables which are statically significant have the expected sign and tend to influence the fraction of outside blockholdings at the end of the year, whereas the strongest predictor is pre-IPO inside blockholding. This makes sense because where a large inside blockholder is in place there is not so much room for outside blockholder to exist. It also shows that the majority of inside blocks is not selling out and retains control which is supportive for Alavi et al. (2008) who stated pre-IPO ownership structure highly matters, especially when it comes to inside ownership. Also the carve-out variable is a strong predictor which is logical since carve-outs is a spin-out in which a parent company sells a substitute but often remains a large blockholder. From the correlation Matrix **Table 3**, it an be seen that the model show some multicollinearity between some variables. Especially, in regards to underpricing it can be seen that especially venture capital seems to negatively effect the degree of underpricing which has been found in studies before. One explanation for this is that venture capital can be a substitute for underpricing by signaling quality to small investors and thereby attracting them to buy a companies shares. Due to the VIF of 1.25 however which is still acceptable the variable can still be included in the regression model.

Table 3: Correlation Matrix

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
UNDERPRICING	(1)	1	0.09	0.03	-0.01	0.04	-0.29**	0.26*	0.07
MARKETCAP_ln	(2)	0.09	1	0.19	0.11	-0.01	0.01	0.06	-0.19
PPE-RATIO	(3)	0.03	0.19	1	0.84**	-0.11	-0.01	0.27*	-0.14
LEVERAGE_ln	(4)	-0.01	0.11	0.84**	1	0.01	-0.12	0.1	-0.14
PRE-INSIDEBLOCK	(5)	0.04	-0.01	-0.11	0.01	1	-0.16	-0.21	0.10
VCBACKED	(6)	-0.29**	0.01	-0.10	-0.12	-0.16	1	-0.29**	-0.11
CARVEOUT	(7)	0.26*	0.06	0.27*	0.10	-0.21	-0.29*	1	-0.09
YEAR_crisis	(8)	0.07	-0.19	-0.14	-0.14	0.10	-0.11	-0.09	1

**Significant on 0.01 level

*Significant on 0.05 level

Table 4: Results Linear Regression Model

The Table below shows the outcome of the linear regression model with *End of Year Outside Blockholding* as the dependent variable, measured as the fraction of outside blockholdings to all shareholdings at the end of the year in which the IPO took place with a total of 82 observation between 2005 and 2015. The R^2 of the model is 0.572. Dummies (VCBACKED, CARVEOUT and YEAR_crisis are set to 1 in case it has been observed and to 0 if otherwise).

	B	SE_B	Beta	t	p	VIF
(CONSTANT)	-11.20	25.44		-0.44	0.66	
UNDERPRICING	0.04	0.17	0.02	0.25	0.80	1.16
MARKETCAP_ln	2.54	1.26	0.16	2.02	0.05**	1.10
PPE-RATIO	-22.68	15.76	-0.22	-1.44	0.15	4.06
LEVERAGE_ln	2.90	2.84	0.15	1.02	0.31	3.77
PRE-INSIDEBLOCK	-0.40	0.05	-0.65	-7.98	0.00*	1.13
VCBACKED	2.15	4.18	0.04	0.51	0.61	1.25
CARVEOUT	21.38	6.41	0.30	3.33	0.00*	1.38
YEAR_crisis	5.32	5.03	0.09	1.06	0.29	1.10

* Significant at the 0.01 level
** Significant at the 0.05 level
***Significant at the 0.10 level

7. Conclusion

In this paper it has been investigated whether there exists a relationship between underpricing and the subsequent block ownership at the end of the year. Many preceding papers came to different conclusions whereas the foundation goes back to Brennan and Franks who argue that underpricing is deployed to avoid blockholding and the opposing theory by Stoughton and Zechner who argue that underpricing is used to encourage them. In this study it has been found that having an outside blockholder in place is the norm for a large fraction of *82.93%* of the firms. Moreover, slightly more than one-third of the firms even have an outside block with a seat on the firm's supervisory board. In accordance with other papers, Germany is therefore a country with high ownership concentration, not only regarding outside blockholdings but also, and especially inside block ownership is quiet high. Therefore, we conclude that firm's concerns and efforts in keeping blockholder out or encouraging them might be misplaced. If firm's want to keep outside blockholder out, most of them lost the battle already before going public. Given the fact that most blocks remain within the first year and do not sell out. On the other hand, when firms want to encourage blocks in order to achieve a more concentrated ownership after going public, most of the firms already won the battle before even offering their shares to the public. In addition, we conducted a model deploying outside blockholding at the end of the year as our dependent variable and came to the conclusion that underpricing has only a small positive effect on the percentage of blockholdings held at the end of the year. However, it is not statistically significant. We came to the conclusion that the best predictor of outside blockholding at the end of the year is pre-IPO inside blockholding which also indicates that most insiders still hold a large fraction of the firm's stock at the end of the year, which supportive for Alavi et a. (2008). In general Germany is country with a high degree of ownership concentration, especially in regards to inside ownership. Inside owners seems to retain control through the holding of blocks after the IPO because these owners are often represented through family who once started the business and therefore they still want to hold the majority of control. For firm's policy that could mean that offering a low price range when going public in order to attract small investors might not be an effective way to keep blockholders out or attract them.

8.Limitation and implications for future Research

This study has tried to give insights on the effect of underpricing on the degree of outside blockholding at the end of the year. We came to the conclusion that most companies already have a blockholder, either inside or outside, in place as of the IPO which is typical for the German context. One limitation of this study was certainly the general amount of IPOs in recent year. Whereas previous studies on German IPOs have been conducted for the *Neuer Markt*, this study analyzed the Frankfurt Stock Exchange/ Xetra where only a small number companies have gone public compared to the other market. Moreover, when looking at other studies for other countries the amount of IPOs is often higher. Therefore, one reason why some variables might not be statistically significant could be attributed to the relatively small sample size. For future studies it is advised to analyze a market where an adequate amount of firms go public. Implications from the findings for future research are the idea of a relationship between underpricing and ownership structure might be misplaced especially for a country like Germany with high ownership concentration and relatively low investor protection as described in the beginning. Future research should take this into account and also the pre-IPO ownership structure since this seems to be a main factor for the companies post-IPO ownership structure. Since underpricing does not really seem to affect ownership structure, as described by Stoughton and Zechner or Brennan and Franks, future research should lead in a different direction by taking into account other offer mechanism used by firms when they go public. In conclusion, underpricing in for recent IPOs in Germany does not have an effect on post-IPO blockholdings.

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10. Appendices

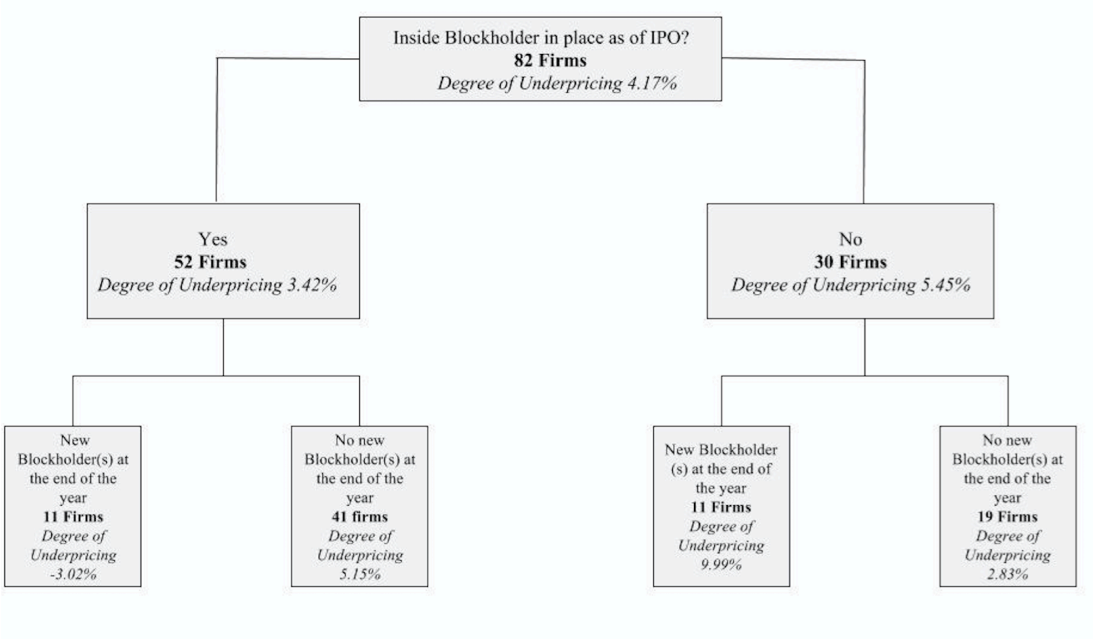

Figure 2: Average degree of underpricing for a sample of 82 initial public offerings between 2005-2015, classified by whether a blockholder exists prior to the IPO and at the end of the year. Degree of underpricing is measured as from the offer price to the first closing price on the secondary market; p-value (as described in the text) are given for for testing the hypothesis that differences in degree of underpricing between groups are zero.