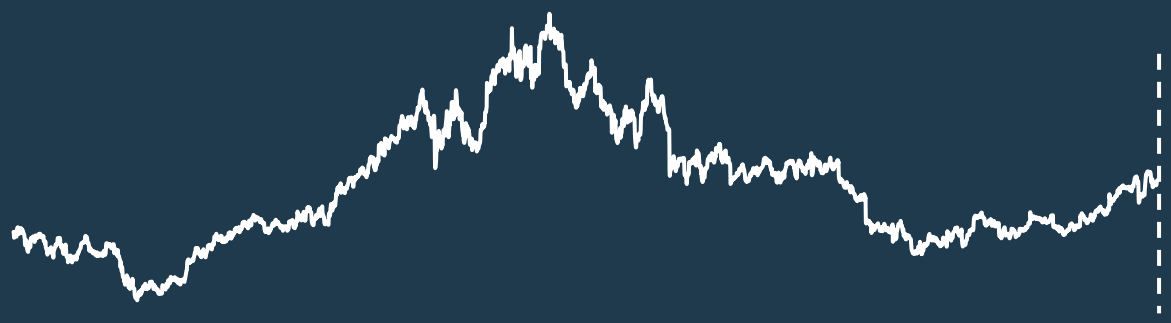
Determinants of Private Equity-Backed Delistings



An Empirical Investigation of the Determinants Affecting the Likelihood of Private Equity-Backed Bids on Publicly Traded Firms

Master's Thesis
Submission date: May 15th, 2018
Supervisor: Leonhardt Pihl
Standard pages: 112
Characters: 255,784

Marc Bregneberg (57617)
Peter Christian Jensen (86207)

CBS COPENHAGEN BUSINESS SCHOOL
HANDELSHØJSKOLEN

MSc ECONOMICS AND BUSINESS ADMINISTRATION
APPLIED ECONOMICS AND FINANCE

Abstract

This thesis studies the determinants of private equity bids on publicly listed firms in Europe by studying firm characteristics of 161 unique private equity targets from 2004 – 2015 and a matched sample of comparable firms which were not targeted by private equity investors. Through a theoretical examination of traditional and agency theory related going private motives and an empirical review of previous studies, we develop seven testable hypotheses which are investigated using multivariate logistic regression analysis.

From our analysis, we find evidence that stable free cash flows, lower firm sizes, dispersed ownership, higher debt collateralization possibilities and higher levels of sales growth increase the likelihood of being targeted by private equity investors. The impact of ownership concentration is analyzed through multiple dimensions, where we conclude a significant negative effect from large shareholders and concentrated ownership. Supplementary, we find that large ownership stakes held by insiders reduce the potential for value creation through a reduction of agency costs and ultimately decrease the attractiveness among private equity investors. Conversely, our results find no evidence of the impact from stock liquidity, undervaluation, levels of free cash flows and profitability. Similarly, by challenging previous studies which find pre-existing leverage significant, we provide findings suggesting that this aspect has no impact on the likelihood of a private equity-backed going private bid.

From a series of modifications of our dataset, we contribute to the existing literature by finding new indications of how investor motives are affected by the global financial crisis of 2007 - 2008 and by structural differences between UK and the rest of Europe. The thesis is concluded by a discussion of limitations and related suggestions for future research within the field of private equity-backed going private transactions.

Table of Contents

1. Introduction

The following introductory part consists of an initial presentation of the background of the thesis and the motivating factors for our conducted research. Based on this, a problem statement is formulated. This is supplemented by the delimitations and the scope of the thesis, after which a methodological framework is briefly established. Finally, the contributions of our research are discussed, and the overall structure of the thesis is outlined.

1.1 Background

An Initial Public Offering (IPO) is a milestone for many firms to reach in order to harvest economic benefits of being a publicly traded corporation. However, some of these firms which have reached such milestone may decide to evaluate the underlying benefits of initiating a reverse process becoming a privately held firm after years as a public entity. Frequently, private equity (PE) investors are the initiators of such transactions. A recent example comprises Hellman & Friedman's acquisition of Nets A/S at an enterprise value (EV) of EUR 5,575m in February 2018 (Mergermarket, 2018). These types of deals absorb significant public attention as they also affect retail investors, which explains the higher degree of transparency of terms in such transactions compared to PE-backed deals where the target is initially privately held, as such deals often are undisclosed.

From 2000 - 2007, PE-backed delistings rose significantly. Especially, Europe excl. UK (Continental Europe) and US experienced a significant increase, where UK maintained its high level of take-private deals which was approximately equal to the total frequency in Continental Europe. As the global financial crisis of 2007 - 2008 (simply denoted "crisis" for the remainder of the thesis) arose, the deal count fell remarkably, and the frequency of take-private deals has not reached the same level as prior to the crisis. However, the deal count in Continental Europe has exceeded UK, which indicates a clear development in the European market. Various previous studies have conducted research within PE-backed delistings, primarily in US and UK, while fewer studies have illuminated the field in a European context. Multiple approaches related to sampling processes and methodologies have been applied by previous papers, which have led to numerous different results and conclusions with opposing statistical evidence. Furthermore, the majority of the previous literature has been completed prior to the financial crisis. From a review of existing literature, we seek to select applicable and relevant techniques combined with own additions to provide an up-to-date analysis within the field. Hence, this thesis studies PE-backed delistings of publicly traded firms in Europe in the period 2004 – 2015 in order to discover significant determinants motivating such transactions. Specifically, by investigating testable hypotheses through an empirical analysis, it focuses on the characteristics of firms taken private by PE funds in pursuance of uncovering statistical significant relationships used to explain preceding take-private transactions. Ultimately the purpose is to contribute to existing academia in the research field examining the decision between public- and private ownership of corporations and possibly assist future research on European PE-backed delistings.

1.2 Research problem

With reference to the previous section presenting the scope of this thesis within European PE-backed delistings, we will focus on the factors driving these transactions and their likelihood of occurrence. These will be investigated through an empirical analysis of delisting determinants. Thus, the following problem statement will be examined:

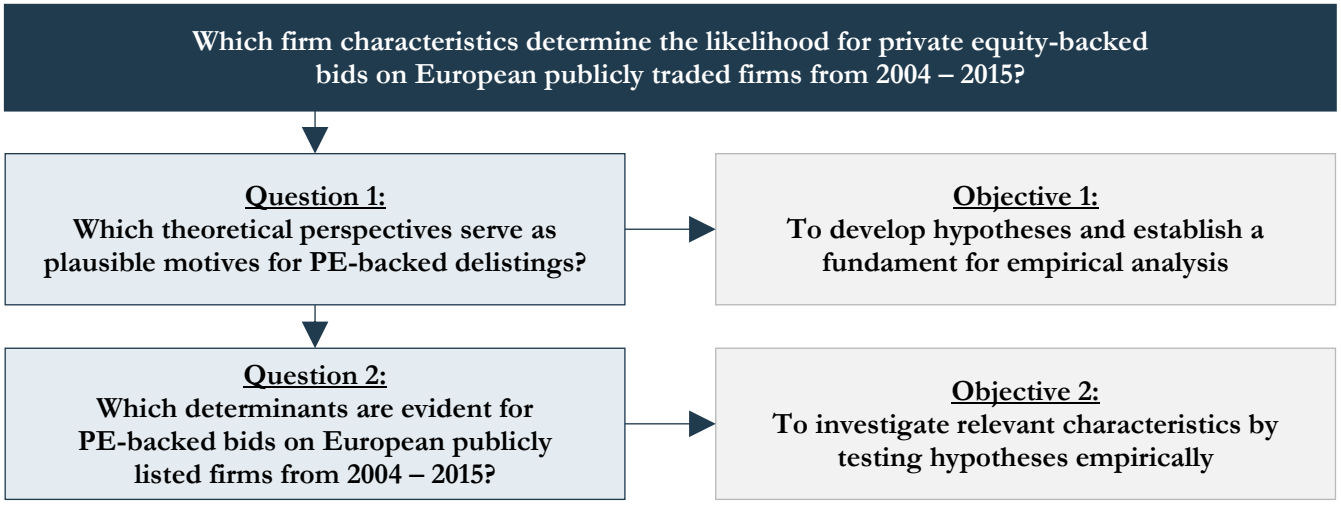
Which firm characteristics determine the likelihood for private equity-backed bids on European publicly traded firms from 2004 – 2015?

This question will be answered empirically through a review of relevant theory and previous studies in the research field and by using logistic regression models to statistically analyze going private motives. Specifically, we will quantitatively measure the impact and significance of selected variables on the likelihood of being taken private by a PE fund (we will use the terms PE fund, PE firm and PE investor interchangeably). The problem statement is divided into two sub-questions, each representing an irreplaceable element in pursuance of investigating the overall question:

1. Which theoretical perspectives serve as plausible motives for PE-backed delistings?
2. Which determinants are evident for PE-backed bids on European publicly listed firms from 2004 – 2015?

The first sub-question seeks to illuminate the problem statement from a theoretical perspective emphasizing motives from both a firm (target) perspective and from a PE (acquirer) perspective. The second sub-question involves actual data from the examined period through statistical analyses. To systematically answer the overall problem statement and its underlying sub-questions, we have developed and researched a total of seven hypotheses which are initially explained and discussed in Part 2 covering the theoretical framework. Figure 1.1 summarizes the composition of the research problem and provides a brief objective related to each sub-question.

Figure 1.1 – Composition of research problem



1.3 Delimitation

To specify the scope of the thesis, a clear set of delimitations are presented. This ensures a well-defined perspective addressing only the intended area of research, hence providing a framework for statistically measuring the likelihood of PE-backed delistings in Europe and ultimately answering our problem statement.

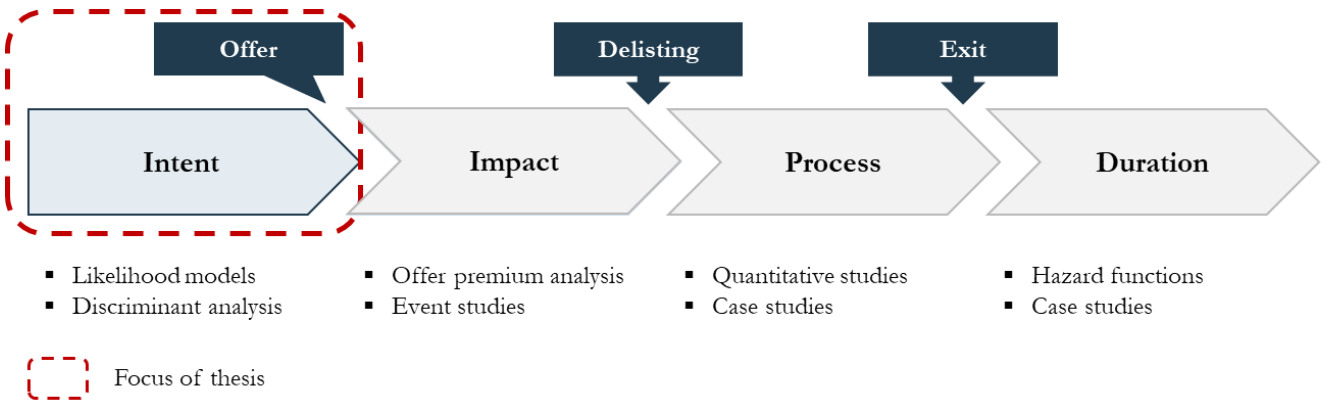
1.3.1 Transaction type

Several different delisting types exist. One type is public-to-private transactions, also known as going private transactions (GPTs), which is the type of delisting illuminated in this thesis (the two terms describe the same phenomenon and for simplicity we use the GPT expression for the remainder of the thesis). Thus, bankruptcies, liquidations and mergers by firms are not considered in our analysis. In short, a GPT is known as a transaction, which concentrates the ownership to a few investors who are not interest in having the firm's equity traded publicly (Leuz *et al.*, 2008). The empirical study conducted in this thesis will focus on PE-backed GPTs, i.e. GPTs via leveraged buyouts (LBOs). We have decided to adopt the definition of a PE-backed delisting based on Weir and Wright (2008) stating that the transaction consists of a publicly quoted company being acquired by an unlisted company specifically set up for the purpose of the deal. From the definition of an LBO transaction, only buyout transactions are observed. Specifically, buyout transactions involve that the acquiring party gains controlling interest of the targeted firm. The different types of delistings are further presented and discussed in Section 2.2.

1.3.2 Transaction phase

Renneboog and Simons (2005) studies GPTs in four separate phases of an entire process. They cover the entire delisting process from initial going private intent through post-transaction value drivers to the duration of the newly obtained private status and develop a theoretical framework on the GPT literature. Each phase represents a stage in a buyout process of a listed firm and the research methods generally used to study each phase of the process.

Figure 1.2 – Going private transaction phases
Source: Renneboog and Simons (2005)



With regards to the first category, "Intent", the literature investigates characteristics of firms which have gone private, prior to their decision to go private and contrasts these characteristics to companies which have not, thus staying publicly quoted. Research methods related to this stage typically include maximum-likelihood methods or discriminant analyses to measure the likelihood of a firm going private. The first stage is concluded by a tender offer. Next, the empirical literature on "Impact" examines price fluctuations in stocks after an official going private offer has been announced and thus measures the impact of an offer. This is fulfilled by analyzing immediate stock price reactions by measuring cumulative abnormal returns or the bid premium paid to the pre-transaction shareholders. The third stage, "Process", begins when a company is fully delisted and taken private. Here, existing literature investigates the post-buyout process of wealth creation through case studies or quantitative approaches. Renneboog and Simons (2005) presents the final stage, "Duration" as relevant if a delisted firm that has been taken private later decides to end its private ownership status through an exit.

Among the four stages, this thesis exclusively focuses on delisting motives and determinants, hence the first stage in a delisting process. In other words, we examine delistings in an ex ante perspective without observing post-delisting processes. Methodologically, this means that the announcement of a bid submitted by a PE investor, targeting the delisting of a publicly listed firm, is the essential part of the transaction phase in our research, i.e. we identify the **announcement** date of a delisting and solely focuses on firm characteristics prior to this specific date. Whether the intended delisting is subsequently fully completed (at a given completion date) or is cancelled for various reasons is not in primary focus. Hence, an important note to this for the remainder of the thesis is that when we mention PE-backed delisting transactions, we do not imply that it necessarily is a fully completed transaction, but simply that it has been announced. Similarly, we interchangeably use the terms "PE-backed delisting", "PE-backed delisting bid" and "PE-backed going private bid". However, of our sample of PE-backed delisting bids, roughly 90% of the observations were also fully completed.

1.3.3 Period

The time frame selected for investigation is the period January 2004 – December 2015. This enables a sufficient event window length of 12 years, which obviously spans over the financial crisis and thus includes a period of both market upturns and downturns, meaning that we expect to see a considerably lower amount of delistings taking place in the first couple of years following 2007. The reason for beginning the period in January 2004 is mainly driven by data availability, as the data quality and extent of data on the variables that we have included is too insufficient prior to 2004. This ensures higher quality of our data sample and moreover enables that the sample mainly includes observations in years that have not been deeply covered by previous studies. Hence, there is little overlap between our sample period and the periods examined in previous studies. December 2015 is deliberately selected as the end of our

sample, as we construct a control group where a major criterion is that each control observations remains publicly listed two years after the delisting of our main observation. This is further explained in Section 3.3.2.2.

1.3.4 Geography and sector

Little existing literature in the research field of PE-backed delistings has selected to study the European region. Studies by e.g. Kieschnisck (1998), Opler and Titman (1993) and Lehn and Poulsen (1989) solely observed US whereas Weir and Wright (2006) and Weir *et al.* (2005a, 2005b and 2008) have conducted similar studies in UK. In addition to this, Achleitner *et al.* (2013) focuses on Continental Europe, thus excluding UK. In our study, we perceive entire Europe (excluding Russia[1]). Earlier, US and UK were the only fully developed markets within PE transactions and are still among the markets with most activity by PE funds, but the rest of Europe have developed strongly in the last ten years and is now assessed as sufficiently developed and comparable to UK (PwC, 2017; Bain & Company, 2018). Hence, we allow for a combination of UK with the rest of Europe in our study instead of separating them as seen in earlier literature. Although our study only includes European transactions, we consider other studies based on e.g. American data, for development of hypotheses and for a comparison of empirical results. With regards to examined sectors, we consider delisting transactions across all sectors except for transactions involving target firms operating in the financial services and utilities sectors (SIC codes 6000 – 6999 and 4900 – 4999) as their balance sheet and regulatory structure differ substantially from other sectors.

1.4 Thesis methodology

The thesis employs an empirical research method based on a theoretical review, which is concisely summarized in the following and fully expanded in Part 2 and 3. To begin with, a literature review interprets and discusses existing theories relevant for the research question of the thesis and summarizes main findings of empirical studies conducted in the field, thus building a useful foundation for our own empirical analysis. The main purpose of the literature review is to develop testable hypotheses. Next, an empirical analysis contains a quantitative study examining firm characteristics of 161 delisted European firms and 161 control firms with logistic regression analyses. Several theoretical and methodological choices constitute the distinctiveness of our analysis and are briefly introduced in the following section.

1.5 Contribution to existing literature

Besides contributing to the limited literature on the motivation of PE investors to acquire publicly listed target firms in Europe, this thesis differentiates from existing empirical studies in various aspects. An initial note to this is that we will refer to several existing empirical studies throughout our studies. Among these, particularly one study is regarded as highly relevant for our analysis as it studies LBOs in Continental Europe: Achleitner *et al.* (2013). Similarities with

[1] Russia is primarily excluded due to lack of data availability from our used transaction databases

this paper includes the limitation to focus on LBOs instead of GPTs in general, whereas major differences include our extended geographical focus by including UK and our updated dataset, as Achleitner *et al.* (2013) examines data from 1997 – 2007. Naturally, we examine and make use of existing theories and re-apply selected prevailing methodological procedures. Nevertheless, this section emphasizes four overall aspects of the thesis which distinguish from preceding relevant literature, thus enabling the thesis to contribute to the research on PE-backed delistings in Europe in a relevant matter.

First, unlike previous European literature which investigates LBOs in either Continental Europe or United Kingdom in isolation, we argue that the PE market in Continental Europe has matured and that the two regions can be combined in an aggregate analysis of Europe as one entity by using new data up to and including 2015. Other studies have similarly combined Continental Europe, but these studies have been in the context of general going private transactions and were not limited to PE-backed delistings (see e.g. Thomsen and Vinten, 2014).

Secondly, we challenge existing literature regarding pre-acquisition capital structure and find empirical evidence that this does not play a significant role when PE investors are targeting publicly listed firms.

Third, we expand and combine the use of theory-based explanatory variables with variables originated from a more applied perspective to achieve a comprehensive quantitative model considering a higher number of different factors than what has been examined in existing comparable literature. As a simple example of this, we disregard the prior practice in the field of proxying free cash flows with other accounting measures by instead collecting actual unlevered free cash flow values for the purpose of investigating volatility of cash flows.

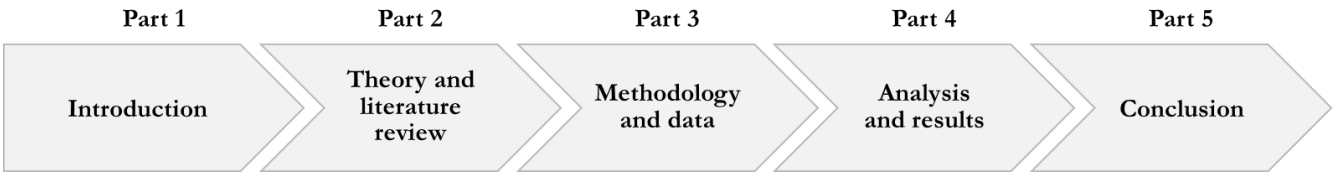
Fourth, in opposition to existing studies that comprise one or few main analyses, we perform a series of thorough robustness checks to investigate the effect of length of event window, geography, sector and transaction status. Given our up-to-date data availability and perspective, we are able to measure how the financial crisis of 2008 impacted the motivation behind PE-backed delisting acquisitions. Similarly, robustness checks involving the use of prior practice allows us to obtain new findings regarding the distinction of the PE market in Continental Europe versus United Kingdom.

Besides the four main differentiating factors specified above, we will state relevant similarities and differences with previous empirical literature throughout the thesis. The findings of our empirical analysis are important for the understanding of how PE funds select delisting targets in Europe based on financial, operational and structural characteristics. Ultimately, bearing in mind that statistical evidence should most often be concluded upon with care, our thesis will attempt to present reliable and apparent evidence.

1.6 Thesis structure

To complete the introductory part of the thesis, the overall structure for the remainder of the thesis is briefly staged. Part 1 has introduced the area of interest and the scope of the thesis along with the major delimitations. Part 2 examines theoretical delisting motives related to going private transactions and reviews existing empirical literature in the research field in order to develop testable hypotheses. Part 3 constitutes the methodological framework and covers the entire dataset construction and presents its underlying descriptive characteristics. Part 4 quantitatively analyses the stated hypotheses through multivariate logistic regression models. Moreover, this part presents and interprets findings and includes various robustness checks. Part 5 concludes on the empirical results and provides limitations and suggestions for future research.

Figure 1.3 – Thesis structure



2. Theory

Delistings can take many forms and depend on a firm's life-cycle and motives to go private. This section will initially provide academia's motives to delist from a perspective regarding a firm's life-cycle in Section 2.1. Secondly, the different forms of delistings will be presented to define the theoretical scope of this thesis in Section 2.2. Finally, theoretical and empirical findings within GPTs and PE-backed GPTs will be investigated in Section 2.3 – 2.5 to develop hypotheses to test empirically.

2.1 The life-cycle of the firm

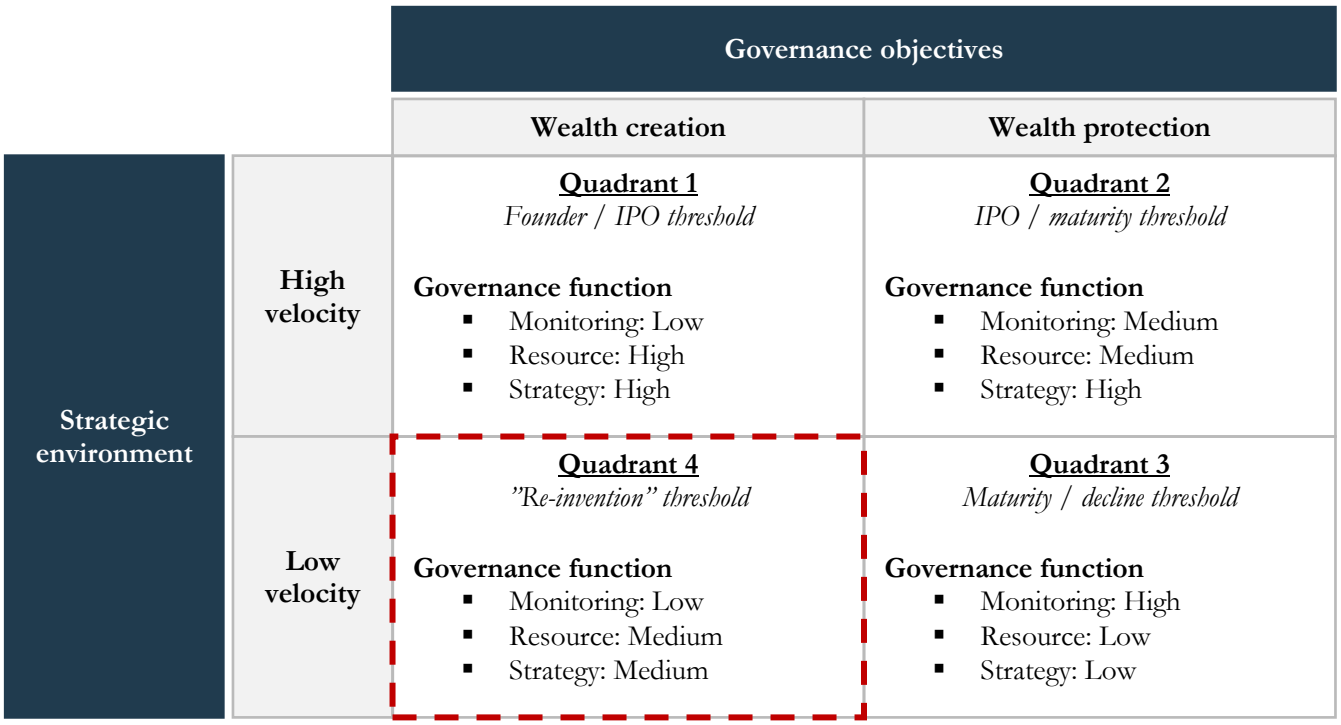
According to Filatotchev *et al.* (2006), there are four different stages in a firm's corporate life-cycle. These four different stages require different needs in terms of corporate governance. As illustrated in Figure 2.1, a typical GPT target is located as a firm which has developed beyond maturity to a firm with extensive needs in terms of its organizational resource base and becomes less transparent moving towards an existence as a privately held firm. Starting from Quadrant 2, an IPO increases transparency and provides access to financial resources from the stock market. As the firm becomes more mature, the external resources are invested in the firm's resource base and it exploits strategic opportunities. After several years as a public corporation, the growth opportunities may be exhausted. Hence, a decline in the organization will occur and a restructuring following a GPT move, typically conducted by a PE investor, may initiate. The new private owner will therefore narrow the scope of its activities to re-shape the firm as desired.

Figure 2.1 – Organizational and corporate governance dynamics
Source: Filatotchev *et al.* (2006)

		Transparency/Accountability	
		Limited	**High**
Organi-zational resource base	**Narrow**	**Quadrant 1** ▪ Small family businesses ▪ Start-ups	**Quadrant 2** ▪ "Threshold firms" ▪ IPOs
	Extensive	**Quadrant 4** ▪ Declining organizations ▪ GPT buyouts	**Quadrant 3** ▪ Mature listed firms ▪ "Cash cows"

Next, as shown in Figure 2.2, a firm can overcome declining growth and "reinvent itself" through new strategic ideas which requires modifications of governance functions. Monitoring decreases as declining organizations tend to have less free cash flow-related agency problems. Resource and strategy roles increase in importance as the organization attempts to reposition itself and seek new value creation opportunities through innovative activities, which typically involve high risk, unpredictability and long-term horizons. A critical notion to address in terms of the view by Filatotchev *et al.* (2006) on the life-cycle of a firm, is that it is assumed that GPTs occur due to declining circumstances in a corporation. Possibly, it is the case in most of the incidents. However, a GPT could alternatively take place because a PE investor considers a potential high-growth target as an attractive investment opportunity. Hence, the argumentation is two-sided. In some cases, this investment opportunity is attractive because a PE investor may be more qualified in restructuring and rescoping processes of a listed company with declining performance than a diversified shareholder base of passive investors or a current owner with low ambitions. In other cases, a well-performing listed firm may simply be a desirable asset in an existing portfolio of a PE investor.

Figure 2.2 – Strategic thresholds and the roles of corporate governance
Source: Filatotchev *et al.* (2006)



In continuation of the discussion above, empirical findings suggest that PE investors choose GPTs based on a range of different criteria. Additionally, previous literature suggests different motives for GPTs in general. These findings will be presented and discussed collectively in Section 2.3 as the motives from a firm perspective may intersect or contradict the motives from a PE investor's perspective.

2.2 Types of delistings

This section introduces the different classifications of delisting routes and subsequently presents the type of delisting in focus by discussing the main characteristics and shareholder incentives of pursuing this route.

A delisting is the process where a publicly listed security is removed from the stock exchange on which the company is listed and traded among public investors. This situation can occur due to several different reasons, e.g. bankruptcy, liquidation, M&A or going private (Thomsen and Vinten, 2014). One general distinction between the different categories of delistings is whether a delisting is voluntary or involuntary (Macey *et al.*, 2008). Generally, involuntary delistings comes as a consequence of stock market authorities' decisions or insolvency, whereas voluntary delistings are due to the firm's own decision. As the definitional framework suggests, involuntary delistings may be easier to categorize, while the definition of voluntary delistings is more heterogeneous. Therefore, this section will provide a presentation of the two types of delistings to ensure the fundamental understanding of the distinctions.

2.2.1 Involuntary delistings

Conceptually, involuntary delistings are due to a different set of main causes, which typically comprise: i) failure to meet listing requirements, ii) bankruptcy or iii) liquidation (Macey *et al.*, 2008; Kashefi Pour and Lasfer, 2013).

Every stock exchange has clear and specific listing regulations that any publicly traded corporation must follow and comply with. Common listing requirements relates to financial specifications such as minimum financial ratios, sales volume, ownership concentration and share price level (London Stock Exchange, 2017). In case a listed company violates these regulations and specifications, an involuntary delisting may be a consequence. One important remark to this is that even though a publicly listed company is forced to delist by a stock exchange, it does not necessarily mean that the company is bankrupt, but may instead trade over the counter, i.e. trading in some context other than on a formal stock exchange.

In case a listed company lacks liquidity and is unable to repay its debt, a situation of insolvency has occurred (Altman, 1968, 1993). Ultimately, insolvency might lead to bankruptcy or liquidation. A bankruptcy is the last state of insolvency and involves failure and significant losses among creditors and investors. Next, liquidation of a company is another source of delisting. The main difference between bankruptcy and liquidation is that bankruptcy is a state of financial failure whereas liquidation is an organized process where the incumbent owners liquidate the company. This process can either be voluntary (shareholder "decision") or involuntary (creditor "decision"). The assets of the firm are commonly sold, and the gains are distributed based on the priority of claimants. Naturally, a firm going through a bankruptcy or liquidation will be delisted.

2.2.2 Voluntary delistings with subsequent trading

If a firm decides to resign from a regulated stock market but continues trading on an unregulated market it is typically known as "deregistration" or "going dark". This type of delisting is generally perceived as a step down in a listed corporate life setting. According to Leuz et al. (2008), going dark transactions are characterized by two points. First, going dark involves trading on another market which is less regulated and restricted. Secondly, going dark does not imply change of control. Additionally, an example of a delisting with subsequent trading could be emphasized as a cross-delisting, which implies a delisting on a foreign stock exchange but continued trading on the domestic stock exchange. In this thesis, we do not focus on such voluntary delistings with subsequent trading, but instead study the category elaborated in the following.

2.2.3 Voluntary delistings with no subsequent trading

A voluntary delisting with no subsequent trading is the most common type of delisting and the type of delisting most frequently covered in academia. We will use GPT as an abbreviation for this category. The common variations of this transaction type can generally be divided in two groups[2]. First, the voluntary delisting may be due to a strategic acquisition or merger, where an acquirer takes the target private (Macey *et al.*, 2008). Such transactions are either horizontal, vertical or involving a conglomerate acquirer. The other variation of this voluntary delisting type is defined as a public takeover bid by a PE fund, i.e. LBOs.

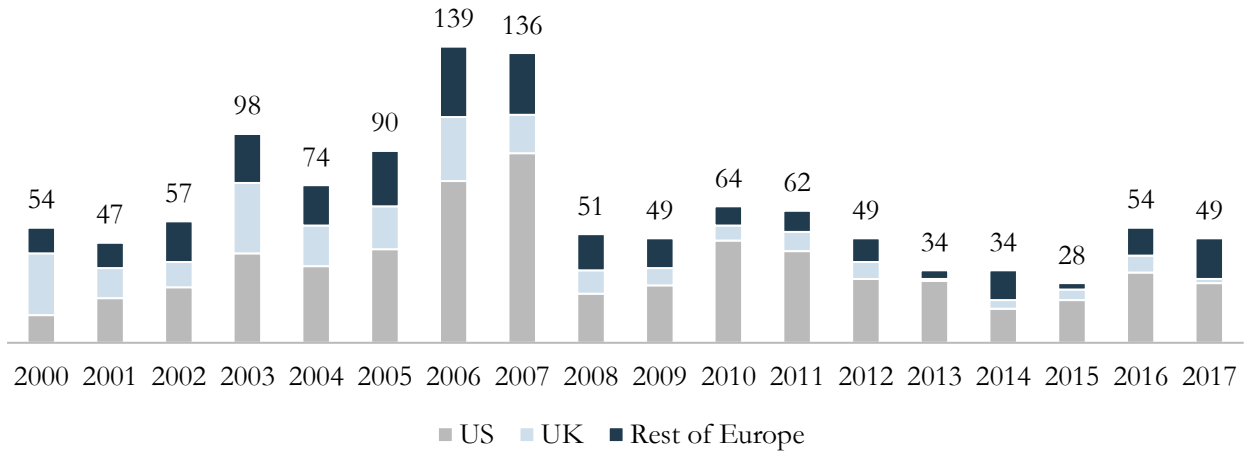
In the US and UK, most GPTs have historically been completed as LBOs, where PE investors use substantial levels of debt to acquire and subsequently delist the target. In this type of transaction, the PE investor has typically set up an unlisted company only for the purpose to acquire the listed target (Jensen, 1993). Additionally, PE-backed GPTs have occurred more frequently for companies with high ownership dispersion (Martinez and Serve, 2017). Renneboog (2007) argue that fewer wealth gains are expected in GPTs where the pre-delisting ownership has been concentrated, which could be an explanation for a lower number of LBOs in Europe as Faccio and Lang (2002) presents a higher ownership concentration for European corporations. However, we are carefully considering this information as the source is approximately 16 years old, hence we acknowledge that European shareholder structure may have developed. The ownership concentration may not only be relevant for the future wealth gains but also for the occurrence of the takeover if the PE investor prefers to obtain 100% of the target's equity via a "squeeze-out". In a squeeze-out, the controlling shareholders have the legal rights to cash out minority shareholders once they have obtained at least 90% of the voting rights[3] (European Parliament, 2004). Hence, a large shareholder which possesses more than 10% of the

[2] Note that GPTs can also be initiated by the existing owners without engagement from external acquirers
[3] Member States may set a higher threshold that must not be higher than 95% of the voting rights

total voting rights is able to obstruct such maneuver. For a further explanation, we refer to Appendix 1 where we have attached two short examples of LBOs with non-completed and completed squeeze-outs respectively.

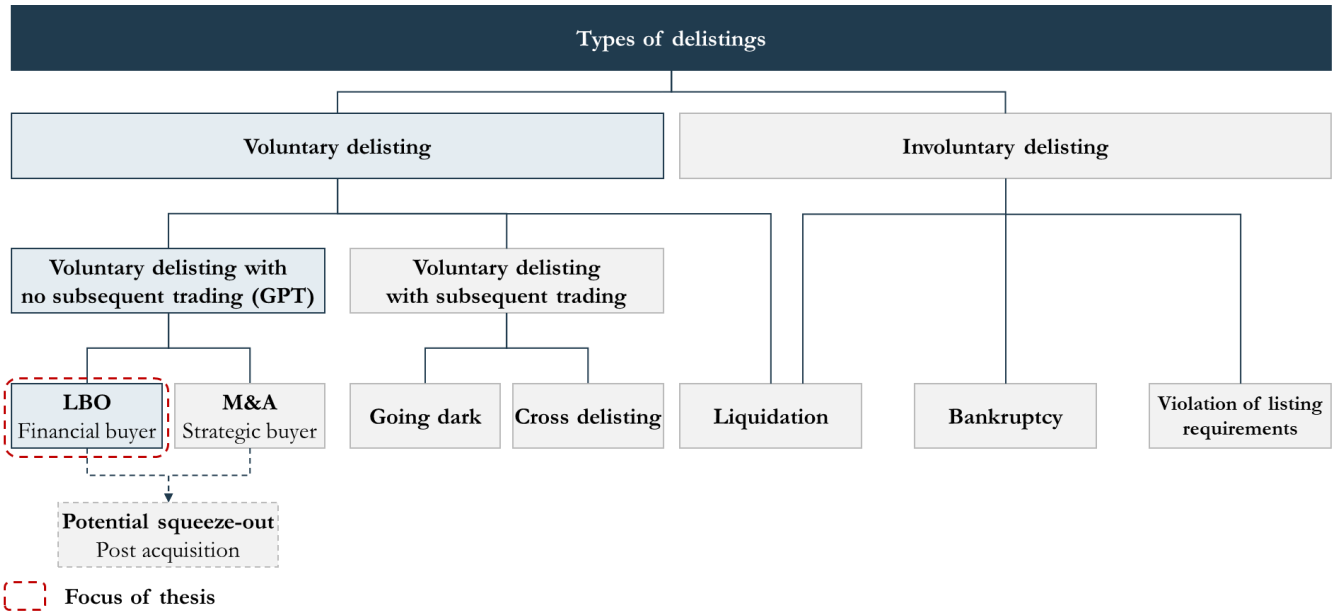
Another reason for more PE-backed GPTs in UK and US is that the LBO market has been mature for more years in US and UK than it has been in the rest of Europe. As illustrated in Figure 2.3, the rest of Europe has caught up on UK in terms of the count of PE-backed GPTs, which is why we prefer to include UK in our analysis of the European market for PE-backed GPTs.

Figure 2.3 – Number of PE-backed GPT deals
Note: Excluding bolt-on acquisitions
Source: Mergermarket



The different categories of delistings and the necessary definitional framework used by academia in relation to GPTs has now been presented and explained. Overall, we illustrate the different types of delistings as the following:

Figure 2.4 – Types of delistings



In the following section, theories and previous empirical findings which we find essential will be investigated in order to generate testable hypotheses regarding PE-backed GPTs (LBOs).

2.3 Theoretical motives and literature review

The objective of this section is to provide a review of existing relevant literature related to GPTs in general and PE-backed delistings of publicly listed firms and thereby facilitate our empirical analysis in Part 3. Specifically, the purpose is to gain a deeper insight in the selected research area by identifying important theories and findings as well as discovering essential similarities and differences among existing literature in order to map alternative methodologies and ultimately decide on our selected approach. The main category of sources drawn upon will be academic journals and selected book chapters. The scope of the review is not delimitated to European studies only, as US-based studies provide important theoretical aspects and empirical findings.

A twofold categorization of motives for delistings will be provided as: i) traditional motives and ii) motives related to agency theory (Djama *et al.*, 2014). These cover motives for publicly listed firms to shift to private ownership through delistings and more importantly motives for PE funds to pursue these delistings from an investor perspective. Thus, the delisting motive is examined from both sides of the transaction. Some of the motives will not be investigated further but are assessed as interesting to illuminate. These will be stated explicitly in the respective sections.

2.3.1 Traditional motives

Generally, GPTs occur due to i) a reduction in economic benefits of being a publicly traded firm and/or ii) an increase in listing costs.

2.3.1.1 Decreasing benefits of being a public firm

Listed corporations have typically completed IPOs to achieve the economic benefits of being a publicly traded firm, e.g. higher liquidity, better access to equity market financing of future investments and risk sharing with public investors (Kim and Weisbach, 2008). If a corporation has not succeeded in realizing these benefits in sufficient proportions to justify its public existence, it may back out of the public markets. The benefits of public ownership are presented in the following.

Investor interest

Mehran and Peristiani (2010) suggests that listing benefits are weakened when the financial visibility falls. Financial visibility is a measure of asymmetric information and is defined as the ability of a corporation to attract a sufficient level of investor interest and recognition, e.g. analyst coverage. Hence, security analysts' role may affect a firm regarding its monitoring and stock liquidity. As Bhushan and O'Brien (1990) and Falkenstein (1996) have pointed out, institutional investors prefer firms which are highly covered by security analysts. The development in institutional ownership of a delisted target could therefore act as a proxy for the analyst coverage and hereby investor interest to conclude on financial visibility. Alternatively, investor interest could be examined by measuring stock liquidity. The primary benefits of going public is related to the liquidity of public equity trading, which has been addressed by various studies (e.g. Amihud and Mendelson, 1998; Bolton and Von Thadden, 1998; Boot *et al.*, 2006). Hence, if these benefits fall, it is observed as a decline in the benefits of being a publicly traded firm such as raising cheap capital in the public market (Boot *et al.*, 2008). Based on this, we assume that firms with low stock liquidity are more willing to accept a public offer by a PE investor if these benefits have declined. The reason why most studies have used stock liquidity as a proxy for investor interest is related to data availability as trading volume is highly transparent. A public firm's current analyst coverage is highly available as well. However, accurate historical analyst coverage data (e.g. 10 years ago) is more challenging to retrieve. Conclusively, the following hypothesis will be investigated empirically:

H1: Low levels of stock liquidity increase the likelihood of being taken private by a private equity investor

Debt financing

If a firm converges towards a state where it is no longer constrained financially or does not need access to equity markets, going private could be preferred to seek alternative sources of financing (i.e. debt). The assertion that delisted firms seek debt financing rather than equity financing has been confirmed by previous empirical studies (Leuz *et al.*, 2008; Bharath and Dittmar, 2010; Kashefi Pour and Lasfer, 2013), which found that delisted firms have higher leverage

levels than control firms that remained public. Additionally, Kashefi Pour and Lasfer (2013) found that voluntary delistings occur to rebalance capital structure rather than financing organic or inorganic growth plans. However, none of these studies emphasize PE-backed GPTs. A PE-backed GPT is usually completed with substantial leverage making the tax benefit of such transaction an essential determinant. The significant increase in cash flows generates a considerable tax shield and post transaction, firms have no tax payments for a long period, which increases the shareholders' gains. One should note that the magnitude of these tax benefits depends on the marginal tax rate, affecting net financial expenses, which the firm is subject to.

The question is how PE investors screen targets in terms of potential value creation through leverage effects. There are opposing views on this. According to Miller and Modigliani (1963), higher leverage increases shareholder value by the benefit from larger tax shields assuming that a firm is in a positive tax bracket. PE investors are frequently following this intuition, which is why future leverage capacity in a potential target firm is essential in order to assess the potential value creation. Further, Weir *et al.* (2008) and Achleitner *et al.* (2013) found that LBO targets had lower debt ratios than other firms prior to delisting. These findings are generally in line with the classical view on pre-existing debt's impact on the likelihood of PE-backed GPTs, which is interesting considering the typical deal structure in an LBO. In practice, pre-existing interesting-bearing debt is of less significance on the completion of an LBO, as a target's capital structure will be replaced by the capital structure implemented by the PE acquirer. Hence, PE investors will repay the pre-existing interest-bearing debt prior to the execution of the LBO process and implement a new financing structure (Rosenbaum and Pearl, 2009). One should note that there are two exceptions to the assertion that pre-existing debt is of less importance in LBOs. First, if a firm decides to repay its debt obligations before maturity this will usually imply a call premium, which is positively dependent on the number of years before maturity. This infers a more expensive repayment of debt, which will increase the purchase EV and ultimately lower the Internal Rate of Return (IRR). However, the magnitudes of call premiums are usually not sufficiently high to demotivate an investment from a PE perspective, as the effect on IRR is limited. Secondly, a firm's lender familiarity may have an impact. If a firm has experience with debt financing and fulfilled its obligations responsibly it may strengthen the relationship with lenders, which could have a potential effect on the desirability to raise new debt or the lending terms, e.g. lower coupon rates. However, this is not assumed as a significant LBO deal determinant as PE investors' track record with lenders should also be assessed from a lender's point of view. Another point opposing the classical view of the pre-existing leverage is based on PE investors' capabilities to identify targets with substantial upside potential in terms of refinancing. This should also be of higher interest from the lenders' point of view as a PE-owned firm, with a higher level of debt financing and increased monitoring of management usually implies a more effective management of debt obligations. Moreover, PE firms usually require a high degree of transparency from the managers in terms of financial performance, which may occur by more frequent internal reporting. As a listed firm, monitoring is based on publicly required information, where the frequency of financial reporting is usually on quarterly basis. As active shareholders, PE

investors are more strict monitors and require a more frequent update (e.g. monthly), which lenders may also request for access to and enjoy the transparency benefits of.

In terms of debt financing capacity, high free cash flow levels may increase the likelihood of being taken private by a PE investor as it is also considered as a proxy for the capacity to repay debt. In continuation of this, PE investors prefer to invest in companies with low cash flow volatility in order to increase certainty and predictability of cash flow capacity to repay debt, as it is a crucial component in LBO modelling (Rosenbaum and Pearl, 2009). Supporting this, Jensen (1986) stated that industries performing steady free cash flows are especially suited for financial leverage. Moreover, PE investors may find it beneficial if a target has a large base of net property plant and equipment (PPE) to collateralize debt obligations. Risk profiles in Collateralized Debt Obligations (CDOs) may vary, but senior tranches usually obtain lower risk profiles as they have priority on repayment from the collateralized asset in the case of default. Subsequently, this implies lower coupon rates than junior tranches due to compensation of risk (Rosenbaum and Pearl, 2009).

Some firms decide to initiate public trade of their equity in order to raise sufficient funds for future investments, e.g. organic or inorganic growth opportunities. Hence, low revenue growth rates prior to delisting may increase the incentives to go private if there are no further needs for public financing of growth opportunities (Lehn and Poulsen, 1989; Kim and Lyn, 1991; Thomsen and Vinten, 2014). On the other hand, most PE firms find high-growth targets attractive and firms may find PE investors' capabilities advantageous in order to grow the business. Hence, there is potentially two expected scenarios of revenue growth's impact on a PE firm's decision to make a public going private bid. We will address this determinant as a supporting variable to our stated hypotheses.

As the above argumentation suggests, debt financing is a crucial factor to address in a PE-based transaction. Hence, we will test two different determinants. First, there are different suggestions on how pre-existing debt levels of a firm may affect the likelihood of being targeted by a PE investor. We challenge previous findings and follow the intuition suggesting that pre-existing debt is not significant as PE investors replace it with new debt financing. Secondly, volatility of free cash flows may be of high importance as it is considered as a representative proxy for a firm's ability to repay debt continuously. In addition to free cash flow volatility, we find it interesting to include level of net PPE as a supporting variable as it may not act as a crucial determinant but is likely to influence lending terms through securitization. Consequently, the following hypotheses will be tested:

H2: Pre-existing leverage has no impact on the likelihood of being taken private by a private equity investor

H3: Low volatility of free cash flows increases the probability of being taken private by a private equity investor

Risk sharing with other investors

Additionally, risk sharing with other investors represents an economic benefit of being a publicly traded corporation. Shah and Thakor (1988) demonstrated that when a controlling shareholder has better information about the return distribution of a firm's assets, it is attractive to be publicly held because it allows the risk to be allocated more efficiently between the public shareholders (assuming investors seek to reduce idiosyncratic risk). A proxy for the risk level could be determined as the beta factor, indicating the level of a firm's systematic risk, i.e. how a firm's value fluctuates with the market. Martinez and Serve (2011) used the beta factor as a proxy for risk of French firms and found that it was a significant factor to determine the likelihood of French GPTs. We will not test the above reflections empirically due to challenges of calculating unlevered beta values consistently between all the observations. Additionally, we do not assume this as deterministic for PE bids.

2.3.1.2 Increasing costs of being a public firm

The costs of being listed may affect the motivation of going private either directly or indirectly, which will be elaborated in the following.

Direct costs

Direct costs of being listed consist of ongoing costs such as registration costs and underwriting fees. In terms of direct costs, larger firms are generally more cost-efficient, yielding that smaller firms have larger incentives to go private when direct listing costs increase. In practice it is difficult to measure increases in listing costs, so the firm size has previously been applied as a proxy to analyze the link between a firm's efficiency regarding direct listings costs and the decision to go private. This is presented by DeAngelo *et al.* (1984) as the size hypothesis and later tested by various studies (Kim and Lyn, 1991; Kieschnisck, 1998; Engel *et al.*, 2007; Leuz *et al.*, 2008; Weir *et al.*, 2008; Bartlett, 2009).

A contradicting perspective to the size hypothesis is that PE firms may prefer to invest in large and mature companies, which need new qualifications to fulfill their potential. This is possibly linked to the preference of firms with stable free cash flows, as large and mature firms are more likely to perform less volatile free cash flows than smaller fast-growing firms, which may not have reached their full matureness. Hence, combining this reflection with the size hypothesis provides two potential outcomes, yielding that firm size has an uncertain directional impact on the likelihood of being taken private by a PE investor.

In continuation of the size hypothesis, delisted firms tend to perform worse than firms remaining public prior to the occurrence of the delisting according to Thomsen and Vinten (2014) who concluded that delisted firms performed lower operating margins and return on assets. Martinez and Serve (2011) presented findings supporting this conclusion. However, Weir *et al.* (2005a) found no results supporting that GPT firms performed worse based on accounting data compared to firms which remained public. Relating this to the probability of being taken private by PE investors, this

is in line with the assertion that PE investors prefer to invest in large and mature companies, which do not perform "best in class" but have the potential to reach such state. As Filatotchev *et al.* (2006) suggests (Section 2.1), firms with several years as a publicly traded entity and exhausted growth opportunities are likely to converge towards a status as a privately held firm, potentially backed by a PE investor. Summarizing these reflections of the firms which PE investors prefer, we categorize such investment targets as "turn arounds" with substantial potential for value creation. Hence, we test the impact of size stated as the following:

H4: Larger firm size decreases/increases the likelihood of being taken private

Indirect costs

Indirect costs of being listed consist of costs related to information transparency, i.e. audit costs, compliance costs and opportunity costs.

Audit costs related to public corporations in the European Union (EU) have since 2005 been regulated by International Financial Reporting Standards (IFRS), which implies that firms in EU must publish consolidated financial statements in line with international accounting standards. This has been concluded to have a significant impact on the decision to go private by Vulcheva (2011) as the amount of delistings increased in the year of IFRS' implementation in EU. However, the paper finds that the incentives to go private are larger in countries where enforcement is strong, since IFRS costs are higher in such countries. Additionally, Pownall and Wieczynska (2017) explains that countries with strong securities regulation may have chosen to avoid IFRS regulation by going private or moving to another non-IFRS regulated stock exchange.

With respect to compliance costs, Hostak *et al.* (2013) examined the implementation of the SOX Act in the US in 2002, which has been considered as a major driver of the underlying regulatory changes. They found that 77% of foreign firms opted out of the US equity markets post to the compliance costs in SOX, where 40% of the firms referred specifically to the act in their public announcement of intention to delist. Following the implementation of the SOX Act, new guidelines for corporate governance was considered in Europe. This can be linked to the findings by Thomsen and Vinten (2014) who investigated the impact of the new corporate governance standards and concluded that strong minority investor protection and strict corporate governance increases the likelihood of a delisting.

Opportunity costs are also considered as essential indirect costs which affect voluntary delistings. One example of opportunity costs is undervaluation, which is generated by asymmetric information between managers or owners and stock market investors. Management has superior inside information and has better access to certainty of future returns. Hence, a corporation is undervalued if the market price per share is not fully reflecting the fair value of the corporation, so shareholders may experience opportunity costs compared to its value under private ownership. Undervaluation of delisted firms was previously studied and concluded as significant in US and UK (Weir *et al.*, 2005b;

Bharat and Dittmar, 2010) and in Europe (Thomsen and Vinten, 2014). However, Martinez and Serve (2011) identified no evidence that delisted firms were undervalued. Similarly, Kieschnisck (1998) and Lehn and Poulsen (1989) found no support backing the impact of undervaluation on LBOs. Intuitively, when management has access to information of undervaluation, they may decide to go private to extract private benefits for strategic reasons and/or to avoid opportunity costs of being a publicly traded firm (Kim and Lyn, 1991). Otherwise, a commonly known signal of undervaluation is when a firm initiate substantial share repurchases as the firm may have superior information compared to the public shareholders yielding a case of asymmetric information (Offen and Baumgartner, 2013). In relation to PE-backed transactions, undervaluation is assessed as an interesting determinant of GPTs to address, as PE investors seek to maximize their return of investments. Additionally, under-/overvaluation is likely to be dependent on the performance of a target in terms of revenue growth and profitability. For instance, a firm may be undervalued in the market even though it has performed well in terms of growth and profitability, where a PE investor may look for such frictions in the market when considering potential targets.

As undervaluation appears to be a frequently investigated determinant, we will test whether this has a significant impact on PE-backed GPTs. We will not investigate the impact of audit costs and compliance costs as we do not find any theoretical rationale for testing these determinants in PE-backed GPTs. Conclusively, we test the following hypothesis:

H5: Undervaluation increases the likelihood of being taken private by a private equity investor

2.3.2 Motives related to agency theory

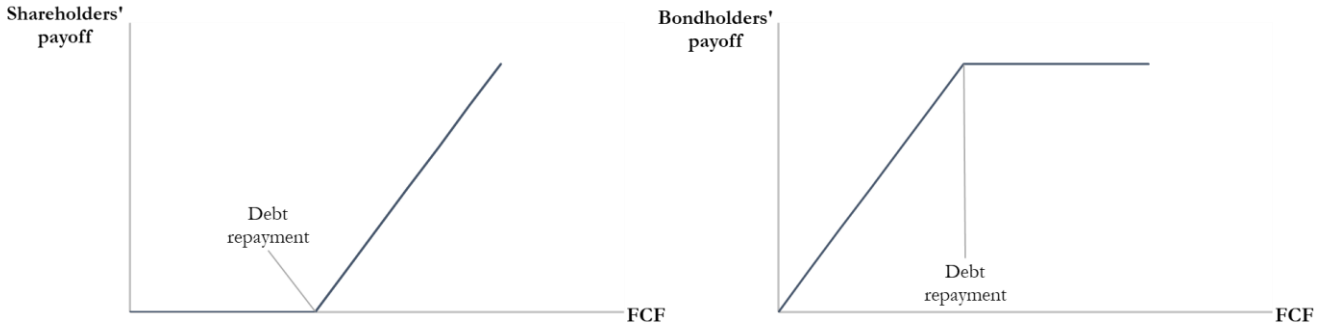
As a public corporation, potential agency costs may arise as a result of conflicts between principal (e.g. shareholder) and agent (e.g. manager). This section will stress some of the motives for PE investors to target public corporations based on agency theory related to level of Free Cash Flows (FCF), ownership structure and outside monitoring.

2.3.2.1 High free cash flows

In practice, a target is considered as an attractive LBO candidate if it performs high levels of FCFs as it allows for capacity of future debt financing (Rosenbaum and Pearl, 2009). Hence, in combination with Hypothesis 3, high and stable levels FCFs are some of the characteristics which PE firms find attractive. Additionally, Jensen (1986) suggests that the high leverage in LBOs reduce the waste of FCFs by managers as cash flows are necessary to repay debt. Waste of FCFs occur when there are excess cash flows and no projects with positive net present value (NPV). This is addressed as the FCF Problem by Jensen (1986). From a shareholder perspective, the management should then pay out dividends or repurchase shares in order to maximize the shareholders' payoff if no positive NPV projects are available. However, the management does not always have sufficient incentives to pay out dividends or repurchase shares as it is not legally binding. It therefore occurs that cash is wasted, e.g. on perquisites (Jensen, 1986). Since debt repayments are legally binding, managers cannot waste excess cash before debt has been repaid.

Hence, the shareholders' payoff can be illustrated as a long call option, where the amount of debt to repay is the exercise price as depicted in Figure 2.5.

Figure 2.5 – Payoff structures
Note: Illustrative example



High FCFs may therefore indicate a potential for value creation for PE investors by reducing agency costs. Furthermore, it is considered as a potential signal of a company's capacity to repay debt. A critical point against the FCF problem implies short termism as it relies on a discouraging perspective on long-term investments such as R&D, which could generate positive cash flows in the long run. Additionally, greater dependence on debt raises the sensitivity to interest rate increases and debt financing will, ceteris paribus, increase the risk of the investments, which a firm will undertake. However, a contradicting argument to such assertion is that PE investors are aware of the increasing risk which is linked to geared investments and are naturally experienced investing with highly levered structures.

Hence, we find it appropriate to analyze the significance of FCF level as it serves as a variable indicating potential for future debt financing, which will increase the disciplining effect on managers to repay debt. Consequently, the following hypothesis will be tested:

H6: High levels of free cash flows increase the likelihood of being taken private by a private equity investor

2.3.2.2 Implications of ownership structure

An essential mechanism by PE investors in LBOs is to improve the corporate governance to such an extent that incentives by managers and owners are aligned to reduce potential agency costs (Jensen, 1989). From a firm's perspective, realignment of incentives of the managers with those of the shareholders is considered as an essential determinant in the decision to delist (Kaplan 1989a, 1989b). Initiating a GPT allows for reconsolidation of ownership and control because a firm with dispersed ownership is acquired by only a few investors. In the case of concentrated ownership, a firm is less likely to suffer from high agency costs from conflicts of interest between managers and shareholders, as a stronger concentration of ownership implies more strict monitoring by shareholders prior to a

potential GPT (Weir *et al.*, 2005a; Renneboog *et al.*, 2007). An interesting aspect to address in this matter is based on findings by Achleitner *et al.* (2013), who argued that the attractiveness for PE investors depends on the quality of the monitoring by the blockholder. An intensively monitored firm is less likely to be taken private by a PE investor because the potential for value creation may be lower. Jensen and Meckling (1976) states that a shareholder's incentive to avoid free-rider problems from a diverse base of minority investors increases with the shareholder's ownership stake in the firm. Additionally, blockholders may extract private benefits of control.

The type of the blockholder may also affect the incentives to delist and is therefore also of interest to investigate, as different types' incentives and private benefits of control may differ. In addition to this, we find it interesting to examine the effect of multiple large shareholders by investigating the impact of ownership concentration in a firm. Using the intuition of monitoring incentives for a large shareholder, we therefore expect that a firm with a large ownership concentration is less likely to be assessed as attractive by PE investors as it implies a lower potential for value creation through reduction of agency costs.

Hadlock *et al.* (1999) presented the entrenchment hypothesis, which implies that managers dislike loss of control even though it may imply financial gains. North (2001) applied this intuition to investigate the link between managerial ownership and acquisition likelihood. He expected that if higher levels of ownership increase managers' ability to deny unwanted acquisition attempts then the relationship between managerial ownership and acquisition likelihood may be negative. Using this logic, we find it interesting to include this element in the investigation of ownership characteristics' impact on the likelihood of being taken private by a PE investor. In addition to this, inside ownership held by directors of the board is also of interest to test. If board members have substantial ownership stakes, the incentives to monitor the firm should increase, which ultimately reduces the value creation potential for PE investors in terms of corporate governance. Hence, we expect that a larger ownership held by directors of the board leads to a lower likelihood of a PE-backed going private bid.

To summarize, we find ownership concentration relevant to test in relation to the likelihood of being targeted by a PE investor. Additionally, we find the types of large shareholders and the ownership stakes held by insiders important to investigate. We test the following hypothesis and include more detailed ownership characteristics to our analysis in order to take the different types of shareholders into account:

H7: Larger ownership concentration decreases the likelihood of being taken private by a private equity investor

2.3.2.3 Outside monitoring

Previous studies have investigated whether outside monitoring affects the likelihood of going private and proxies for outside monitoring have varied. However, some of the recognized proxies consist of the fraction of independent directors and CEO duality (if the CEO is also chairman it is assumed that monitoring is less intensive). Weir *et al.* (2005a) found that delisted firms have more duality than listed firms based on a sample from UK. Additionally, smaller boards may reflect more intensive monitoring as it implies a lower probability of free-rider problems (Martinez and Serve, 2017). However, one may argue against such assertion as more resources could enhance monitoring and strengthen corporate governance by more different perspectives gathered in the board. Hostak *et al.* (2013) found that delisted firms have weaker governance by using proxies as CEO duality, board size and fraction of outside directors. Hence, weak monitoring is likely to increase the likelihood of going private as it reinforces the incentives to realign interests between shareholders and managers. This is interesting in relation to LBO transactions as PE investors may improve monitoring when entering board positions with their experience and knowledge from previous positions (Moon, 2006). In sum, a PE-backed delisting may therefore act as an effective improvement of corporate governance.

Finally, institutional ownership has also been used as a proxy for outside monitoring, where low institutional ownership implies weak monitoring. In line with Bharath and Dittmar (2010), Mehran and Peristiani (2010) found that lower institutional ownership increased the likelihood of voluntary delisting.

We will not test this variable empirically as data of historical board compositions is complex and comprehensive to collect. Instead, we focus on monitoring shareholders' impact on the likelihood of being taken private (Hypothesis 7). Nevertheless, we consider outside monitoring as an interesting aspect to be aware of, which is our motive for including this reflection in our theoretical presentation of motives for PE-backed delistings.

2.4 Empirical review

In the previous section, we presented motives both from a public corporation's perspective and a PE investor's perspective related to GPTs. This section will provide some of the previously found parameters which have been concluded as significant on the likelihood of PE-backed GPTs. A selection of the empirical studies will be reconsidered in Part 3 when our methodologies and data will be presented and discussed. The findings have differentiated based on the geographical origin of the observations. Commonly, the geographies have been divided into US, UK and Continental Europe and naturally many of the findings overlap.

2.4.1 Continental Europe

In Continental Europe, few studies have focused on the motivation for GPTs. Thomsen and Vinten (2014) investigated all types of delistings, including voluntary and involuntary delistings. They analyzed determinants of 3,577 delistings from 21 different European countries between 1995 and 2005 and concluded that all the delisted

corporations had the following in common: slow growth, undervaluation and illiquidity. However, they divided their sample into M&As, GPTs, bankruptcies and liquidations. They found size, equity to assets, sales growth, profitability, firm value and stock liquidity to have a negative impact. Regarding GPTs, they found ownership concentration to have a positive impact on the likelihood of going private. Their sample of GPTs include both transactions backed by PE firms and transactions which was not backed by PE firms. Hence, their finding of a positive relation between ownership concentration and the likelihood of going private is also affected by inside owners initiating a going private transaction, where it is likely that a concentrated ownership increases the likelihood of going private.

Martinez and Serve (2011) studied French voluntary delistings in the period 1997 - 2006. Their analysis was based on a sample of 70 firms voluntarily delisted with squeeze-outs and 70 industry-matched control listed firms. Their findings supported common theory implying that when the listing benefits decrease because of low liquidity and/or weak analyst coverage, it seems more beneficial to go private. Additionally, other characteristics as performance, leverage and beta factor emerged as driving factors for GPTs. Finally, the type of the controlling shareholder influenced the significance of the driving factors. For instance, the level of systematic risk was the strongest determinant for family firms, while non-family firms considered their own financial structure as well.

Studies in Continental Europe dedicated more focus on how ownership structure affects the likelihood of GPTs. Achleitner *et al.* (2013) tested different determinants which affect the likelihood of PE-backed GPTs in Continental Europe in the period 1997 - 2007, including determinants related to financial- and ownership characteristics. They found strong evidence supporting the incentives of the incumbent large shareholder to monitor the management and the private benefits of control to have a significant negative impact on the likelihood of a PE acquisition. Additionally, the paper finds leverage and stock liquidity significant with negative effects, where it finds cash flow levels and cash flow volatility insignificant. The study is based on 115 observations in Continental Europe and 115 matched control observations.

2.4.2 United States and United Kingdom

A majority of previous empirical literature focusing on LBOs analyzed observations in US, mainly due to the fact that this region has represented the largest share of all LBOs internationally. Lehn and Poulsen (1989) used a sample of 263 LBOs in the period 1980 - 1987 and found that the likelihood of being taken private was significantly related to the fraction of retained cash flows supporting the FCF hypothesis. The results were even more significant for firms with less concentrated ownership. Kim and Lyn (1991) found evidence supporting the FCF hypothesis based on 53 PE-backed GPTs between 1976 - 1984. In addition, they concluded that the common financial characteristics for these firms were undervaluation and decrease in public equity financing. The likelihood was especially large for companies in industries with less volatile cash flows and for relatively small firms.

Mehran and Peristiani (2010) dedicated their focus to the impact of liquidity and financial visibility on the decision to go private. From a sample of 218 US-based PE-backed GPTs between 1990 and 2007, they found results suggesting that firms with declining analyst coverage, institutional ownership and stock volume were more likely to go private. As a proxy for analyst coverage they used the growth in number of analysts and the change in institutional ownership. Bharath and Dittmar (2010) underscored the significance of the trade-off theory as a determinant of GPTs. Different from other empirical studies, they investigated US firms from IPO to delisting over the period 1980 to 2004 (equal to 1,081 firm-years based on their sample) and compared with a control group of firms that went public and remained public (equal to 6,640 firm years based on their sample). Their results supported previous empirical findings, including a significant impact from free cash flows, liquidity and financial visibility. Moreover, they found evidence to the significance of ownership structure by concluding that GPTs by IPOs typically were targets which had a lower fraction of institutional ownership, a higher concentration of ownership and more informed trading at the time of IPO.

Weir *et al.* (2005b) analyzed the driving factors of the GPT decision by comparing 84 LBO firms with a matched sample in the period 1998 - 2000 in UK. The firms that were delisted appeared to be smaller, younger, more diversified and had lower growth opportunities in terms of valuation. They found no support pro the FCF hypothesis and lower tax advantages for debt-financed firms in UK.

2.4.3 Key take-aways from previous empirical findings

From our review of previous empirical findings, we have made three observations. First, it is clear that the geographical scope in literature has focused significantly more on markets in the US and UK. Secondly, a majority of the findings are completed before the financial crisis, whereas the LBO market has developed significantly afterwards. Finally, the deterministic variables so far are roughly divided in two classifications: financial determinants and corporate governance determinants. We have summarized the findings in Table 2.1 consisting of details related to year, geography, sample size, econometric technique, data type and empirical findings related to our stated hypotheses. Note that the table includes more empirical studies than presented in the above section in order to provide a broad overview of the findings.

Table 2.1 – Overview of empirical studies
Note: All studies included investigated the "Intent" phase of going private transactions[4]. NS = Not significant

					Methodology and data			Hypotheses (H1 - H7)							Support variables		
Author	**Year**	**Geography**	**N**	**Period**	**Econo-metric technique**	**Data type**	**Control group?**	**Stock liqui-dity**	**Leve-rage**	**FCF vola-tility**	**Size**	**Under-valu-ation**	**FCF level**	**Owner-ship**	**Growth**	**Perfor-mance**	**Collate-raliza-tion**
Panel A: European studies																	
Thomsen and Vinten	2014	UK and CE	3,577	1995-2005	Logistic	Delistings	No	-			-	+		+	-	-	
Achleitner et al.	2013	CE	115	1997-2007	Logistic	LBOs	Yes	-	-	NS	(NS)		NS	-			
Martinez and Serve	2011	CE (France)	70	1997-2006	Logistic	Squeeze-outs	Yes	-				NS				-	
Panel B: UK studies																	
Kashefi Pour and Lasfer	2013	UK	380	1995-2009	Logistic	Delistings	Yes	-	+		-				+		
Weir et al.	2008	UK	115	1998-2001	Logistic	GPTs	Yes				-						
Weir and Wright	2006	UK	96	1998-2000	Logistic	LBOs	Yes								-		
Weir et al. (2005a)	2005	UK	95	1998-2000	Logistic	LBOs	Yes								-	NS	
Weir et al. (2005b)	2005	UK	84	1998-2000	Logistic	LBOs	Yes					+					
Panel C: US studies																	
Bharath and Dittmar	2010	US	1,023	1980-2004	Logistic	GPTs	Yes	-	+			+					
Mehran and Peristiani	2010	US	262	1990-2007	Hazard	GPTs / LBOs	Yes	-									
Leuz et al.	2008	US	484	1998-2004	Probit	GPTs	Yes		+		-				-	-	
Engel et al.	2007	US	237	1998-2005	Logistic	GPTs	Yes	-			-						
North	2001	US	342	1990-1997	Logistic	GPTs	Yes		NS		NS	NS		+/-	-	NS	
Kieschnisck	1998	US	263	1980-1987	Logistic	LBOs	Yes				-	NS					
Opler and Titman	1993	US	180	1980-1990	Logistic	LBOs	Yes					+					
Kim and Lyn	1991	US	53	1976-1984	OLS	LBOs	Yes				-	+			-		
Lehn and Poulsen	1989	US	263	1980-1987	Logistic	LBOs	Yes					NS			-		
Maupin et al.	1984	US	63	1973-1983	Discriminant	MBOs	Yes					+					

[4] Note that the results of Thomsen and Vinten (2014) are related to GPTs only, but the sample size covers all types of delistings. The number of observation included in the GPT sub-sample is not available.

2.5 Hypotheses we will test

From our theoretical and empirical presentation of findings within GPTs we can conclude that several studies have been completed with focus on financial and/or corporate governance deterministic variables. A selection of these theories and previous findings has been excluded in order to narrow the scope of this thesis. Additionally, the availability of data has affected the scope of the theories we will test as some categories of data are less available. Secondly, we have excluded some hypotheses if the underlying theoretical intuition has received little academic support within PE-backed GPTs. To summarize the hypotheses we will test empirically, we present an overview in Table 2.2.

Table 2.2 – Overview of hypotheses
Note: +/– = Directional effect by one unit increase. NS = Not significant

Hypotheses	Exp. effect
H1: Low levels of stock liquidity increase the likelihood of being taken private by a PE investor	–
H2: Pre-existing leverage has no impact on the likelihood of being taken private by a PE investor	**NS**
H3: Low volatility of free cash flows increases the probability of being taken private by a PE investor	–
H4: Larger firm size decreases/increases the likelihood of being taken private by a PE investor	+/–
H5: Undervaluation increases the likelihood of being taken private by a PE investor	–
H6: High levels of free cash flows increase the likelihood of being taken private by a PE investor	+
H7: Larger ownership concentration decreases the likelihood of being taken private by a PE investor	–

Conclusively, we have developed seven separate hypotheses through a review of relevant literature related to motives of PE-backed GPTs. Having determined a number of theoretical perspectives that serve as reasonable motives for PE-backed GPTs and thus answered our first sub-question from our problem statement, we now focus on the selection of methodology to test the developed hypotheses. The methodology is applied in order to obtain empirical results that will ultimately serve as base for answering our second sub-question, i.e. identifying evident determinants of PE-backed bids on European publicly listed firms from 2004 – 2015.

3. Methodology

This part initially introduces the overall methodological framework from the perspective of philosophy of science and subsequently in detail regarding the specific statistical methodology applied. Afterwards, the data construction process is discussed, and descriptive statistics are presented. In the succeeding Part 4, our empirical analysis consisting of univariate and multivariate quantitative analyses is introduced. This structure ensures that the methodological framework is discussed and assessed in order to point out selected areas of awareness related to data quality, analytical approaches and the overall research design prior to the quantitative analysis. An initial note to the methodology of the thesis is that our study takes the form of a deductive empirical study, as theoretical assumptions were initially discussed in Part 2 and subsequently tested through hypotheses applied on real data observations.

3.1 Philosophy of science

The position of the thesis from the perspective of philosophy of science is initially outlined, as the choice of paradigm affects the methodological approach of the thesis, the choice of data and how conclusions are derived.

A research paradigm is an abstract term which has been assigned many different definitions, e.g. as "the identification of the underlying basis that is used to construct a scientific investigation" (Krauss, 2005) or as "a loose collection of logically held together assumptions, concepts and propositions that orientates thinking and research" (Bogdan and Biklan, 1982). We apply the definition by Guba (1990): "a basic set of beliefs and feelings about the world and how it should be understood and studied". Strictly speaking, a paradigm relates to how researchers perceive the world, what they believe constitutes knowledge about the world and how this knowledge is attained. According to Guba (1990), a paradigm consists of three fundamental questions related to ontology, epistemology and methodology. The ontological question is: "What is the nature of the 'knowable'? Or, what is nature of 'reality'?". This can be interpreted as the different ways of constructing reality, how things are and how things work. Secondly, the epistemological question is: "What is the nature of the relationship between the knower (the inquirer) and the known (or knowable)?". Thus, this is the study of knowledge, compromising both the nature and the extent of knowledge and can be understood as: "How do you know something?", i.e. the recognition of knowledge. Lastly, according to Guba, the methodological question is: "How should the inquirer go about finding out knowledge?". The methodology therefore covers the practice of how to discover and create knowledge and which tools that are used in the creation of knowledge.

In relevance for the methodological approach of this thesis, the relationship of the three questions is that the epistemological and ontological positions affect the methods selected for the research conducted. Among the different generic paradigms, this thesis belongs in the post-positivistic paradigm, which is a modified version of positivism. Among the most recognized contributors to defining this paradigm are Popper (1959) and Kuhn (1962). In post-positivism, the focus is to predict rather than to verify, as is the case in 'classic' positivism. Ontologically, positivism is

strictly "realistic", whereas post-positivism is better characterized as "critical realistic". The essence of this is that a real world driven by real natural causes exists, but it can never be fully apprehended and perceived. Humans have imperfect sensory and intellective mechanisms and reality can only be incompletely understood (Cook and Campbell, 1979). Reality is therefore seen in a wide perception-critical examination to facilitate understanding. Within post-positivism, the epistemology is defined as modified objectivist. Objectivity remains a regulatory ideal, but it can only be approximated. More applicable for the remainder of the thesis is the scope of the methodology within the paradigm. In post-positivism, Guba (1990) defines the methodology as modified experimental / manipulative. This usually involves quantitative experimental methods with threats to validity, as knowledge is inferred from observational data and observations are influenced by perception and cognition.

Related to this thesis, the post-positivistic paradigm means that the delimitation, the selection of data and the methodological approaches can affect the final results, despite the most appropriate effort from the authors to make objective and correct choices. Hence, from a perspective of philosophy of science, the thesis can simply approximate reality and is unable to fully comprehend true reality and all its aspects. This leads to a discussion of data sources, data collection techniques and sample construction, all of which are covered in Section 3.3, in order to determine the validity of the inferences and conclusions drawn with the use of our constructed sample. The general quantitative methodology is presented in the following.

3.2 Quantitative methodology

This section covers our empirical analysis approach initiated through multiple logistic regression models. The general statistical methodology is outlined to establish a quantitative methodological foundation before presenting the dataset and subsequently the empirical results of our analyses. We argue for the choice of statistical approach and explain the essential mechanisms of the technique as well as the underlying assumptions. This section follows literature by Stock and Watson (2012), Hosmer *et al.* (2013) and Ranganathan *et al.* (2017) unless otherwise stated.

3.2.1 Selection of statistical methodology

To better decide on which statistical regression methodology to approach, we first discuss the conventional ordinary least squares (OLS) linear regression framework, commonly used in econometrics, and its limitations in the scope of our research objective. Moreover, we briefly discuss the discriminant analysis framework and illuminate that this is neither optimal for our research design. Based on this, we argue for the alternative use of logistic regressions. In our dataset, the dependent Y-variable is binomial (also known as dichotomous) as it is set to unity ($Y = 1$) if the specific observation has been a PE target during the observed period and set to zero ($Y = 0$) for the control group of firms which were not targeted. All information regarding our data collection and sampling process as well as our construction of control group is fully elaborated in Section 3.3.

A **linear** regression analysis estimates the relationship of an outcome (dependent) variable on a continuous scale with continuous and/or binary predictor (independent) variables. Hence, at this point, one observable drawback to applying linear regression models on our dataset is apparent. As the dependent variable in a linear regression model operates on a continuous scale, it is not constrained to attain values between 0 and 1. This condition violates several of the underlying assumptions of a linear regression model as explained in the following.

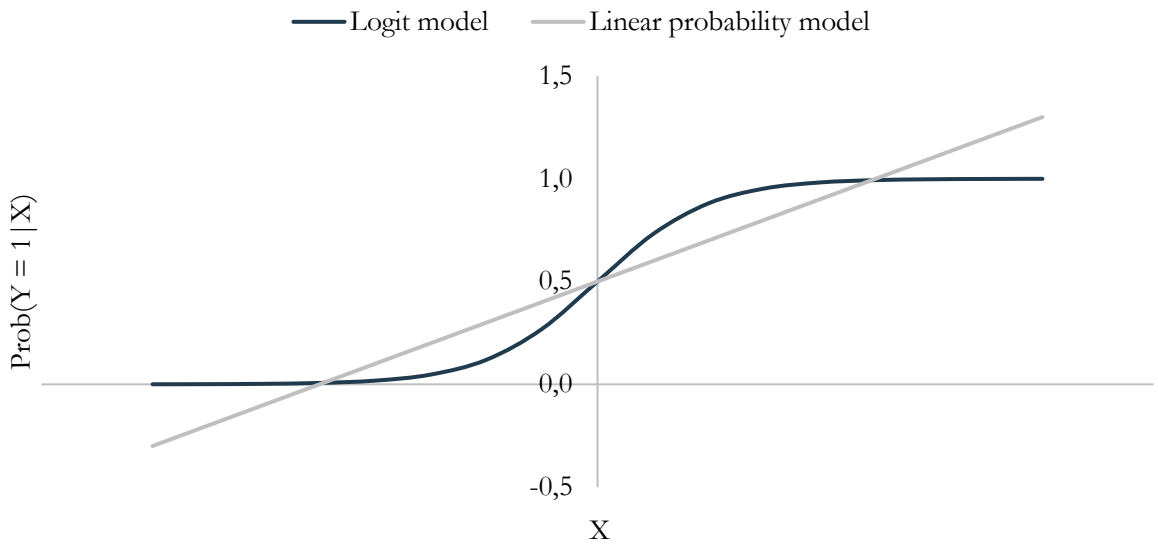
The essential assumptions of the linear regression model are briefly reviewed and discussed and will not contain an in-depth explanation of each assumption, as we primarily seek to argue for applying an alternative regression framework and disregard the linear regression approach. For an in-depth explanation of all nine assumptions discussed in the following, we recommend consulting Stock and Watson (2012).

1. The relation is linear in parameters, and given by: $Y_i = \beta_1 + \beta_2 X_{2i} + \beta_3 X_{3i} + u_i$
2. The X values are independent of the error term: $\mathrm{Cov}(u_i, X_i) = 0$
3. The error term has zero expected value: $E(u_2^i | X_i) = 0$ for each i
4. The error term has constant variance for all observations (homoscedasticity): $\mathrm{var}(u_i) = \sigma^2$
5. The random variables u_i are statistically independent (no autocorrelation): $E(u_i, u_j) = 0$ for all $i \neq j$
6. The number of observations (n) must be greater than the number of parameters to be estimated
7. The nature of X: Variability in X values: $\mathrm{var}(x \neq 0)$
8. No exact collinearity between the X variables (multicollinearity)
9. The error terms are normally distributed: $u_i \sim N(0, \sigma^2)$

If all assumptions above are satisfied when performing linear regressions, the estimates of the beta coefficients are unbiased. However, this is rarely the case in reality. Moreover, each assumption is not of equal importance. In our case with a dependent variable that can take the values 1 (bid by PE investor) or 0 (no bid by PE investor), an OLS framework will form a linear probability model where the predicted value of Y is interpreted as the predicted probability that Y = 1 and the beta coefficients simply reflect the change in that predicted probability for a unit change in X. When having multiple regression coefficients, i.e. explanatory variables, the regression coefficient β_1 for example indicates the change in probability of Y = 1 associated with a unit change in X_1, holding all other regressors constant. An advantage of a linear probability model is that the coefficients are easy to interpret.

However, the linear probability model is not optimal to apply when the dependent variable is binomial, explained by three overall arguments. First, the probability can go below zero or exceed one in the linear probability model as depicted in Figure 3.1 where the Y-axis represents the probability of Y = 1 given one or more explanatory variables.

Figure 3.1 – Linear probability model versus logit model
Note: Illustrative example



As a binary dependent variable is nonlinear and bounded, i.e. restricted to take on values in the interval 0 – 1, the use of a linear regression allows the risk of obtaining meaningless predictions where the predicted probability is less than 0 or larger than 1. On the contrary, logistic regressions do not assume a linear relationship between the dependent variable and the independent variables, as the logistic regression model transforms the dichotomous dependent variable into a "continuous" variable by means of logged odds and thereby creates a linear relationship between the dependent and independent variables. This satisfies an assumption in logistic regression models of a linear relationship between independent variables and the logit of the dependent variable. A further review of the assumptions in logistic regression is provided in Section 3.2.2.2.

Additional assumptions of the linear regression framework are violated when Y is binomial. Assumption four concerning homoscedasticity is not conformed. As the X values are assumed to be fixed, the variance of the error term, u_i, mirrors the variance of the dependent variable, Y_i. In other words, a linear regression requires that the variance of the error terms is constant across levels of the independent variable. Otherwise, significance tests and confidence intervals will be invalid. In the linear probability model, when the dependent variable follows a binomial distribution, the variance of the error terms will be largest around the mean values and minimized at the lower and upper values of 0 and 1. This is a case of heteroscedasticity, thus violating the assumption of homoscedasticity. In contrast, logistic regression analyses do not assume constant variance and thus does not encounter this violation of an essential assumption. In logistic regression models, this issue is mitigated through the logit transformation of the dependent variable.

Additionally, assumption nine regarding normality of the error terms is violated. As the dependent variable is binomial, the error terms unavoidably take one of only two values and will therefore violate the assumption of normality. The estimation of parameters in OLS are founded on minimizing the squared residuals, where the residuals, $\hat{u}$, represent estimates of the error terms, u. Due to this, the violation of the normality assumption will affect coefficient estimates as well as confidence intervals. This assumption of normally distributed error terms is not assumed in logistic regression and applying the logistic approach instead thus mitigates the concern. Nevertheless, logistic regression analysis includes a different assumption regarding normality, which is elaborated in Section 3.2.2.2.

As observed from the paper by Renneboog and Simons (2005) concerning the four overall phases of going private transactions, we noted that discriminant analyses have also been used as an alternative method in the field. Generally, discriminant analyses can be used to i) find a predictive equation for classifying new individuals to one group among a number of groups or ii) to interpret and assess the predictive equation to better understand the relationships that may exist among the variables. However, we do not regard this statistical approach as useful for our research design as discriminant analyses include several assumptions which are violated by our dataset. For instance, discriminant analysis assumes that all variables have linear and homoscedastic relationships, that each of the independent variables are normally distributed and that no outliers may be present in the data (Webb and Copsey, 2011).

To summarize the discussion above, it is recognized that in the presence of a dichotomous dependent variable, the traditional linear regression model using OLS includes flaws and limitations, including non-linearity, heteroscedasticity and non-normality, which together can lead to errors in establishing significance, poor estimation of coefficients and unreliable confidence intervals. Likewise, discriminant analyses include similar distributions assumptions (normality, linearity and homogeneity of variance among the independent variables). Conversely, logistic regression analysis overcomes these issues. In the following section we focus on the dynamics of logistic regression models as well as the assumptions and interpretation. Note that an alternative probability model exists: the probit model. The difference between the logit- and probit models are theoretical and not of importance for our analysis. The two models are non-linear regression models specifically designed for binary dependent variables. Similarly, they yield similar results and can be used for the exact same research purposes and the main difference is that they use different link functions, i.e. the logit model uses the logit cumulative distribution function. Having arrived at the relevance of logistic regression analysis and the selection of this technique for our further quantitative analysis, we note that this is in line with previous studies in the field, as seen in the overview in Table 2.1, which is also provided in Appendix 2.

3.2.2 Logistic regression analysis

Founded on the argumentation in the preceding section, we apply logistic regressions in our analysis to determine delisting motives among PE investors. Contrary to a linear regression analysis, logistic regression examines the relationship of a binary outcome with one or several predictors, which can be either continuous or categorical. As the dependent variable in a logistic regression model has two potential outcomes, logistic regression models fit consistently with the construction of our dataset and our dependent variable and are therefore used to test the developed hypotheses with the examined variables. Specifically, we test the directional effect $(+/-)$ of each variable on the likelihood of being targeted by a PE investor as a European listed company. As logistic regression analysis is commonly less used in general econometric studies than the conventional OLS methods, we provide a review of the mechanisms and characteristics of logistic regression models in the following.

3.2.2.1 Introduction and interpretation

In general, logistic regression models have basic similarities with linear regression models. Coefficients are estimated with related standard errors and these can be used to test null hypotheses for each variable. When creating a multivariate logistic regression model, a statistical software tool is utilized to first calculate the baseline odds of the event occurring (Y = 1) versus not having the outcome, without the use of any predictors. This provides the constant, also known as the intercept of the model. Subsequently, the selected X-variables are added to the model and a regression coefficient (β_i) is computed for each of the entered input variables. Simultaneously, p-values are computed for each X-variable. These p-values indicate the significance of the predictive power of the variables and thus how each variable contributes to the occurrence of the predicted outcome. Based on the coefficient results, an equation including both the constant term and the regression coefficient for each variable can be used to express the model used to predict the probability of Y = 1, given a particular set of predictor factors. If we define π_i as the probability that the outcome Y_i equals one, the multiple logistic regression model is denoted as follows:

$$\pi_i = P(Y_i = 1|X_1, X_2, \dots, X_k) = \frac{e^{(\beta_0+\beta_1X_1+\beta_2X_2+,\dots,+\beta_kX_k)}}{1+e^{(\beta_0+\beta_1X_1+\beta_2X_2+,\dots,+\beta_kX_k)}} \quad (1)$$

π_i is the expected probability that the outcome is present. Y_i is the binary response variable. $X = (X_1, X_2, \dots, X_k)$ is the set of explanatory variables which can be discrete, continuous or a combination. x_i is the observed value of an explanatory variable for observation i. β_0 through β_k are the regression coefficients. As briefly mentioned, the logistic regression model transforms the dependent variable by means of logged odds and the coefficients in the logistic model therefore represent the natural logarithmic form of odds associated with each factor.

The odds (O) refers to the ratio of the probability of occurrence of an event divided by the probability of no event (here denoted with multiple regressor variables):

$$O = \frac{P(Y = 1|X_1, X_2, \dots, X_k)}{P(Y = 0|X_1, X_2, \dots, X_k)} = \frac{\pi_i}{1 - \pi_i} \quad (2)$$

The interpretation of the coefficients' magnitude in logistic regression models is not highly relevant for our further analysis and presentation of empirical results, as we solely seek to measure directional effects of independent variables. In other words, we seek to measure how our included X-variables affects the Y-variable, i.e. the likelihood of a PE bid, but we do not seek to measure exact numerical values and predict probabilities. Although we essentially measure effects of explanatory variables on the likelihood, the estimation of specific probabilities and prediction of outcomes is in other cases a motive to apply logistic regression models, especially in studies within the fields of natural science. However, the interpretation of odds is briefly explained with an example adapted from Pedhazur (1997): Suppose that seven out of ten males (group A) are admitted to an engineering school while only three of ten females are admitted. Thus, the probability of success (Y = 1) for males is 7/10 = 0.70 and the probability of failure (Y = 0) is 0.30. In this example, the odds of Y = 1 for males is 0.70 / 0.30 = 2.333. Therefore, the odds indicate how many occurrences that are expected (Y = 1) relative to non-occurrences. If the probabilities of success and failure are identical, the odds will simply be one. The transformation from probability to odds is monotonic in the way that odds increase when probability of Y = 1 increases. As known, probabilities ranges from 0 to 1. Correspondingly, odds range between 0 and infinity. In essence, by using the natural log of the odds of the outcome as the dependent variable, the relationships can be linearized and treated much like multiple linear regression. The reason for transforming from probabilities to odds is therefore to avoid the restricted range of 0 – 1 coming from the probability scale.

Based on the equation of the odds, and with k explanatory variables and n individuals, where π_i is defined as the probability that $Y_i = 1$, the outcome is then the expected log of the odds that $Y_i = 1$ and the binomial logit can mathematically be denoted as:

$$\text{Logit}(\pi_i) = \text{Log}\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k \quad (3)$$

The transformation from probabilities to the log of odds is called the logit transformation. Notice that the right-hand side of the equation above mirrors a multiple linear regression equation. However, as the technique for estimating the regression coefficients is distinct in a multiple logistic regression model compared to a multiple linear regression model, the beta-coefficients should be interpreted differently. As the coefficients are represented by logged odds, they are difficult to interpret directly. Nevertheless, note that a higher value of odds also leads to a higher value of the logged

odds and vice versa. In logistic regression, β_1 as example indicates the change in the expected log odds relative to a one-unit change in X_1, holding all other predictors constant. It is therefore only the **sign** of the coefficient that can be interpreted easily. A positive (negative) coefficient for a particular variable means that the firms targeted by PE investors have a higher (lower) value of the characteristic relative to firms in the control sample.

An alternative method to interpret the estimates are by the use of odds ratios (ORs). The OR is the ratio of odds of an event in one group (A) versus the odds of the event in the other group (B).

$$\text{Odds ratio (OR)} = \frac{P(Y = 1|X_A)/P(Y = 0|X_A)}{P(Y = 1|X_B)/P(Y = 0|X_B)} = \frac{O_A}{O_B} \quad (4)$$

An OR = 1 indicates that there is no difference in odds between the groups being compared. An OR > 1 indicates an increase in odds among the exposed group (Y = 1) compared to the unexposed (i.e. a positive relationship between the dependent and independent variables), whereas a OR < 1 indicates a decrease in odds in the exposed group (i.e. a negative relationship). An alternative method to compute the odds ratios are by exponentiating the coefficients $\left(e^{\beta_1}\right)$.

3.2.2.2 Assumptions

As clarified in Section 3.2.1, logistic regression analysis does not require the three assumptions violated in linear regression models when having a dichotomous dependent variable, i.e. linearity, normality and homoscedasticity. Nevertheless, other assumptions apply, and the essential ones are shortly explained in the following.

To begin with, it is assumed that the observations $Y_1, Y_2, \ldots, Y_n$ are independently distributed, meaning that each PE bid is independent of each other. Next, a binomial logistic regression requires the dependent variable to be binary and an ordinal logistic regression requires the dependent variable to be ordinal, i.e. on a numerical scale. However, this is not relevant as we have a binomial dependent variable.

Secondly, the model should be fitted correctly, i.e. only meaningful variables are included, and no meaningful variables are omitted. To accommodate this assumption appropriately, we follow a stepwise estimation methodology in the selection of variables, elaborated in Section 4.1.

Logistic regressions assume little or no multicollinearity among the independent variables. This means that the independent variables must be independent of each other and should therefore not be highly correlated. Related to this, it is still an option to include interaction effects of categorical variables in the model.

Next, logistic regression has an alternative linearity assumption. It is not required that the dependent and independent variables are related linearly, but instead required that the independent variables are linearly related to the log odds. If

this assumption is not satisfied, the test can underestimate the strength of the relationship and thereby have a risk of rejecting the relationship too easily, i.e. being insignificant (not rejecting the null hypothesis) where it should be significant.

As logistic regression analysis uses maximum likelihood estimations (MLE) computed through iterative processes, logistic regression relies on sufficiently large samples. A reason is that maximum likelihood estimates are less "powerful" than OLS estimates, as they require more observations per independent variable than OLS does. A general rule of thumb is that a minimum of 10 observations is needed per independent variable in MLE whereas OLS estimates are reliable with just five observations per predictor variable. However, this general rule has been questioned by e.g. Vittinghoff and McCulloch (2006) who concludes that this rule can be relaxed. We do not regard this assumption as an issue as our sample size is in line with previous literature as supported by Appendix 2.

Finally, although a logistic regression does not assume normally distributed error terms as the linear regression framework does, it still assumes that the distribution belongs to one of the groups of exponential distributions and thus can be "normalized" through transformation.

3.2.2.3 Explanatory power

When assessing the explanatory power of a logistic regression model, the traditional coefficient (R^2) is not suitable and is seen as an invalid goodness-of-fit statistic for non-linear models by literature. The reason is that the conventional R^2 is based on an underlying assumption that a linear model is fitted. For linear models, the sum of the squared errors (SSE) and the sum of the squared regression (SSR) adds up to the sum of squares total (SST). SSE quantifies how much the data points (y_i) vary around the estimated regression line ($\hat{y}_i$). Note that this is the quantity that OLS minimizes. SSR quantifies how far the estimated regression line ($\hat{y}_i$) is from the sample mean ($\bar{y}$). Mathematically, R^2 is computed as SSR divided by SST.

$$R^2 = 1 - \frac{\sum_{i=1}^{N}(y_i - \hat{y}_i)^2}{\sum_{i=1}^{N}(y_i - \bar{y})^2} = 1 - \frac{SSE}{SST} = \frac{\sum_{i=1}^{N}(\hat{y}_i - \bar{y})^2}{\sum_{i=1}^{N}(y_i - \bar{y})^2} = \frac{SSR}{SST} \quad (5)$$

In non-linear models, e.g. the logistic regression, SSE and SSR does not add up to SST, thus invalidating the R^2 measure as it no longer is restricted to values between 0 and 1. The reason is that in a logistic regression, observed values of the dependent variable need to take the values 0 or 1, while the predicted values are in between these extreme values.

Hence, an equivalent statistic to R^2 with equivalent OLS-interpretations does not exist in logistic regression analysis, but other measures are useful to measure the goodness-of-fit of our logit models. First, several pseudo R^2 measures have been developed in academia and are known as "pseudo" R^2 because they operate on a similar scale with values

ranging from 0 – 1 and are similarly interpreted with higher values indicating a better model fit. They measure the improvement in the value of the log-likelihood relative no having no X's. However, different pseudo R^2 measures can arrive at very different values and they cannot be interpreted as the OLS R^2 is interpreted. As we seek to test the significance level of certain variables and not to construct a model with the best explanatory power, measures to evaluate goodness-of-fit will not be the drivers of our analysis as this would lead us to exclude some of the variables we will test. However, we will report pseudo R^2, AIC and LR Chi^2 to detect possible issues of our specification of regression models. In previous literature in the field involving logistic regression analyses, e.g. North (2001), Achleitner et al. (2013), Thomsen and Vinten (2014), interpretations of pseudo R^2 are rarely seen and we will therefore not put major attention to this measure but rather detect whether the explanatory power of our models is in line with precedent studies.

In addition to the pseudo-R^2, other measures are useful. The LR Chi^2 statistics test if at least one of the predictors' regression coefficients are not equal to zero in the model. When deciding on model selection among a finite set of models, the measure Akaike's Information Criterion (AIC) is useful. When a logit model is fitted, it is possible to increase the predicted likelihood by adding more parameters to the model, but this may result in overfitting the model. AIC attempts to resolve this problem by introducing a penalty term for the number of parameters included in the model. Hence, this measure makes it possible to compare different models and the models with lower values of AIC are preferred.

Finally, based on the assumptions of logistic regression discussed in the preceding section, residual plots and multicollinearity between the variables must be investigated to secure a valid model. An investigation of these factors is included as part of our empirical results provided in Part 4.

3.3 Data

This section reviews our dataset by initially covering the sources used to extract data. Additionally, the actual construction of the dataset, including the filtering process and the collected variables, is deliberated in Section 3.3.2 and finally the quality of the data is discussed in Section 3.3.3.

The dataset constructed for our empirical analysis consists of two overall dimensions. First, 161 going private bids by PE investors announced between 2004 – 2015 comprise the observations in our "target sample", where each observation represents a target firm that has received a PE bid while having a public ownership status. Next, a number of input variables, which are elaborated in Section 3.3.2.3, are included for each observation. To complement this sample, a control sample of publicly listed firms that have not been delisted within two years post to the announcement of bid, has been constructed through paired sampling. By the definition "control sample", we imply this sub-sample constructed with the use of paired sampling where a "control firm" is identified as a match for each target observation.

The control group therefore also consists of 161 observations and the exact same variables as the sample of target firms. Hence, the entire dataset consists of 322 observations. The dependent variable is binomial and takes the value Y = 1 for the 161 targets where a PE bid is present and Y = 0 for the 161 control observations which were not targeted by PE investors.

3.3.1 Data sources

In order to collect the data and construct the dataset, several data sources have been identified, investigated and assessed to ultimately decide on the most suitable sources based on both quality and reliability.

PE-backed delisting targets

Beginning with the observations in the initial sample, i.e. the delisting targets, data has been collected from Mergermarket, which has been selected instead of alternative sources such as Dealogic and Zephyr. Mergermarket has a highly relevant definition for "Take private" deals that allows the data extraction process to be filtered to only include transactions matching the following definition: "the acquisition of a publicly quoted company, usually by a financial institution such as private equity firm or venture capitalist (as opposed to a trade purchaser)". To ensure the quality of the observations and to construct a dataset solely consisting of PE investors, the acquirer's categorization has been verified manually.

Control group

For the control group, the source S&P Capital IQ has been applied. This database contains comprehensive information on industries, firms, including accounting data, capital market data and ownership data among additional categories. The construction of the control group sample is explained in Section 3.3.2.2.

Variables

To collect data related to all variables, several sources have been required. Financial data related to all financial statements as well as ownership data and capital market data have been collected from S&P Capital IQ. The data related to financial statements has been extracted from S&P Capital IQ. The same applies for ownership data, while the percentage of shares held by insiders have been manually collected from the database for each transaction at the point in time where the transaction was announced, as the database did not allow for a mutual extraction of this data historically. In cases of lacking data points, especially for financial statement data, gaps were manually filled out with supplemental data from local annual report registers such as Companies House for British target firms, Borsa Italiana for Italian and Brønnøysundsregisteret for Norwegian.

As our dataset comprises observations from numerous different European countries and thus includes data which is originally reported in different currencies, we have converted all local currencies to EUR by historical rates at the dates where the original data is reported. Naturally, as most observed countries already use EUR as their local currency, this

conversion has mainly been relevant for UK and for Scandinavian countries. However, most of our financial variables used as explanatory variables in our regression models consist of margins and ratios.

3.3.2 Data collection techniques

After having outlined the data sources used in the data collection process, this section provides a deeper explanation and discussion of how our sample was constructed. Key issues in the sampling process included how to filter from an irregular gross sample to an accurate final sample and how to create a reliable and useful control group.

3.3.2.1 Sample of PE-backed delisting targets

Among the construction of i) the delisting target sample, ii) the control group of listed firms and iii) the variables, the delisting sample involved the most time-consuming and tedious process. Hence, a detailed systematic clarification is provided in the following and is illustrated in Figure 3.2. The filtering process is a necessary trade-off between the quantity and the quality of the examined observations, where we primarily have focused on the quality of the data and subsequently compared our sample size to similar studies to ensure sufficiency.

Figure 3.2 – Filtering process in construction of delisting target sample

Step	Filter	Remaining transactions
1	No filter (Gross sample of European GPTs from 2004 – 2017)	**371**
2	Transactions from 2016 – 2017	**329**
3	Financial and utilities sectors	**298**
4	Revenue data available LFY	**283**
5	Minority investments	**241**
6	Insufficient data availability	**186**
7	No adequate control firm	**161**

To begin with, all European "take-private" transactions announced since January 2004 were accumulated, comprising a total of 371 transactions. 42 of these were announced between January 2016 – January 2018 and were as a result removed in order to satisfy a criterion of only observing transactions announced between January 2004 – December 2015. This was done to ensure that the control group only consists of firms that are still publicly listed at least two years after the delisting announcement of the observed delisting target. For instance, if a firm was delisted in December 2015, the paired control firm should still be publicly listed as of December 2017. Having removed the 42 delisting transactions announced in 2016 and 2017, 329 observations remained. Next, 31 delisted firms operating in the financial services or utilities sectors were excluded in line with the sector focus stated in the initial delimitation. A short justification is that firms within these sectors differ significantly when it comes to balance sheet composition and regulatory structure, including external scrutiny of the financial services authorities. Previous studies such as North (2001) and Weir *et al.* (2005a) follow a similar exclusion of financial services and Achleitner *et al.* (2013) also remove utilities. As revenue in the latest fiscal year was later used as one parameter in the identification of comparable control firms, 15 delisted firms with no revenue data were removed. As all targets were publicly listed prior to the transaction, it seems unusual that Mergermarket did not have data on the topline. On one hand, this is interpreted as a clear point of weakness of the database. However, the main purpose of using Mergermarket was to identify the actual transactions and then obtain data for the variables, including revenue, from other sources more suitable for this. Hence, we assessed the 15 target firms in the S&P Capital IQ database and concluded that it would be highly unlikely to collect full data on all variables required in our logistic regression and consequently excluded these. In the fifth step of our filtering process, transactions where the PE investor acquired a minority stake were excluded. Surprisingly, 42 of the remaining transactions included minority investments (<50%) and were therefore removed. We decided to do this as most of the 42 excluded minority transactions involved stakes between 0 - 25% and were far from close to a control-acquiring situation. In the filtering process, we expected less than 42 transactions to have involved such minority stakes and this discovery is seen as an additional point of awareness with regards to the overall quality assessment of the database. As mentioned, Mergermarket applied a well-defined and specific "take-private" criterion, however these minority transactions arguably violate this criterion, especially in those cases where we in the manual read-through of deal descriptions discovered that the PE investor simply acquired as little as 5% of the shares outstanding in a listed firm. Hence, we found it more appropriate to make a clear cut and omit all transactions where less than 50% were acquired. The main implication of this is that the total achievable sample size is noticeably reduced. On a positive note, this step ensured that our remaining transactions are all involving majority stakes and fulfills our research purpose of examining transactions in the buyout category.

As of this stage in the filtering process, 241 delisting transactions remained and satisfied the following five gross criteria:

1. Target is a European listed firm and a bid is submitted by a PE investor
2. Announced between January 2004 – December 2015 (including both months)
3. Target does not operate in financial services and utilities sectors
4. Target has available revenue data
5. Transaction involves a majority stake

Next, we attempted to collect data on all desired variables. This resulted in excluding 55 observations which did not have sufficient data, i.e. did not have data on all relevant variables after consulting both our primary databases and supplementing from local registers manually. In some cases, the observations were removed because they did not have three years of financial data before the delisting announcement. For other observations, they did meet this criterion of at least three years of financial data published but lacked different data points in other variables of interest. With the enduring 186 transactions, we initiated the process of identifying paired control firms of listed firms and from this had to exclude 25 observations where no adequate control firm was detected in the control group process. The control group matching process is explained in Section 3.3.2.2. Ultimately, our target sample consists of 161 transactions satisfying the five gross criteria formerly listed as well as the additional two:

6. Data available on all variables required to investigate hypotheses
7. Adequate control firm identified

To sum up the sampling process of our transactions (defined by listed European firms who received PE bids), 241 transactions satisfied the five criteria that we stated with respect to our overall research purpose. This is perceived as the total possible transactions identified in the research process that could have been examined in case of perfect data and sufficient control firms. However, one third of the transactions were removed from these imperfect conditions and hence our final sample size is 161. A detailed overview of this exclusion is provided as part of descriptive statistics in Section 3.5.3. Despite solely focusing on the time of announcement of the transactions and not whether the transactions have been completed, as mentioned in our delimitation, it is worth noting that approximately 90% of our 161 transactions have been fully completed, as just 15 of the transactions only have an announcement date and no completion date in the Mergermarket database. From a general statistical perspective, a total of 161 observations might seem as relatively few. However, we regard the scope of our problem statement and research objective as somewhat narrow, as PE-backed delisting transactions only comprise a small amount of PE related M&A transactions.

3.3.2.2 Control group

Having shortly touched upon the control group sampling process, the methodology is outlined and discussed in detail in the following. As mentioned, a paired sampling process has been completed. This paired matching methodology is acknowledged as choice-based sampling and classifies the observations into groups based on outcome (Cosslet, 1981). Choice-based sampling is regarded as appropriate when random samplings would provide a small number of cases falling into a particular category (Amemiya, 1985).

Our initial criterion related to the selection of control firm is as follows. If a delisting of a target firm was announced in e.g. January 2010, the number one criterion for our selected control firm was that the matching control firm should still be listed on a stock exchange two years later, i.e. in January 2012. Whether this control firm was then subsequently delisted, e.g. in January 2013, is irrelevant, as we set the required period to two years, in line with the approach by Achleitner *et al.* (2013). The overall purpose of the control group is to create a group of firms similar to our target firms but where the control firms have not been targeted by PE investors and thus have remained listed. By having these two groups and combining them in one dataset, with identical variables characterizing the firms, we expect to observe significant differences reflected in our logistic regressions.

With the primary criterion in mind for the rest of the control sampling process, we followed an algorithm inspired by North (2001), Weir *et al.* (2005), Klein and Zur (2009) and Achleitner *et al.* (2013) in order to obtain a match for each of our PE targets. The following systematic approach in the identification of control firms has been followed to reduce the risk of subjectively selecting firms with no methodical justification in mind. Instead we strive to remain objective within a restricted framework and ultimately achieve a higher degree of reliability of the control sample and its ability to identify significant delisting motives among PE investors. Initially we observed public firms, which operate within the same industry classification as the delisting target according to S&P Capital IQ's industry classification (based on SIC codes), as we regard the industry classification as critical for comparability. Note that this is not a general sector classification but is specified in more detail in explicit sub-industries. Next, we preferred to select control firms that have their headquarters in the same country as the target that they must match, based on the notion that the investment strategy of PE investors often include a geographical aspect. If no obvious control firm existed in the same country, European neighbor countries were preferred and in the few cases where no adequate control firm existed in the neighbor countries, this geographical selection criterion was extended to the same European region, i.e. Northern, Southern, Eastern or Western Europe, based on an assumption that the geographical investment focus is largely region-oriented and rarely restricted to just one European country. Taking industry and geography into account as well as the primary criterion of still being listed at least two years after the matching delisting transaction was announced, our model allowed a total of 10 possible matches for each delisting transaction where the best of the 10 then could be selected manually. However, for most of the observations we did not identify 10 adequate control firms, but mainly

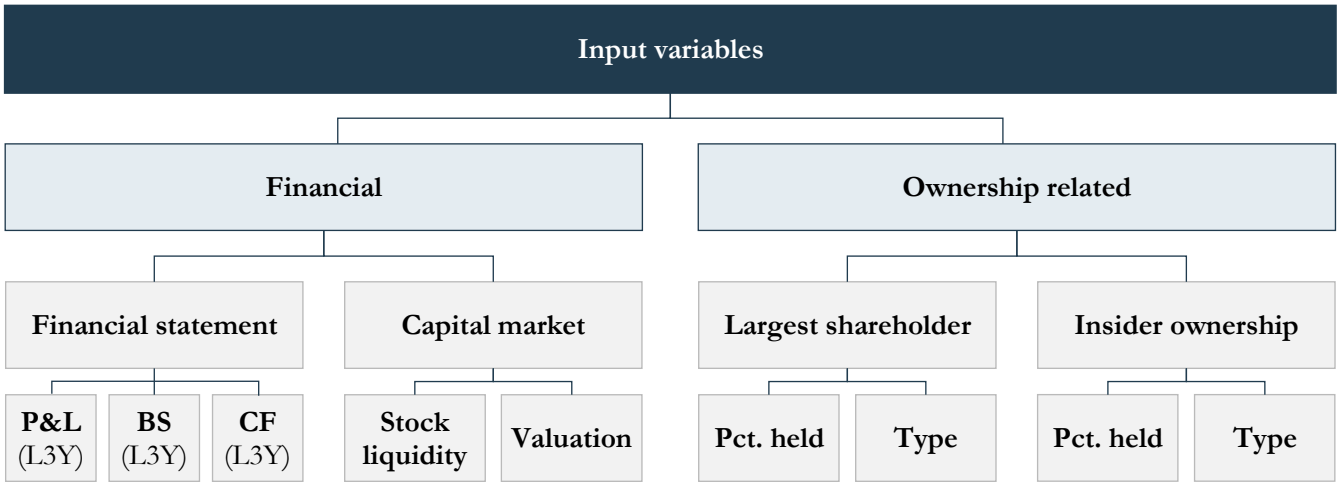
selected between 3 – 5 suitable matches. Additionally, among the possible matches, we attempted to select control firms that matched the delisting firm most in terms of size. North (2001) uses the market capitalization as a size proxy, but we followed the method by Weir *et al.* (2005a) and Achleitner *et al.* (2013) where revenue was used. As an example, if one target firm had five different matched firms in the same industry and same country, we selected the match with the lowest absolute difference in revenue compared to the target firm in the latest fiscal year. Note that although we test the impact of size on the likelihood of a PE bid, we still find it necessary to match the firms with this size criterion to minimize the differences in size. By consistently striving to minimize absolute differences, we assess the construction of the control group to be appropriate and evaluate that the average differences in size across all observations in the two groups can still be used as a valid point of investigation in Hypotheses 4. As stated previously, we had to omit 25 observations since we could not find an adequate control firm that satisfied the selection algorithm in a sufficient manner. Hence, similarly to the overall sample process, the matching procedure of finding satisfactory control firms necessitated a trade-off between quantity and quality. In sum, the control group matching procedure have been fulfilled by the following criteria (ranked by order):

1. Control firm must be listed at least two years after the going private announcement of the target firm
2. Control firm operates within the same industry classification
3. Control firm from same country is preferred, i.e. geographic headquarter difference is minimized
4. Control firm with smallest absolute difference in revenue is selected

3.3.2.3 Variables

In the review of sources used for the dataset, we introduced that S&P Capital IQ served as the main source for all variables, supplemented by domestic registers for gaps in accounting data. In the following, a brief explanation of the specific input variables is provided. These gross variables serve as input for the computation of explanatory variables used in our regressions models and the following review is formulated to provide a fundamental understanding of the actual data points included in the models and driving the regression analyses. In a rough categorization, all variables are either financial or ownership related variables with the following sub-categories:

Figure 3.3 – Overview of input variables



Beginning with financial input variables, these are divided into either financial statement or capital market data. The financial statement data comprises consolidated accounting data collected throughout the three financial statements: profit and loss statement (P&L), balance sheet (BS) and cash flow statement (CF). For data related to the P&L, we have collected revenue, EBITDA, EBIT and net income. Secondly, selected balance sheet items include total assets, total equity, total interest-bearing debt, and net PPE. From the cash flow statement, we have collected unlevered FCF. For all financial statement data, we have extracted annual data from the latest fiscal year prior to the delisting announcement (dependent on the fiscal year end date) and two fiscal years before this, i.e. three fiscal years in total for each observation. For instance, if a delisting was announced in April 2010 and we assume that this company has fiscal year end December 31st, the last fiscal year (LFY) is 2009 and is the latest financial data point for this observation. In the same example, we have collected annual data two additional years back to fiscal year 2007. This periodical approach is applied mainly due to data availability. We acknowledge that quarterly results would be optimal as these contain the latest published and publicly available data. However, using quarterly data also involves a tradeoff, as fewer data items are published on a quarterly basis and thereby creates a less comprehensive option for obtaining full data on all variables from quarterly reports. Conversely, using annual data as of the latest fiscal year preceding a firm's delisting bid contains

more updated and more detailed annual financial statement data points easily comparable across time. The disadvantage of this approach is that it involves a larger risk of having larger time gaps between the announcement date of the PE bid and the date of the latest available fiscal year data, everything else equal. Decisively, we use the latest fiscal year preceding a delisting bid, as we trust that this reasonably serves as a sufficient predictor. This is line with previous studies such as Weir *et al.* (2005a). With regards to capital market data, we have collected stock volume and valuation data. This will be elaborated in Section 3.4. The same applies to all ownership related data.

Besides the financial and ownership related input variables later used to define explanatory variables in our regression models, selected descriptive variables are included in our dataset. These comprise announcement date and potential completion date of delisting, headquarter country, sector and corporate tax rate. Before presenting a general descriptive analysis of the dataset in Section 3.5, we discuss the quality of our dataset in the following.

3.3.3 Data quality

This section discussed several aspects of the overall data quality, including the quality of the sources used and different types of biases potentially encountered in quantitative analysis.

3.3.3.1 Quality of sources

With reference to the quality of the sources used, all data is categorized as secondary data as it is from published databases collected in the past and is not collected directly by the authors of this thesis. Developing additional data at first hand has not been considered essential for the purpose of creating the desired dataset and ultimately testing the developed hypotheses. Despite the objective character of the data and the consistent reporting used in the database sources, we discuss the quality of the sources in the following.

First, S&P Capital IQ is a platform that provides standardized data that ensures consistency and comparable data across firms and industries. The main target group of this database is perceived as investment professionals, but the data also fits the quantitative research intended in this thesis. Mergermarket is a transaction database targeting professionals within M&A. More than 300 specialist M&A journalists throughout 67 countries provides insights to the database and direct links to all sources are provided, i.e. press releases and corporate website news. From an external perspective and based on the usage by prior empirical studies in the research field, we appraise the two main databases used in the construction of our dataset as reliable.

We have investigated significant outliers and back-tracked the original sources. This has ultimately led to our own verification of the outlier values and confirmed the quality and reliability of the data sources. Further, for the transactions collected from Mergermarket, each transaction has been examined. Lastly, we have looked at the detailed deal descriptions provided from the database and ensured that the transactions were relevant for our research.

3.3.3.2 Selection bias

As familiarized in the discussion of the research paradigm relevant for this thesis, post-positivism, several threats to validity exist given the essential role of perception and interpretations. Specifically, the data selection and the corresponding de-selection of other data can have a decisive effect on the results estimated in the regression analyses. This comprises a potential risk of selection bias, which arises when members of the target population are excluded from the sample due to the nature of the sampling process (Keller, 2009). Statistically, this can distort the validity of the interpretation, as characteristics of the sample might deviate from those of the actual population.

In terms of selection bias regarding our included observations, we remain confident that the structured filtering process minimized selection bias and ensured that we ultimately only included observations where all our desired input variables were available and thus enabled a complete dataset. Regarding the selection of the input variables reviewed in the previous section, these have been strictly selected based on our review of existing literature covering delisting motives in general as well motives among PE investors.

3.3.3.3 Measurement errors

Given the character of our problem statement and the related sub-questions, a hypothesis-driven approach is appropriate to identify relevant PE-backed GPT determinants. Next, given the hypothesis structure and the statistical quantitative methodology selected, numerical data points are required and are irreplaceably used to answer the problem statement. This relates to a discussion of measurement errors, which are defined as present when the observed value of a variable does not perfectly reflect the true value (Hopland, 2015). These errors can generate biased estimators and reduce the validity of the dataset, but we do not regard this as a concern given the nature of our quantitative data which is originally sourced from officially published financial reports and proxy statements.

An alternative approach to answering a hypothesis-driven problem statement would be through qualitative data, e.g. surveys and in-depth interviews with industry experts. Nevertheless, we have selected to rely on the quantitative route, as this minimizes the risk of measurement errors, although it naturally creates potential gaps and points of awareness when drawing conclusions. Thus, we are aware of this when interpreting results and seek to sustain a relevant degree of modesty concerning our analysis and its deduced results.

3.3.3.4 Omitted variable bias

An additional point of awareness in continuation of the above discussion regarding the interpretation of results is omitted variable bias. Omitted variable bias can be defined as the situation where a regression model incorrectly excludes a relevant variable, i.e. a variable that is determinant of the dependent variable $(\beta_1 \neq 0)$ that correlates with at least one the of included independent variables specified in the regression $(cov(x_1, x_2) \neq 0)$ (Hopland, 2015). In case that this type of bias is present, the regression model will attribute the effect of the missing variable(s) to the

estimated effects of the included variables. Hence, in case we have failed to include relevant explanatory variables in our dataset, bias in the results can occur.

First, omitted variables partly include variables which we are not aware of, despite conducting a review of previous literature, both including theoretical and empirical findings. It might be the case that significant delisting determinants exist, which we or other authors of previous literature are not sufficiently knowledgeable about. In our attempt to minimize omitted variables bias, we have investigated common variable selections in our review of existing literature. Moreover, we analyze the isolated effect of each potential explanatory variable through a univariate analysis presented in Section 4.1 to ensure the relevance of variables later included in multivariate analyses.

In addition, there are few variables which we are aware of, but where we have been unable to collect sufficient data to include the variables in our dataset. One variable where we acknowledge a limitation of not being able to include it is voting rights of the controlling shareholders. As a proxy for concentrated ownership we have instead been able to include cash flow rights, proxied by the percentage of shares held by the largest shareholders, but in a case of perfect data availability we would have preferred to include both and be able to compute differences between cash flow- and voting rights. This is for instance achieved in the study by Laeven and Levine (2008) who investigate the impact of complex ownership structures with multiple blockholders on firm value and indeed observe differences between control (voting) rights and cash flow rights and find clear evidence on the significance of this difference on firm value. Thus, a similar study on PE-backed GPT likelihood would have been interesting.

3.4 Definition of explanatory variables

The explanatory variables included in our regression analyses are defined in the following. Each explanatory variable is afterwards used in our logistic regression analyses to determine the directional effect and the explanatory power on the likelihood for European listed firms to be targeted by a PE investor.

H1: Stock Liquidity aims to address the relationship between investor interest and the likelihood of being taken private by a PE investor. We use the average daily stock volume traded relative to total shares outstanding at every trading day the last twelve months prior to the announcement date of a PE bid. Hence, the daily stock volume traded divided by the total shares outstanding available at the given trading days ensures a relative and comparable measure of the stock liquidity. This ratio is also commonly known as stock turnover. The higher the stock turnover ratio is, the more liquid the security is. As this variable contains a very low numerical value, we have scaled it by multiplying with a factor of 100 to ease the descriptive analysis without comprehensive needs for excessive decimals.

H2: Leverage level in a firm can be interpreted by several ratios. One of the more common ratios comprise debt relative to the book value of equity as it considers the leverage level from a perspective in terms of capital structure. Another measure is based on the debt in relation to EBITDA (Petersen and Plenborg, 2012). However, problems by

using these measures in a regression model may occur if equity or EBITDA are negative values as this situation would result in a negative ratio, which a quantitative model would interpret as a low leverage level, where it in practice would be interpreted as a high leverage level. For instance, if the book value of equity is negative one (-1) and the total debt is 5, the debt-equity ratio based on these two metrics will be -5.0x and will thus have an incorrect negative impact. Therefore, we find it more appropriate to measure leverage by using market capitalization, representing the market value of equity, as it never results in a negative ratio. Hence, we have calculated the leverage ratio using total debt divided by market capitalization in the last financial year available before announcement date. Other studies have used total debt relative to enterprise value at last financial year. Enterprise value consists of the sum of market value of equity and net interest-bearing debt (i.e. interest-bearing debt minus cash and cash equivalents). The mathematical consequence of this is that the numerator value is also included as a part of the denominator value. Hence, we find it more appropriate to use market capitalization as relative changes in total debt does not have a direct effect on the market capitalization.

H3: Volatility of Free Cash Flows can be addressed by different proxies, which we have evaluated from previous studies. Achleitner *et al.* (2013) use EBITDA as a proxy for free cash flows, which Petersen and Plenborg (2012) also present as a common proxy for cash flows. However, EBITDA does not account for investments in non-current assets or changes in working capital, which are two crucial components of a firm's free cash flow generation and is highly considered by PE investors (Rosenbaum and Pearl, 2009). Therefore, we prefer to apply a firm's actual unlevered cash flows as it presents cash flows available before interest payments. From our data collection, we have managed to collect sufficient data regarding unlevered free cash flows for the last three years prior to the announcement date of the public PE bid. Achleitner *et al.* (2013) use five years of log-transformed EBITDA as the base for cash flow volatility. However, as some of our observations of unlevered cash flows are negative values, this is not an appropriate measure unless adjustments regarding negative values are applied. Alternatively, we have initially calculated the cash flow volatility of unlevered free cash flows the last three years measured in euro millions. Subsequently, we have log-transformed the standard deviations to stabilize the data and avoid that large outliers will drive our results substantially. Hence, we have a comparable measure of cash flow volatility across our observations. Allayannis *et al.* (2005) use this technique as well in order to present that volatility of cash flows is negatively valued by investors.

H4: Size can be explained by different metrics, e.g. revenue, assets and enterprise value. In our initial algorithm to construct a paired sample of control firms, we used revenue as an indicator for size as the last criterion to find the most relevant peers for the transaction firms. To minimize the risk of bias in our regression models we prefer to apply another metric for this hypothesis. We do not assess enterprise value as appropriate because it includes net debt and do not want to include debt financing in our assessment of size. Hence, we prefer the book value of total assets at last financial year as a measure to avoid direct influence from debt financing. Moreover, we log-transform the variable in

order to stabilize the variation and minimize the impact of outliers. Further, the coefficient related to total assets in euro millions would yield the effect of a one million euro increase in assets, which we expect to be minimal with low coefficients requiring more decimals.

H5: Undervaluation can be observed from a range of different ratios. Tobin's Q is one of the frequently applied measures in academia to assess a firm's valuation, which is calculated as enterprise value divided by total assets (i.e. market value of assets divided by book value of assets). Alternative measures consist of the P/B multiple, calculated as the market value of equity divided by book value of equity or by the P/E multiple, computed as the market value of equity divided by the net result. However, one should note that problems may occur by using these multiples as the book value of equity and net result may be negative values, which will bias the model's coefficients towards unmeaningful estimates. In other words, a negative P/B is quantitatively being observed as an indicator for undervaluation, where it in practice may indicate a state of overvaluation if a firm is observed as attractive by the market, regardless of negative book value of equity. In practice, negative valuation multiples are usually addressed as unmeaningful. To test the impact of undervaluation on the likelihood of being taken private be a PE investor, we apply Tobin's Q based on the enterprise value divided by total assets at the year-ending of the last financial year available. Alternatively, we have considered applying enterprise value divided by revenue (EV/Sales). However, the use of this multiple is most common when valuing companies with negative earnings (Rosenbaum and Pearl, 2009). Conclusively, based on the factors discussed above, we apply Tobin's Q as a measure of undervaluation.

H6: Level of Unlevered Free Cash Flows is based on data from the last year prior to the announcement date of a PE bid. To transform this into a relative measure we have calculated the levels of unlevered free cash flows divided by total assets. Achleitner *et al.* (2013) use EBITDA relative to total assets at the last financial year as a proxy. As in the case of the volatility of free cash flows, we prefer to apply the actual unlevered free cash flows as it includes investments in non-current assets and working capital changes. We regard our application of actual cash flows as superior as it captures all elements relevant for PE investors when assessing a target firm and its ability to generate free cash flows, i.e. its ability to yield an attractive operational return.

H7: The Concentration of Ownership can be measured in various ways. First, we have collected ownership data related to the stake held by the largest shareholder. Supplementary, we have extracted the type of the largest shareholder. We have categorized ownership types in four categories consisting of "Investment Management Firm", "Insider", "Corporation" and "Other". Investment Management Firms are asset management firms, hedge funds or other types of investment firms. Insiders consist of individuals with a corporate role within the firm in management or board of directors, which will be described in the following paragraph. Corporations are public firms and private parent non-financial companies. Finally, Other consists of 37 observations, where the largest shareholders were within the following categories: Unspecified, Other, Government, Sovereign Wealth Fund and Bank. As the frequency of

these categories were substantially lower than Investment Management Firms, Insiders and Corporations, we have categorized these firms in a residual group. In addition to the largest shareholder of the firm, we have generated a variable consisting of the aggregate ownership by the three largest shareholders to estimate a proxy for the concentration of ownership.

H7 (continued): Closely Held Shares is calculated as the shares owned by insiders relative to total shares outstanding. Some researchers use an aggregate measure of insider ownership that includes ownership by all board members and managers of the firm (North, 2001). As the role of ownership by managers may differ from the role of ownership by directors of the board, we follow a more time-consuming process applied by Shivdasani (1993), Hadlock *et al.* (1999) and North (2001) where ownership of different insider types is calculated separately. By manually assessing each of our total 322 observations on the S&P Capital IQ's platform, where an overview of all insiders can be found, we have classified these into three separate categories: Executive Directors, Directors or Managers. Executive Directors are insiders who are executive managers and hold board positions. Director only hold board positions. Finally, Managers are executive managers, but do not hold any board positions.

To reduce potential omitted variable bias, we have decided to include five accounting variables in our analysis, which consist of the **Sales Growth**, **Average EBITDA margin**, **Profit margin and Return on Assets** based on the last three years prior to announcement date of PE bid as well as **Net PPE to Total Assets** in the last financial year. Besides these financial control variables, we have included control variables related to the descriptive characteristics of each observation. More specifically, we have included dummy variables that consider **Year**, **Country** and **Sector**, as we solely seek to investigate how firm characteristics affects the likelihood of being targeted by PE investors. This is further explained in Section 4.2.

3.5 Descriptive analysis of dataset

Having settled with a specific selection of input variables and a subsequent definition of explanatory variables, the descriptive statistics of our dataset are now presented based on our raw dataset, i.e. unmodified by any robustness checks or correction of outliers. Characteristics related to geography and sector distribution of our sample of listed targets are initially covered. Next, the distribution across years in our observed period is provided, including descriptive characteristics regarding enterprise value. Finally, descriptive statistics of our explanatory variables are established and presented for both the target sample and the control group in order to provide a comparable overview and potentially discover noteworthy outliers.

3.5.1 Geography

Table 3.1 – Number of private equity bids from 2004 - 2015 by geography: Target sample

Country	Number of PE bids	Percentage of PE bids
United Kingdom	66	41.0%
France	21	13.0%
Germany	13	8.1%
Norway	10	6.2%
Netherlands	10	6.2%
Sweden	7	4.3%
Italy	6	3.7%
Poland	6	3.7%
Spain	4	2.5%
Denmark	3	1.9%
Ireland	3	1.9%
Switzerland	2	1.2%
Luxembourg	2	1.2%
Hungary	2	1.2%
Greece	2	1.2%
Finland	1	0.6%
Belgium	1	0.6%
Bulgaria	1	0.6%
Iceland	1	0.6%
Total	**161**	**100%**

Table 3.1 reports the distribution of PE bids across European countries covered in our dataset based on the headquarter locations. As seen, targets headquartered in UK account for the largest fraction of the transactions. This is arguably driven by the maturity of the UK PE market versus Continental Europe as discussed earlier. After UK,

several transactions involve targets from France, Germany, Norway and Netherlands. Among the countries least represented in our dataset are eight countries which in total accounts for less than 8% of the number of transactions.

3.5.2 Sector

Table 3.2 provides an overview of how the observed going private targets are distributed across general sectors.

Table 3.2 – Number of private equity bids from 2004 - 2015 by sector: Target sample

Sector	Number of PE bids	Percentage of PE bids
Consumer Discretionary	53	32.9%
Information Technology	34	21.1%
Industrials	31	19.3%
Healthcare	19	11.8%
Consumer Staples	11	6.8%
Materials	6	3.7%
Telecommunication Services	3	1.9%
Real Estate	2	1.2%
Energy	2	1.2%
Total	**161**	**100%**

We have classified each target by The Global Industry Classification Standard (GICS) to obtain a concise overview without an excessive amount of underlying sub-industries. The GICS framework contains of 11 overall sectors. We present nine of them in the above table, as the Financials and Utilities sectors are excluded as explained in our data filtering process. To clarify, the Consumer Discretionary sector reflects cyclical industries, i.e. industries providing goods and services that are considered non-essential by consumers but are rather income-sensitive and are influenced by the state of the economy and consumer confidence. As observed in the table, approximately one third of our observed PE targets operates in this sector. Conversely, Consumer Staples is defined as non-cyclical essential products that consumers always demand regardless of the state of the economy. In general, the table reveals that listed firms within the Consumer, IT and Industrials sectors have been highly attracted by PE investors whereas Materials, Telecommunication Services, Real Estate and Energy represent sectors less desired by PE investors seeking listed target firms in Europe in our observed period.

3.5.3 Number and size of PE targets across time

An alternative dimension to describe general sample characteristics is by perceiving the development through the years in our period from 2004 - 2015. First, Table 3.3 illustrates the sample coverage ratio by year, i.e. the table demonstrates how many of the PE-backed GPTs identified in our sample filtering process that has been included in the final sample by year.

Table 3.3 – Sample coverage by year: Target sample

Year	Total identified		Included in sample		Coverage ratio	
	Number	EV	Number	EV	Number	EV
2015	4	1,360	2	403	50.0%	29.6%
2014	13	4,769	12	4,759	92.3%	99.8%
2013	4	1,921	4	1,776	100.0%	92.4%
2012	17	9,886	14	9,271	82.4%	93.8%
2011	16	3,994	13	3,832	81.3%	95.9%
2010	13	7,173	8	1,943	61.5%	27.1%
2009	13	1,069	10	689	76.9%	64.5%
2008	24	10,004	19	5,465	79.2%	54.6%
2007	31	29,283	19	17,575	61.3%	60.0%
2006	47	48,395	31	22,664	66.0%	46.8%
2005	33	30,685	21	16,929	63.6%	55.2%
2004	26	24,445	8	2,059	30.8%	8.4%
Total	**241**	**172,983**	**161**	**87,365**	**66.8%**	**50.5%**

As discovered in the sample filtering process in Section 3.3.2, the table above demonstrates that we identified 241 suitable PE-backed GPTs and found sufficient data and adequate control firms for 161 of the observations, which comprise our final sample. Table 3.3 presents the coverage ratio measured both by number of observations and by EV and shows that almost all identified transactions in 2011 – 2014 were included in the sample. A lower coverage was achieved in the beginning of our observed period, especially in our first observed year, 2004, where a substantial lack of data points impacted the coverage significantly, as only eight of 26 identified firms were covered by full data. When measuring coverage by EV, the table reveals that the excluded firms in 2004 comprised most of the value in that year. Moreover, the EV coverage ratio surprisingly shows a relatively low coverage in 2015 and 2010.

Next, Table 3.4 and 3.5 provides descriptive statistics for the enterprise values of our observations, including both the target group and the control group. The first column denotes the year of the announcement of the PE bid. EV is reported at the end of the financial year prior to the transaction announcement. The EV is used to measure the size of targeted firms across time.

Table 3.4 – Number and size of private equity targets by year

Year	Number of PE bids	Percentage of PE bids	EV (EURm)				
			Sum	Mean	Median	Min	Max
2015	2	1.2%	403	202	202	35	368
2014	12	7.5%	4,759	397	417	51	755
2013	4	2.5%	1,776	444	491	7	788
2012	14	8.7%	9,271	662	67	2	1,273
2011	13	8.1%	3,832	295	63	17	1,498
2010	8	5.0%	1,943	243	196	5	773
2009	10	6.2%	689	69	52	7	146
2008	19	11.8%	5,465	288	115	11	1,833
2007	19	11.8%	17,575	925	253	4	4,221
2006	31	19.3%	22,664	731	186	8	5,700
2005	21	13.0%	16,929	806	200	2	8,499
2004	8	5.0%	2,059	257	182	10	649
Total	**161**	**100%**	**87,365**	**543**	**156**	**2**	**8,499**

As noted earlier, our observed period involves the financial crisis and thus pre-event years and post-event years around the crisis. The impact from this is clearly reflected in the number of observations in these two periods and creates a high degree of skewness in the number of observations. In fact, approximately half of the observations (79) occur in 2004 – 2007 while the other half (82) occurred in 2008 – 2015. The 79 observations in the pre-crisis period account for a total of EUR 59,228m of the total EV in the period, i.e. ~68%. The highest amount of PE bids occurred in 2006 while the lowest amount surprisingly happened in 2015, where the amount of just two observed transactions is much lower than the years immediately following the crisis. The average EV each year, thus reflecting outliers, peaked in 2005 - 2007 and afterwards decreased to less than half of the pre-crisis level in 2008 and onwards. This trend is in line with findings by Achleitner *et al.* (2013) who observed a similar drop after the first half of 2007. As reflected in the "Max" column, the largest PE target occurred in 2005 and had an EV of EUR 8,499m. This observation represents a delisting attempt of TDC A/S in 2005 (Nordic Telephone Company's Bid for TDC, 2008).

An analogous analysis of the control group yields interesting findings. Similarities with the target group include the trend of large average sizes in 2005 – 2007 and a vast drop in the following years. Moreover, the pre-crisis years, i.e. 2004 – 2007, comprise ~67% of the total EV among all control group observations in the period, thus a similar relative share as for the target group where the portion was 68%. Conversely, there is a considerable difference in the average EV. One factor potentially explains this. Our selection of control firms is based on several parameters, i.e. industry, geography and size, where the size measure was revenue in the latest fiscal year prior to the PE bid announcement and

not the EV of the firms. However, we do not regard this as an issue for our further analysis as the median EVs, not impacted by heavy outliers, are reasonably comparable with respectively EUR 156m for the target group and EUR 205m for the control group.

Table 3.5 – Number and size of control firms by year

Year	Number of PE bids	Percentage of PE bids	EV (EURm)				
			Sum	Mean	Median	Min	Max
2015	2	1.2%	6,581	3,291	3,291	205	6,376
2014	12	7.5%	6,749	562	162	8	3,982
2013	4	2.5%	1,491	373	430	23	608
2012	14	8.7%	25,184	1,799	314	3	7,875
2011	13	8.1%	7,077	544	259	9	3,262
2010	8	5.0%	5,954	744	252	8	2,503
2009	10	6.2%	3,668	367	30	2	1,949
2008	19	11.8%	2,682	141	65	6	536
2007	19	11.8%	41,462	2,182	344	4	27,516
2006	31	19.3%	46,985	1,516	377	6	13,287
2005	21	13.0%	27,959	1,331	128	27	10,642
2004	8	5.0%	4,106	513	373	11	1,452
Total	**161**	**100%**	**179,899**	**1,117**	**205**	**2**	**27,516**

3.5.4 Control and type of ultimate controlling shareholder

Before presenting the complete overview of the explanatory variables and their descriptive statistics, the concentration of ownership is unfolded in Table 3.6. The table reports the concentration of ownership across types of ultimate controlling shareholders and includes a comparison of the two groups in our sample. The average percentage of shares held by each type is reported along with the number of each type with a corresponding percentage of the total sub-sample size.

Table 3.6 – Controlling shareholder: Private equity targets versus control group

Largest shareholder type	PE targets			Control group		
	Avg.	No.	% of total	Avg.	No.	% of total
Investment Management	9.1%	92	57.1%	7.6%	66	41.0%
Insiders	24.0%	27	16.8%	27.8%	43	26.7%
Corporations	30.3%	23	14.3%	38.3%	34	21.1%
Other	25.3%	19	11.8%	20.1%	18	11.2%
Total	**16.5%**	**161**	**100%**	**20.9%**	**161**	**100%**

The shareholder type Investment Management is evidently the most common type in both groups, although most in the target group, as it represents the largest shareholder type in respectively 57.1% and 41.0% of the cases. Insiders are the second most common type of controlling shareholder in both groups. In general, an interesting observation is the total average of shares held by controlling shareholders in the two groups. For the target sample, the average is 16.5% while it is more than four percentage points higher at 20.9% for the control group. When breaking this observation down by observing the average percentage of shares held by the different types of controlling shareholders, the difference between the two groups is noticeable. Investment Management owners on average hold 9.1% of the shares in the group of PE targets, while the number is slightly lower at 7.6% for the control group. Relatively small differences in the average percentage of shares held by the largest shareholders across the groups also apply for Insiders and Other. The largest difference is seen for Corporations at 8%. In conclusion, based on the differences detected at first sight, we also expect the difference across the two groups to be statistically significant.

3.5.5 Explanatory variables

Table 3.7 contains an overview of the constructed variables. Mean, median, minimum and maximum values are included as well as the standard deviation of each variable. We report these descriptive summary statistics separately for the PE targets and the control group to identify central tendencies and deviations in our dataset. Panel A includes all variables involving financial data, Panel B covers ownership variables and Panel C provides the statutory corporate tax rate. Panel C is included as an alternative dimension to verify the geographical selection element in the construction of the control group, as the corporate tax rate only varies with country and year. In other words, if the selection of control firms based on the steps discussed in Section 3.3.2.2, has led to reasonable selections based on the geographical criterion, i.e. control firms from same or comparable countries were found, the descriptive statistics of corporate tax rate across the groups are expected to be similar. As aspired, this is the case. The highest corporate tax rate of 0.38 is from Germany in 2007 where as the lowest of 0.10 is from Bulgaria in 2009 (KPMG, 2018). For the remainder of this section, the descriptive summary statistics in Panel A and B are assessed.

Table 3.7 – Explanatory variables: Private equity targets versus control group

Variable	PE targets					Control group				
	Mean	Median	Min	Max	σ	Mean	Median	Min	Max	σ
Panel A: Financial data										
Stock liquidity * 100 (LTM)	0.25	0.15	0.00	2.33	0.31	0.24	0.14	0.00	2.56	0.30
Total Debt / Equity (LFY)	0.47	0.41	-11.92	5.25	1.46	0.64	0.37	-1.46	5.11	0.87
Total Debt / Mcap (LFY)	0.85	0.26	0.00	46.95	3.85	0.58	0.18	0.00	12.03	1.45
Total Debt / EV (LFY)	0.28	0.21	0.00	1.80	0.28	0.25	0.16	0.00	1.82	0.29
FCF Volatility (L3Y)	0.86	0.81	-1.44	2.76	0.66	0.96	0.95	-1.32	3.46	0.78
Log of Assets (LFY)	2.24	2.22	0.57	4.08	0.63	2.33	2.29	0.53	4.31	0.76
Tobin's Q (LFY)	1.14	0.92	0.09	6.89	0.89	1.24	0.94	0.08	7.16	1.10
EV/Sales (LFY)	1.46	1.05	0.06	12.70	1.47	1.90	1.02	0.12	38.10	3.76
Levels of Cash Flow (LFY)	0.04	0.04	-0.26	0.32	0.10	0.03	0.03	-0.41	0.45	0.11
Sales CAGR (L3Y)	0.16	0.09	-0.41	1.49	0.28	0.10	0.05	-0.47	1.37	0.21
EBITDA-% (L3Y)	0.12	0.13	-2.99	0.61	0.32	0.12	0.12	-1.26	0.90	0.21
EBIT-% (L3Y)	0.04	0.07	-4.67	0.47	0.43	0.06	0.08	-1.58	0.89	0.21
Profit margin (L3Y)	-0.04	0.04	-4.57	0.67	0.54	0.04	0.05	-1.27	2.03	0.27
RoA (L3Y)	0.01	0.04	-1.98	0.33	0.19	0.04	0.04	-0.87	0.48	0.13
Net PPE / Assets (LFY)	0.26	0.18	0.01	0.95	0.25	0.23	0.15	0.00	0.95	0.23
Panel B: Ownership data										
Largest shareholder (LS)	0.17	0.12	0.00	0.95	0.15	0.21	0.14	0.00	0.74	0.18
LS * Inv. Mgmt.	0.05	0.01	0.00	0.31	0.08	0.31	0.00	0.00	0.29	0.05
LS * Insider	0.04	0.00	0.00	0.47	0.11	0.07	0.00	0.00	0.64	0.14
LS * Corp.	0.04	0.00	0.00	0.95	0.13	0.08	0.00	0.00	0.74	0.18
LS * Other	0.03	0.00	0.00	0.69	0.10	0.02	0.00	0.00	0.67	0.08
Top 3 holders ownership	0.29	0.27	0.00	0.98	0.23	0.35	0.32	0.00	0.89	0.23
Insider ownership	0.09	0.00	0.00	0.69	0.16	0.16	0.06	0.00	0.76	0.20
Ownership by Exec. Dir.	0.04	0.00	0.00	0.52	0.10	0.06	0.00	0.00	0.69	0.14
Ownership by Directors	0.05	0.00	0.00	0.48	0.10	0.09	0.01	0.00	0.74	0.15
Ownership by Managers	0.01	0.00	0.00	0.28	0.03	0.00	0.00	0.00	0.14	0.02
Panel C: Other										
Corporate tax rate	0.29	0.30	0.10	0.38	0.05	0.29	0.30	0.10	0.38	0.06

The variables involving financial data in Panel A are used to test Hypotheses 1 – 6. In the following, comments regarding selected variables and values are provided. At first sight, this panel reveals that the data contains outliers, reflected by the differences in averages compared to differences in median values. As an example, the average profit margin in the last three fiscal years prior to the delisting announcement have a mean value of negative 0.04 for the group of PE targets and positive 0.04 for the control group. When the median values are examined instead, the difference is minimal with profit margins of 0.04 and 0.05 respectively. Due to these noticeable differences in means compared to median values, indicating that there are outliers in the dataset and thus a fair amount of skewness in the distribution of values, we utilize the median as a measure of central tendency. Hence, the outliers are noted as a potential bias besides the types of biases introduced earlier in the discussion of data quality.

Other financial variables seemingly impacted by outliers include Total Debt / Equity, Tobin's Q and EV/Sales ratio. For instance, EV/Sales have median values of 1.05 and 1.02 respectively but have maximum (minimum) values of 12.70 (0.06) among the targets and 38.10 (0.12) among the control firms. These values are evaluated as extreme outliers. Other significant and mentionable outliers include the minimum and maximum Tobin's Q values among both groups and the maximum Total Debt / Market Cap among the target group.

Next, Panel B comprises variables relevant for Hypothesis 7. The average (median) percentage of shares held by the largest shareholder is 0.17 (0.12) for the target group and 0.21 (0.14) for the control group. Hence, the control firms have larger ownership stakes held by the largest blockholder. The same deduction applies to ownership concentration when it is measured by the aggregate holding of the top three largest shareholders and by the ownership percentage held by insiders. For the ownership variables, several outliers are also observed through the minimum and maximum columns. The largest percentage of shares held by the single largest shareholder prior to the delisting bid is 95% among the target firms and 74% among the control firms. In these two extreme cases, the largest shareholder comprised a listed parent corporation in Hungary and France respectively. Similarly, the largest percentages of shares held by insiders in the two groups are 69% and 76% respectively, which is significantly above the mean and median values. Concerning all ownership variables, the minimum values of 0.00 reported in the table essentially has values above zero but are minor. These come from listed firms with a very high ownership dispersion, where the largest controlling shareholder holds a minimal stake although it is the highest among all shareholders.

Having selected a statistical methodology to perform quantitative analysis and concluded a review of our sampling process, variable definitions and descriptive statistics, we present the empirical results in the following Part 4.

4. Empirical results

In this part, we first present the univariate results of our selected explanatory variables and subsequently initiate our multivariate empirical analysis. The latter is regarded as the most important analysis and the former is regarded as supporting prerequisite for this. Hence, the majority of this part focuses on the multivariate analyses. To support the analyses, several robustness checks are completed in Section 4.3 and finally all results are interpreted and critically assessed in Section 4.4. All regression analyses are conducted via the statistical software program Stata.

4.1 Univariate results

In extension of our descriptive analysis, providing an overview of the descriptive summary statistics related to the selected explanatory variables in Table 3.7, this section includes statistical tests of the differences in variables across the target group and the control group. Previously we commented on selected outlier observations and shortly touched upon perceivable differences across the two groups, but this section extends the investigation by statistically measuring the differences. Specifically, we provide two univariate comparisons of the 161 firms targeted by PE investors versus the 161 sampled control firms that did not receive PE bids.

The purpose of the first test is to test for differences in **means** across the two groups. For this, we have completed a two-sample t-test assuming unequal variances, as homoscedasticity is not required in logistic regressions as recognized earlier. Secondly, differences in **medians** are calculated using a Wilcoxon signed-rank test. This test, developed by Wilcoxon (1945), is a non-parametric statistical hypothesis test used to compare two related samples, matched samples or repeated measurements on a single sample to evaluate whether their population median differ. In other words, the test is used to determine whether two dependent samples were selected from populations having the same distribution (Sidney, 1956). In case the null hypothesis is true, the median difference is equal to zero. We report the results from the t-test measuring differences in mean values and the Wilcoxon signed-rank test measuring differences in median values by p-values. One star indicates significance at a 25% level (p-value < 0.25), two stars at a 10% level and three stars at a 5% level. Although a 25% level might seem high at first sight, it is a well-approved and recommended level to be used as a screening criterion for variable selection in logistic regression analysis when completing univariate analyses (Hosmer *et al.*, 2013). Authors such as Bendel and Afifi (1977) and Mickey and Greenland (1989) show that the use of a more traditional level (e.g. 0.05) often fails to identify variables known to be important. Note that these tests solely represent a univariate analysis and are not directly used to conclude on our stated hypotheses but are rather used to obtain an initial indication of differences across the two sub-samples and support the selection of variables used in our subsequent multivariate analyses.

Table 4.1 – Univariate analysis of variables: Private equity targets versus control group
Note: Significance levels: *** = 5%, ** = 10%, * = 25%

Variable	PE targets		Control group		Difference		t-test (p-values)	Wilcoxon (p-values)
	Mean	Median	Mean	Median	Mean	Median		
Panel A: Financial data								
Stock liquidity * 100 (LTM)	0.25	0.15	0.24	0.14	0.01	0.00	0.7612	0.8910
Total Debt / Equity (LFY)	0.47	0.41	0.64	0.37	-0.17	0.04	0.2085 *	0.9900
Total Debt / Mcap (LFY)	0.85	0.26	0.58	0.18	0.27	0.08	0.4053	0.0929 **
Total Debt / EV (LFY)	0.28	0.21	0.25	0.16	0.03	0.06	0.2795	0.1286 *
FCF Volatility (L3Y)	0.86	0.81	0.96	0.95	-0.10	-0.14	0.2037 *	0.2689
Log of Assets (LFY)	2.24	2.22	2.33	2.29	-0.09	-0.07	0.2576	0.3120
Tobin's Q (LFY)	1.14	0.92	1.24	0.94	-0.10	-0.02	0.3528	0.8617
EV/Sales (LFY)	1.46	1.05	1.90	1.02	-0.44	0.03	0.1716 *	0.6626
Levels of Cash Flow (LFY)	0.04	0.04	0.03	0.03	0.01	0.01	0.4734	0.4187
Sales CAGR (L3Y)	0.16	0.09	0.10	0.05	0.06	0.04	0.0276 ***	0.1109 *
EBITDA-% (L3Y)	0.12	0.13	0.12	0.12	0.00	0.01	0.8891	0.2546
EBIT-% (L3Y)	0.04	0.07	0.06	0.08	-0.02	0.00	0.5885	0.4818
Profit margin (L3Y)	-0.04	0.04	0.04	0.05	-0.09	-0.01	0.0759 **	0.2487 *
RoA (L3Y)	0.01	0.04	0.04	0.04	-0.02	-0.01	0.2001 *	0.1975 *
Net PPE / Assets (LFY)	0.26	0.18	0.23	0.15	0.03	0.03	0.2343 *	0.2592
Panel B: Ownership data								
Largest shareholder (LS)	0.17	0.12	0.21	0.14	-0.04	-0.03	0.0197 ***	0.0241 ***
LS * Inv. Mgmt.	0.05	0.01	0.31	0.00	-0.26	0.01	0.0049 ***	0.0041 ***
LS * Insider	0.04	0.00	0.07	0.00	-0.03	0.00	0.0151 ***	0.0237 ***
LS * Corp.	0.04	0.00	0.08	0.00	-0.04	0.00	0.0321 ***	0.0732 **
LS * Other	0.03	0.00	0.02	0.00	0.01	0.00	0.4854	0.8263
Top 3 holders ownership	0.29	0.27	0.35	0.32	-0.06	-0.04	0.0252 ***	0.0210 ***
Insider ownership	0.09	0.00	0.16	0.06	-0.06	-0.05	0.0020 ***	0.0001 ***
Ownership by Exec. Dir.	0.04	0.00	0.06	0.00	-0.02	0.00	0.2076 *	0.1240 *
Ownership by Directors	0.05	0.00	0.09	0.01	-0.05	-0.01	0.0008 ***	0.0001 ***
Ownership by Managers	0.01	0.00	0.00	0.00	0.00	0.00	0.9386	0.0122 ***
Panel C: Other								
Corporate tax rate	0.29	0.30	0.29	0.30	0.00	0.00	0.4794	0.6256

An initial look at Table 4.1 reveals that several differences in mean values are present and fewer considerable differences in median values, explained by the existence of outliers as discovered earlier. Outliers are reflected by large differences in the differences in mean and median across the two groups. For instance, the difference in Total Debt / Market Capitalization is 0.27 when measured by mean but only 0.08 when measured by median. Conversely, financial variables with minimal differences across the two groups include EBITDA- and EBIT margin, Log of Assets, Levels of Cash Flow and Stock Liquidity. The similarity in Stock Liquidity indicates that there is no significant difference in investor interest across the two groups and hence no support in favor of Hypothesis 1. For this variable, mean and median values are nearly identical across the groups. Likewise, the Levels of Cash Flow has small differences across the two groups and does not provide evidence supporting Hypothesis 6 stating that high levels of unlevered free cash flows increase the likelihood of being targeted by a PE investor.

Next, the p-values differ in the two tests. For some variables the difference is minor, i.e. for Log of Assets or Levels of Cash Flow, but for other variables the difference is considerable, i.e. leverage ratios and Tobin's Q. This serves as a reasonable indicator that robustness checks of the dataset is suitable, especially regarding an inspection of heavy-weighting outliers distorting the results.

Panel A contains variables relevant for Hypotheses 1 – 6. When ignoring the presence of outliers and looking at the t-test of differences in means across the two groups, little support of the hypotheses exists, when the isolated effects are measured. The Total Debt / Equity ratio possesses a p-value of 0.2085, hence significant at a 25% level. However, this ratio was disregarded earlier as Total Debt / Market Capitalization is evaluated to be more appropriate. The p-value related to this measure supports H2. On a 25% level, FCF Volatility is significant and provides evidence in support of Hypothesis 3, as PE targets have lower volatility in free cash flows than control firms. Again, as this is simply a supportive analysis prior to our multivariate analyses, we are not highly concerned about the somewhat weak empirical evidence related to the financial variables from the univariate analysis. Conversely, Panel B provides strong evidence of Hypothesis 7. As stated in the hypothesis, we expect the percentage of shares held by controlling shareholders to have a negative impact on the likelihood of being targeted by a PE investor. The descriptive summary statistics in Panel B indicate strong support to this. This also applies when the hypothesis is decomposed to observe insider ownership.

According to the p-value obtained through from the Wilcoxon test, the difference in leverage when measured by Total Debt / Market Capitalization is significant which contradicts Hypothesis 2. For FCF Volatility, the p-value of 0.2689 is slightly higher than for the t-test and indicates weaker support for Hypothesis 3. Again, few other hypotheses are clearly supported except for Hypothesis 7 concerning ownership held by the largest shareholders. We acknowledge that these results should be cautiously concluded upon as they originate from separate analyses of each variable without considering pairwise correlations. As logistic regression assumes little or no multicollinearity among the independent

variables, a pairwise correlation matrix is provided in Appendix 3. The pairwise correlations are discussed in the selection of variables for our multivariate regression analysis in Section 4.2.

The results from Table 4.1 can be summarized as follows. Based on the univariate results, i.e. t-tests and Wilcoxon signed-rank tests of mean and median differences respectively, empirical evidence supporting Hypotheses 3 and 7 exists, where the evidence for H3 is weak and cautiously interpreted. On the contrary, there is no univariate empirical support for Hypothesis 1, 4, 5 and 6. Lastly, the univariate results related to H2 are ambiguous. As the univariate results discovered are simply indicative and are not used to deduce final conclusions, a multivariate regression analysis is now performed. Based on the findings from the univariate analysis in terms of the variables' significance levels and robustness in terms of potential outliers, we find the following variables contained in Table 4.2 as the most appropriate to include in our multivariate logistic regression analysis.

Table 4.2 – Variables included in multivariate analysis
Note: +/– = Directional effect by one unit increase. NS = Not significant

Hypotheses	Variables	Label in models	Expected effect
H1	Stock liquidity * 100 (LTM)	Stock Liquidity	**–**
H2	Total Debt / Mcap (LFY)	Leverage	**NS**
H3	FCF Volatility (L3Y)	FCF Volatility	**–**
H4	Log of Assets (LFY)	Size	**+/–**
H5	Tobin's Q (LFY)	Tobin's Q	**–**
H6	Levels of Cash Flow (LFY)	FCF Level	**+**
H7	Largest shareholder	Largest Shareholder	**–**
	Largest Shareholder * Inv. Mgmt.	Largest Shareholder * Inv. Mgmt.	
	Largest Shareholder * Insider	Largest Shareholder * Insider	
	Largest Shareholder * Corp.	Largest Shareholder * Corp.	
	Largest Shareholder * Other	*Omitted (reference category)*	
	Top 3 holders ownership	Top 3 Holders	**–**
	Insider ownership	Closely Held Shares	**–**
	Ownership by Executive Directors	Inside Ownership by Exec. Dir.	
	Ownership by Directors	Inside Ownership by Directors	
	Ownership by Managers	Inside Ownership by Managers	
Supporting variables	Sales CAGR (L3Y)	Sales Growth	**+/–**
	RoA (L3Y)	ROA	**+/–**
	Net PPE / Assets (LFY)	Fixed Assets Ratio	**+**

4.2 Multivariate results

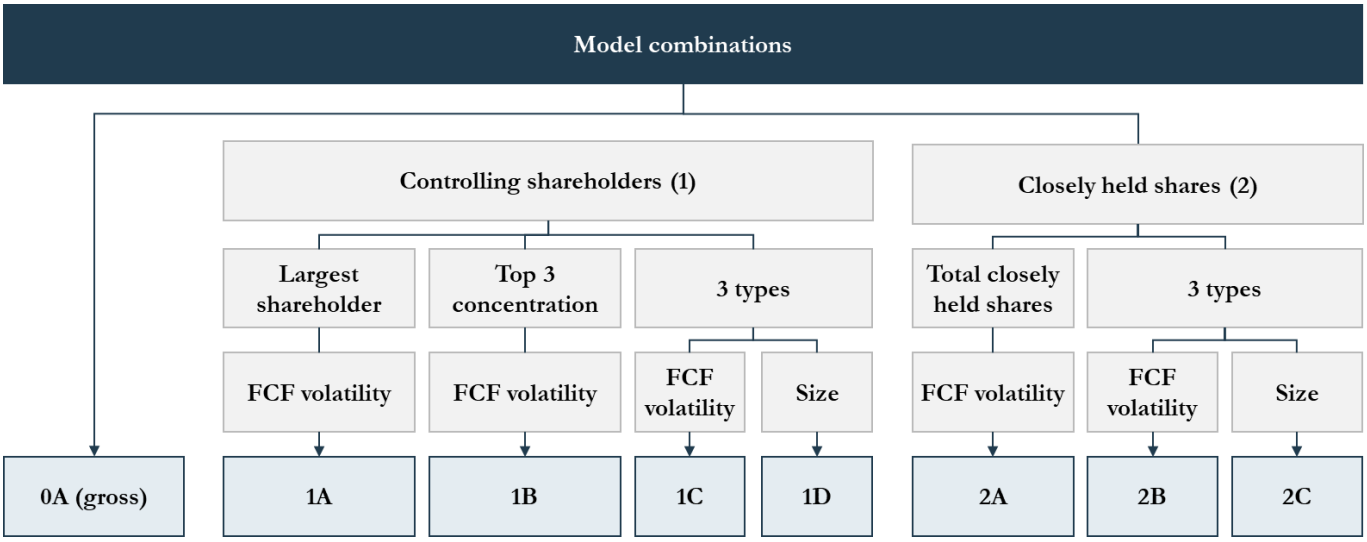
Based on the variables presented in Section 3.5.5, we have constructed seven regression models. Our decision to construct this exact amount of regression models will initially be elaborated. Afterwards, we present the models' results.

In order to detect potential multicollinearity, we have made a baseline model with all of our variables, which we have assessed with support from calculations of the explanatory variables' pairwise correlations (Appendix 3). From this, we have detected two potential issues related to multicollinearity. First, some of the variables related to ownership are highly correlated. For instance, Largest Shareholder and Top 3 Holders highly correlates with a value of 0.92 and moreover correlates with types of Largest Shareholders. Similarly, Closely Held Shares' highly correlates with ownership held by different types of insiders. Largest Shareholder and Closely Held Shares do not correlate highly (0.38), but we expect potential issues of including both variables in same regression model as the Largest Shareholder could potentially be an Insider. Additionally, our main objective is to test the impact of ownership concentration. Therefore, we divide our regression models in two main categories to investigate the impact of ownership structure and inside ownership respectively. Secondly, FCF Volatility and Size appears to correlate substantially, which affect the parameters significantly as the correlation equals 0.80. Hence, we find it necessary to investigate these variables in models separated from each other. Taken this consideration into account, we have structured our logistic regression analysis as shown in Figure 4.1 to avoid substantial econometric issues[5]. A potential explanation of this correlation of these two variables is that both are computed from absolute values and are not relative margins. Hence, a firm with a high absolute value of assets (measured in euro millions) is likely to have higher absolute cash flows are thereby a higher absolute volatility in these. Recall that in order to minimize the bias from large differences in absolute values, we log transformed both variables.

To ensure avoidance of multicollinearity, we have analyzed the Variance Inflation Factor (VIF) of our models (Appendix 4), which is calculated as the variance of a model with multiple explanatory variables divided by the variance of a model only including the explanatory variable to investigate. VIF values above 10 are signs of serious multicollinearity (Sarkar and Rana, 2013). None of our models exceed this level, but when we evaluate our initial gross model (0A), it is clear that multicollinearity occurs when we include Size as its VIF exceeds 11. When we separate Size and Cash Flow Volatility, we obtain remarkably lower VIFs for Size (5.51 in Model 1D and 4.65 in Model 2C). This still indicates low degree of multicollinearity, but when considering Size's correlation with the other explanatory variables, no correlation exceeds 0.25, which we consider as acceptable. Model 1A - 1C and 2A - 2B show satisfying low levels of VIF.

[5] Note, that the rest of the explanatory variables which is not specified in Figure 4.1 are included in all the models. The variables illustrated in the figure aim to simplify intuition of the structure.

Figure 4.1 – Investigated combinations of multivariate logistic regression models



Based on the structure illustrated in Figure 4.1, we first present findings from models including controlling shareholders in Section 4.2.1 and subsequently present models including closely held shares in Section 4.2.2.

4.2.1 Multivariate logistic regression models: Controlling shareholders

For the regression models related to largest shareholders, types of largest shareholders and ownership concentration, we have constructed four different models (Table 4.3). In addition to the variables which are selected from our univariate analysis, we have included control variables to account for country-, sector- and year effects. Hence, we take the heterogeneity of the transactions and the control group into account. In terms of country effects, it is important to address that we have made a categorization as "Other" including countries with frequency in our sample below 3 in order to avoid omission of observations which do not have a matched observation from same country or significant impact from potential outliers. Conclusively, this yields the following equational specifications and results (Table 4.3):

(0A) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{FCF Volatility} + \beta_4 \text{Size} + \beta_5 \text{Tobin's Q} + \beta_6 \text{FCF Level} + \beta_7 \text{Sales Growth} + \beta_8 \text{ROA} + \beta_9 \text{Fixed Assets Ratio} + \beta_{10} \text{Largest Shareholder} + \beta_{11} \text{Closely Held Shares} + \beta_{12-27} \text{Country Dummies} + \beta_{28-35} \text{Sector Dummies} + \beta_{36-46} \text{Year Dummies} + u_i$

(1A) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{FCF Volatility} + \beta_4 \text{Tobin's Q} + \beta_5 \text{FCF Level} + \beta_6 \text{Sales Growth} + \beta_7 \text{ROA} + \beta_8 \text{Fixed Assets Ratio} + \beta_9 \text{Largest Shareholder} + \beta_{10-25} \text{Country Dummies} + \beta_{26-33} \text{Sector Dummies} + \beta_{34-44} \text{Year Dummies} + u_i$

(1B) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{FCF Volatility} + \beta_4 \text{Tobin's Q} + \beta_5 \text{FCF Level} + \beta_6 \text{Sales Growth} + \beta_7 \text{ROA} + \beta_8 \text{Fixed Assets Ratio} + \beta_9 \text{Top 3 Holders} + \beta_{10-25} \text{Country Dummies} + \beta_{26-33} \text{Sector Dummies} + \beta_{34-44} \text{Year Dummies} + u_i$

(1C) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{FCF Volatility} + \beta_4 \text{Tobin's Q} + \beta_5 \text{FCF Level} + \beta_6 \text{Sales Growth} + \beta_7 \text{ROA} + \beta_8 \text{Fixed Assets Ratio} + \beta_9 \text{Largest Shareholder} * \text{Inv. Mgmt.} + \beta_{10} \text{Largest Shareholder} * \text{Insider} + \beta_{11} \text{Largest Shareholder} * \text{Corp.} + \beta_{12-27} \text{Country Dummies} + \beta_{28-35} \text{Sector Dummies} + \beta_{36-46} \text{Year Dummies} + u_i$

(1D) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{Size} + \beta_4 \text{Tobin's Q} + \beta_5 \text{FCF Level} + \beta_6 \text{Sales Growth} + \beta_7 \text{ROA} + \beta_8 \text{Fixed Assets Ratio} + \beta_9 \text{Largest Shareholder} * \text{Inv. Mgmt.} + \beta_{10} \text{Largest Shareholder} * \text{Insider} + \beta_{11} \text{Largest Shareholder} * \text{Corp.} + \beta_{12-27} \text{Country Dummies} + \beta_{28-35} \text{Sector Dummies} + \beta_{36-46} \text{Year Dummies} + u_i$

Table 4.3 – Multivariate analysis of variables: Private equity targets versus control group
Note: The table consists of results from binomial logistic regressions, where Y = 1 if the observation is a PE target and Y = 0 if it is a control firm. The table shows coefficients of the variables and their p-values in parenthesis. Significance levels: *** = 1%, ** = 5%, * = 10%

Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Liquidity	-0.156	-0.075	-0.083	-0.117	-0.080
	(0.759)	(0.878)	(0.866)	(0.812)	(0.873)
Leverage	0.009	0.005	0.003	0.010	0.006
	(0.920)	(0.938)	(0.965)	(0.890)	(0.934)
FCF Volatility	-0.064	-0.137	-0.138	-0.186 **	
	(0.635)	(0.114)	(0.113)	(0.038)	
Size	-0.180				-0.201 **
	(0.242)				(0.045)
Tobin's Q	-0.212	-0.187	-0.188	-0.170	-0.187
	(0.150)	(0.195)	(0.191)	(0.243)	(0.196)
FCF Level	1.328	1.586	1.581	1.533	1.545
	(0.354)	(0.259)	(0.263)	(0.286)	(0.281)
Sales Growth	1.680 ***	1.416 **	1.457 **	1.586 **	1.594 **
	(0.007)	(0.016)	(0.014)	(0.012)	(0.012)
ROA	-0.696	-1.043	-1.055	-1.052	-0.678
	(0.455)	(0.229)	(0.224)	(0.228)	(0.456)
Fixed Assets Ratio	1.144 *	1.182 *	1.176 *	1.309 **	1.418 **
	(0.089)	(0.067)	(0.070)	(0.048)	(0.034)
Largest Shareholder	-0.760	-1.893 **			
	(0.400)	(0.025)			
Largest Shareholder * Inv. Mgmt.				4.513 *	4.369 *
				(0.076)	(0.085)
Largest Shareholder * Insider				-2.064 *	-2.169 *
				(0.091)	(0.077)
Largest Shareholder * Corp.				-2.014 *	-1.918 *
				(0.050)	(0.061)
Top 3 Holders			-1.560 **		
			(0.014)		
Closely Held Shares	-2.765 ***				
	(0.002)				
Constant	0.827	-0.255	-0.134	-0.545	0.075
	(0.382)	(0.742)	(0.864)	(0.496)	(0.930)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.118	0.095	0.097	0.119	0.118
AIC	487.558	494.143	493.058	487.484	487.760
LR Chi^2	52.828	42.244	43.329	52.903	52.627

From our estimated regression models, we achieve values of Pseudo R^2 which in absolute terms seem low. However, the observed level of explanatory power of 0.10 – 0.12 is in line with previous studies, which have applied similar econometric techniques (e.g. North, 2001; Achleitner *et al.*, 2013; Thomsen and Vinten, 2014). Therefore, we find this level satisfying and will not assess it as a critical point. The AIC values are stated as well, although our purpose is not to predict the probability of a PE bid, but rather to investigate the determinants affecting it. Best practice for applications of AIC is to apply the model with the lowest value. In this case, AIC suggests model 1C as the slightly best. The LR Chi^2 statistic tests that at least one of the predictors' regression coefficients is not equal to zero in the model. When observing Table 4.3, this measure is assessed to be stable across the models and does not indicate any substantial points of awareness. As we do not seek to evaluate the overall explanatory power of the models, we will not focus further on this measure. We therefore put our focus to the independent variables' significance levels to conclude on our hypotheses from a multivariate point of view.

From the models presented in Table 4.3 we find no evidence supporting the significance of Stock Liquidity, Leverage, Tobin's Q, FCF Level and ROA at a 10% level. However, the degree of insignificance is taken into account when comparing these variables as Stock Liquidity and Leverage appears to be highly insignificant, where Tobin's Q, FCF Level and ROA performs p-values mostly around 20 - 25%. One may note that the p-value of ROA increases substantially when Size is included, which may be due to the fact that both of these variables are calculated including the metric of total assets or because of the lack of effect from FCF Volatility. However, when we analyze the pairwise correlations, ROA does only correlate with Size and FCF Volatility at levels of 0.25 and 0.05 respectively, which does not indicate any multicollinearity issues. Focusing on the signs of the coefficients, Stock Liquidity, Tobin's Q and FCF Level all have the directional effects we expect and follows the intuition supporting the respective hypotheses. However, based on the lack of significance for these variables, we find no evidence supporting Hypotheses 1, 5 and 6. In Hypothesis 2, we projected that Leverage would not be a significant determinant. From our multivariate analyses, Leverage has p-values above 0.85 indicating a high degree of insignificance. Hence, we find strong evidence supporting Hypothesis 2 as the interpretation of this hypothesis is conceptually opposite of the other hypotheses.

When considering the significant variables, FCF Volatility is close being significant at a 10% level in all models but appears to be most significant when including the parameters specifying the types of the largest shareholders. Importantly, the variable's sign is in line with our expectations implying a lower volatility of unlevered cash flows to increase the probability of interest from a PE investor. In addition to this, the Fixed Assets Ratio is significant at a 10% level in all models and specifically significant at a 5% level when including the types of shareholders. The sign of the variable is in line with our discussion related to Hypothesis 2. Hence, the impact of FCF Volatility and Fixed Assets Ratio support our discussion on the role of pre-existing leverage as a proxy for potential future debt financing capacity, where we concluded that PE investors may find the ability to perform stable cash flows and the possibility to

collateralize debt obligations in fixed assets more attractive. In this context we also expected the level of cash flows to be more significant as it serves as a proxy for capacity to pay back debt obligations, but also for the potential to reduce agency costs. However, based on our models we find the volatility of cash flows more influential.

Size appears to have a significant negative impact on the likelihood, which is in line with Hypothesis 4. Sales Growth is highly significant in all the models at a 5% level with a positive sign, indicating that PE investors prefer to invest in targets which have performed historical high growth rates. As discussed earlier, the expectation to this variable was twofold and could both be positive and negative. The former indicates attractive growth cases while the latter indicates turnaround cases of mature listed companies with stagnating sales levels. Hence, our finding of a highly significant positive relation supports the expectation that PE investors prefer to invest in companies with high growth rates, which signals sustainable investment cases with positive outlooks for further growth. Conversely, we do not find any significant negative relationship between sales growth and the likelihood of a PE bid, which implies that we have few turnaround cases observed in our dataset.

Finally, we find strong evidence supporting Hypothesis 7, which predicted that high ownership concentration decreases the likelihood. Both stakes of the Largest Shareholder and Top 3 Holders appears to be highly significant at a 5% level. Considering the different types of largest shareholders, all the types perform significance at a 10% level. An important aspect to consider is the difference in the signs of the types. If the largest shareholder is either a Corporation or an Insider it has a negative impact on the likelihood, but if the largest shareholder is an Investment Management firm it increases the likelihood. One explanation supporting this finding may be derived from the degree of active ownership. It is likely to assume that a large shareholder such as an insider is an active monitoring shareholder who must be compensated in order to give up control in terms of a sufficiently high premium added to the value of the equity stake. Corporations may also be addressed as active shareholders, even though this could be a strict generalization, which have higher incentives to monitor the higher their ownership stake is. Hence, the potential for value creation in terms of reduction of agency costs could be restricted for a PE investor. To address the positive sign of the impact of largest shareholders as investment management firms, this indicates that this category of shareholders is more passive than the two other types of owners. Such investors may be more driven by return on investment, where potential bid premia from PE investors possibly are considered as a beneficial gain to achieve on a short-term basis. Additionally, passive investors require a lower premium to sell their holdings than active investors as active investors may seek to get sufficient compensation for the efforts they have put in the firm. In Section 4.2.2 we investigate whether conclusions on our hypotheses are in line with the those from Section 4.2.1, when we account for shares owned by insiders.

4.2.2 Multivariate logistic regression models: Closely held shares

For the regression models related to closely held shares, i.e. inside ownership, we have constructed three different models, which are specified in the following and tabulated in Table 4.4.

(2A) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{FCF Volatility} + \beta_4 \text{Tobin's Q} + \beta_5 \text{FCF Level} + \beta_6 \text{Sales Growth} + \beta_7 \text{ROA} + \beta_8 \text{Fixed Assets Ratio} + \beta_9 \text{Closely Held Shares} + \beta_{10-25} \text{Country Dummies} + \beta_{26-33} \text{Sector Dummies} + \beta_{34-44} \text{Year Dummies} + u_i$

(2B) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{FCF Volatility} + \beta_4 \text{Tobin's Q} + \beta_5 \text{FCF Level} + \beta_6 \text{Sales Growth} + \beta_7 \text{ROA} + \beta_8 \text{Fixed Assets Ratio} + \beta_9 \text{Inside Ownership by Directors} + \beta_{10} \text{Inside Ownership by Executive Directors} + \beta_{11} \text{Inside Ownership by Managers} + \beta_{12-27} \text{Country Dummies} + \beta_{28-35} \text{Sector Dummies} + \beta_{36-46} \text{Year Dummies} + u_i$

(2C) $\text{PE Bid} = \beta_0 + \beta_1 \text{Stock Liquidity} + \beta_2 \text{Leverage} + \beta_3 \text{Size} + \beta_4 \text{Tobin's Q} + \beta_5 \text{FCF Level} + \beta_6 \text{Sales Growth} + \beta_7 \text{ROA} + \beta_8 \text{Fixed Assets Ratio} + \beta_9 \text{Inside Ownership by Directors} + \beta_{10} \text{Inside Ownership by Executive Directors.} + \beta_{11} \text{Inside Ownership by Managers} + \beta_{12-27} \text{Country Dummies} + \beta_{28-35} \text{Sector Dummies} + \beta_{36-46} \text{Year Dummies} + u_i$

Table 4.4 – Multivariate analysis of variables: Private equity targets versus control group
Note: The table consists of results from binomial logistic regressions, where Y = 1 if the observation is a PE target and Y = 0 if it is a control firm. The table shows coefficients of the variables and their p-values in parenthesis. Significance levels: *** = 1%, ** = 5%, * = 10%

Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Liquidity	-0.156	-0.222	-0.226	-0.163
	(0.759)	(0.658)	(0.655)	(0.750)
Leverage	0.009	0.006	-0.005	-0.008
	(0.920)	(0.942)	(0.947)	(0.921)
FCF Volatility	-0.064	-0.191 **	-0.194 **	
	(0.635)	(0.033)	(0.033)	
Size	-0.180			-0.237 **
	(0.242)			(0.021)
Tobin's Q	-0.212	-0.197	-0.221	-0.243
	(0.150)	(0.179)	(0.142)	(0.104)
FCF Level	1.328	1.342	1.613	1.661
	(0.354)	(0.349)	(0.263)	(0.250)
Sales Growth	1.680 ***	1.687 ***	1.824 ***	1.840 ***
	(0.007)	(0.007)	(0.004)	(0.004)
ROA	-0.696	-1.077	-1.274	-0.818
	(0.455)	(0.218)	(0.151)	(0.377)
Fixed Assets Ratio	1.144 *	1.025	1.082	1.239 *
	(0.089)	(0.120)	(0.106)	(0.068)
Largest Shareholder	-0.760			
	(0.400)			
Closely Held Shares	-2.765 ***	-2.877 ***		
	(0.002)	(0.000)		
Inside Ownership by Directors			-4.468 ***	-4.574 ***
			(0.001)	(0.000)
Inside Ownership by Ex. Dir.			-1.929 *	-2.032 *
			(0.096)	(0.081)
Inside Ownership by Managers			1.831	1.207
			(0.729)	(0.819)
Constant	0.827	0.248	0.198	0.937
	(0.382)	(0.757)	(0.805)	(0.287)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.118	0.113	0.121	0.123
AIC	487.558	485.805	486.245	485.390
LR Chi^2	52.828	50.581	54.142	54.997

Overall, the inclusion of inside ownership implies a higher Pseudo R^2. However, the small increase should not be assessed as a significant improvement of the models' explanatory power.

By including inside ownership to our multivariate analysis, we still find Stock Liquidity, Leverage, Tobin's Q and ROA insignificant at a 10% level. Hence, we find no evidence supporting Hypothesis 1, 5 and 6, but strong evidence supporting Hypothesis 2 concerning the insignificance of Leverage. Moreover, it is worth noticing that Tobin's Q is less insignificant than the other variables.

In terms of significant variables, FCF Volatility is significant at a 5% level in Model 2A and 2B, which conclusively yields that it appears to be more significant when including inside ownership. The opposite is the case for the significance of Fixed Assets Ratio, which has been weakened, but still is significant at a 12% level, which leaves us with the conclusion that it is an essential factor to address as well. Sales Growth has increased in significance to a p-value below 1%.

The inclusion of Closely Held Shares in our regressions implies a very significant impact on the likelihood as it shows significance at a 1% level. Expectedly, the sign is negative, which supports our discussion related to Hypothesis 7 and the impact of inside ownership. Note, that the p-value is remarkably low. In this context, it is interesting to investigate whether the significance is highly driven by type of inside ownership, where we find Inside Ownership by Directors and Inside Ownership by Executive Directors to be significant at a 1% and 10% level respectively with negative signs. Inside Ownership by Managers is highly insignificant and appears to have a positive sign, which is unexpected. Hence, the Closely Held Shares is most certainly driven by the high significance of Inside Ownership by Directors. An explanation supporting the insignificance of management ownership and significance of director ownership, may be related to the impact on decisions in terms of voting rights, where managers with ownership, but no board position may just have cash flow rights and no voting rights. Often managers are assigned cash flow rights in order to align their incentives with the interest of the firm's shareholders, either in terms of stocks or stock options. However, we do not have data covering voting rights and we therefore carefully consider it as the explanation. Another interesting aspect to address from the findings related to inside ownership is the difference in significance levels between the types of directors. Ownership by Directors appears to be more significant than ownership by Executive Directors. This contradicts the findings of North (2001), who found the ownership by "inside directors" more significant than "outside directors", which may be due to the origin of our data, where the transactions we study are solely consisting of PE-backed going private bids. North (2001) investigates determinants affecting the likelihood of mergers in the US, which is likely to differentiate from PE-backed transactions.

A final note to our regression models including the types of inside ownership is related to the large change in the p-value of the intercept in Model 2C when the Size variable is included. The intercept is still insignificant at a 10% level,

but the large decrease from 0.75 – 0.80 to 0.29 should be considered. However, as stated in the beginning of Section 4.2, we have analyzed for potential multicollinearity in our models by manually detecting highly correlated pairs and high Variance Inflation Factors. Additionally, the intercept is of less interest in our study but would have been more crucial to investigate if our purpose was to create the most appropriate model to predict probabilities.

In all our models we find Stock Liquidity and Leverage highly insignificant. We therefore find it interesting to conduct a multivariate regression excluding these two variables to see the impact on the other variables to check the vulnerability of our hypotheses (Appendix 5). We find no indications of issues related to the inclusion of Stock Liquidity and Leverage as the remaining variables' coefficients and p-values are relatively unaffected. Hence, we will not address this potential issue further, but continue with the initially stated regression models.

4.2.3 Summary of multivariate results

Model 1A - 1D: We find little evidence supporting our Hypotheses related to Stock Liquidity (H1), Undervaluation (H5) and FCF Level (H6). Especially Stock Liquidity performs surprisingly high p-values yielding a very low degree of significance. Leverage (H2) also appears to have a high p-value above 0.85. However, this is in line with Hypothesis 2, where we follow the intuition stating that pre-existing leverage is of less importance. From our multivariate model concerning types of largest shareholders and FCF Volatility, we find strong evidence at a 5% level, supporting Hypothesis 3 which states that lower FCF Volatility increases the likelihood of a PE bid. In our models including no specifications of the largest ownership types (1A and 1B), we can confirm the significance at a 11% level, which we still find supportive to Hypothesis 3, but in a weaker form. When we include the Size variable we find evidence supporting the significance of Hypothesis 4 at a 10% level. Finally, Hypothesis 7 is well backed by all our models as we find the ownership stake by the largest shareholder and the ownership concentration based on top 3 shareholders significant at a 5% level with negative coefficients. As predicted from our discussion related to Hypothesis 7, we find the type of the largest shareholder informative to our model as all of the three shareholder types appear to be significant at a 10% level, where Investment Management Firm has a positive coefficient and Insider and Corporation have negative coefficients.

Model 2A - 2C: In Model 2A - 2C, we still find weak evidence to accept our hypotheses regarding Stock Liquidity, Undervaluation and FCF Level, but find the coefficients' signs in line with our hypotheses. Leverage still appears to be highly insignificant which supports Hypothesis 2. By including characteristics related to inside ownership we experience an increased significance level of FCF Volatility to a p-value of 0.03 which leads us to the conclusion that we find strong evidence supporting Hypothesis 3 using this multivariate model. We conclude Size as significant at a 5% level, which supports Hypothesis 4. As an in-depth dimension to Hypothesis 7, we find it interesting to investigate the impact of ownership stakes by inside owners. This aspect of the analysis appeared to be highly contributing as it suggests an extremely high significance of Inside Ownership by Directors, with a negative coefficient.

As supporting variables to our analysis, we have furthermore included Sales Growth, ROA and Fixed Assets Ratio to get a sense of the impact of growth, performance and debt collateralization respectively. We find strong evidence suggesting that PE investors are attracted to high growth targets, but little evidence suggesting importance of profitability in terms of ROA. We find Fixed Assets Ratio significant at a 5 - 10% level with a positive sign, which in collaboration with the significance of cash flow volatility supports our belief of pre-existing leverage as less important compared to these two variables. Fixed Assets Ratio becomes less significant when including characteristics of inside ownership. Table 4.5 summarizes the expected effect of each hypothesis compared with the actual effect discovered in the multivariate logistic regression analysis.

Table 4.5 – Expected results compared with actual results
Note: +/– = Directional effect by one unit increase. NS = Not significant. The actual effects and the p-values are averages based on all regression models (excluding gross model)

Hypotheses	Variables	Expected effect	Actual effect	Average p-values
H1	Stock liquidity (LTM)	–	NS	0.78
H2	Total Debt / Mcap (LFY)	NS	NS	0.93
H3	FCF Volatility (L3Y)	–	–	0.07
H4	Log of Assets (LFY)	+/–	–	0.03
H5	Tobin's Q (LFY)	–	(NS)	0.18
H6	Levels of Cash Flow (LFY)	+	NS	0.28
H7	Largest shareholder	–	–	0.03
	Largest Shareholder * Investment Management	--	+	0.08
	Largest Shareholder * Insider		–	0.08
	Largest Shareholder * Corporation		–	0.06
	Largest Shareholder * Other		*Omitted*	*Omitted*
	Top 3 holders ownership	–	–	0.06
	Insider ownership	–	–	0.00
	Ownership by Executive Directors		–	0.00
	Ownership by Directors		–	0.09
	Ownership by Managers		+	0.77
Supporting variables	Sales CAGR (L3Y)	+/–	+	0.01
	RoA (L3Y)	+/–	NS	0.26
	Net PPE / Assets (LFY)	+	+	0.07

From our seven different multivariate models we have been able to identify variables of high importance and low importance related to the likelihood of being taken private by a PE investor. In order justify the conclusions of our models, we conduct different variations of robustness checks to detect potential biases or specification errors.

4.3 Robustness checks

Conducting robustness checks is an exercise in empirical studies, where the fluctuation of certain regression coefficient estimates is examined when the regression specification is modified by adding or removing regressors. In cases where the coefficients are plausible and robust, it is commonly interpreted as evidence of structural validity. An early supporter of this practice is Leamer (1983) who influentially advocated investigations of this sort and argued that fragility of regression coefficient estimates is indicative of a specification error and that robustness checks should routinely be conducted in order to diagnose such misspecification (Lu and White, 2014).

In our multivariate analysis in the previous section we performed similar actions when experimenting with closely held shares instead of controlling shareholders and by substituting between using Log of Assets and FCF Volatility to ensure the robustness of our main models. In this section, we perform a series of alternative and arguably more direct robustness checks. In total, five data related separate robustness checks are completed related to i) outliers, ii) length of event window, iii) geography, iv) transaction status and v) sector. These are presented and ranked by importance but are all considered relevant in order to ensure an investigation of our dataset and related empirical results from distinct perspectives. For each type of robustness check, we apply the same multivariate logistic regression models as included in the original analysis in Section 4.2. In addition to the data related robustness checks, we run the original regression with heteroskedasticity-consistent standard errors and clarify if there exist any specification errors which have an impact on the overall results. Each analysis of robustness is rationalized, and the implications are subsequently discussed. In this section we will not elaborate on all variables as it requires an excessive walk-through. We will specify significant changes based on detailed robustness checks provided in Appendix 6 – 18. A complete illustrative summary is included in the end of this section.

4.3.1 Outliers

This robustness check is completed to account for outliers in data. Although we have relied on medians rather than means when interpreting descriptive statistics and univariate empirical results, the outliers impacting the mean values are potentially spurious and will thus impact the results. Hence, we regard it as necessary to adjust for outliers before fully being able to conclude on our empirical analysis. Two common methods to adjust for outliers are trimming and winsorization.

The first approach, trimming (also known as truncation), involves that all outliers set above or below a specified percentile are **removed** from the dataset. As an example, a two-sided 95% trimming of one or more explanatory

variables removes the 2.5% extreme values in each direction. Trimmed means are perceived as robust estimators, as they are less sensitive to extreme values than the mean of the full sample. As a result, the trimmed mean provides a more reliable insight on the central tendency of a sample distribution (Bloch, 1966).

An alternative and less simple procedure to adjust for outliers is by winsorization, which is a technique introduced by Winsor *et al.* (1947). In this method, outliers set above or below a specified percentile are **replaced** with the value of that specific percentile with the purpose of reducing the effect of outliers. A 95% winsorization will set the 2.5% percentiles in each tail equal to the percentile preceding the tail. In other words, all values in the first 2.5% percentile will be set to take values equal to the 2.5% percentile and all values between the 97.5% and the 100% percentiles are set to take values equal to the 97.5% percentile. While trimming and winsorization commonly achieves similar effects, we prefer to adjust outliers by winsorization. A brief motivation for selecting this technique is that the outlier values in each value differ across different observations. If we imagine one unique observation contains the maximum value in Sales Growth, but another unique observation contains the most extreme value in Closely Held Shares, the trimming approach would force us to remove both observations, while winsorization allows us to maintain the full sample size of 322. In order to avoid replacing and attempting to "correct" too many data points, we initially investigated each explanatory variable in our dataset to determine an appropriate degree of modification. Based on this, we apply a moderate 98% winsorization, hence replace all data in the lower (upper) 1% (99%) percentile, as we evaluate that a stronger degree of adjustment, e.g. at a 90% or 95% level, would alter the dataset excessively. One could argue that the technique is only appropriate on accounting and market-based variables, especially financial ratios driven by several components, but we decide to winsorize each explanatory variable, as ownership-related variables correspondingly contains large outliers as discovered in Section 3.5.4. Note that the variables related to Closely Held Shares only contain extreme values in the upper end, i.e. at the 99% percentile, as numerous of the observations do not possess any percentage of shares held by insiders. Hence, the minimum value of 0% is common for this variable and the winsorization will have no effect in this end, as the values at the 2% percentile (and even the 10% percentile) are likewise 0% (zero closely held shares).

Results from robustness check of outliers

Our winsorized models are attached in Appendix 6. From our winsorized editions of model 1A - 1D, we find no significant changes to our conclusions from the main models. However, it is important to address the change in the variables related to the type of ownership. From our main models we concluded that all the types were significant at a 10% level. In the winsorized editions, the Largest Shareholder * Corporation type has increased in significance, where Largest Shareholder * Insider type has decreased, yielding a p-value above 10% in model 1C. Yet, the variable's p-value is still close to 10% and we do not consider it as a drastic change to our findings.

Similarly, the winsorized editions of model 2A - 2C do not show any overall significant changes compared to our main model. Nevertheless, we will point out the change to the variable emphasizing the Ownership by Executive Directors as its p-values in model 2C - 2D rises above 15%, where it was below 10% in our main models. The inside ownership by Directors remains unchanged in significance. Hence, this stresses a more distinct difference between the impact of ownership by directors with management positions and directors without management positions.

Overall, we find our model robust with respect to outliers, but observe minor changes regarding the types of largest shareholders and types of inside shareholders. Due to the general robustness from this check, we use the raw dataset for the following robustness checks in order to observe the isolated effect of each modification.

Another important aspect to address in terms of potential issues sourced from outliers is related to the "influence" of the observations in our regression models. This is commonly tested by interpretation of the regression models' residuals and the leverage of these, i.e. how much they influence the coefficients. Hence, it is appropriate to investigate studentized Pearson residuals and deviance residuals to observe potential outliers combined with their corresponding leverage as influence is measured as the product of outlier and leverage (Zhang, 2016). In Appendix 7 - 12, we have performed isolated analyses of studentized Pearson residuals, deviance residuals and leverage against the models' predicted values and the matched pair ID (e.g. PE target with ID = 130 has a corresponding control firm whose ID = 130) respectively. Hence, six different types of graphs are analyzed. Finally, we have combined the studentized Pearson residuals and the models' leverage in one graph (Appendix 13) to evaluate if any observations have substantial influence on the models' coefficients. A commonly used guideline to evaluate an observation with high influence is whether the observation has i) residuals above |2| and ii) leverage three times above the average leverage of the observations. However, this guideline cannot be used generically as it usually requires a large sample (UCLA Institute for Digital Research and Education, n.d.). Nevertheless, we will use these critical values to assess whether observations are influential. As Appendix 13 suggests, our model is not highly influenced by any outliers as none of the observations are located in corner areas with residuals >2 and leverage >0.5. It is worth noticing that observation 155 and 53 has a high value of leverage, but we do not find the level of the residuals sufficiently high for these observations. Hence, we will not exclude these from the sample as they are not located in the critical corner areas, which would yield a clear incentive to analyze the data without these observations. Conclusively, we prefer to sustain our sample.

4.3.2 Length of event window

The second of five robustness checks related to our dataset concerns the length of our studied event window. In the main analysis, we observe the period 2004 – 2015. As noted earlier, this period includes the financial crisis and thus pre- and post-crisis years. Recall that approximately half of the observations (79 of 161) occurred in 2004 – 2007 and the other half in 2008 – 2015. Based on this, we add a new control dummy variable that will take the value one in the pre-crisis years (2004 – 2007) and zero in the post-crisis years (2008 – 2015). We acknowledge that some of the years

emphasizing the financial crisis are included in our defined post-crisis period and that an alternative cut-off period for the financial crisis could be argued. For instance, one might prefer to define three separate periods, i.e. pre-crisis, during-crisis and post-crisis, but we apply our specific cut-off for simplicity. The purpose of this analysis is to test whether there exist any significant differences in the delisting determinants before and after the financial crisis. The pre-crisis period represents 158 observations of our total sample and the post-crisis period analogously represents 164 observations. We name this control variable "Period dummy" and replace it with the prevailing Year dummies. By adding this control variable to the full sample, we seek to observe if there exist any significant structural changes across time. The coefficient of the Period dummy can then be interpreted to determine if any statistical significance is reflected in the model when the period shifts from pre- to post-crisis period. In addition to this, we create interaction terms between the Period dummy and the original explanatory variables. The coefficients of interaction terms are interpreted as the additional effect that occurs from two (or more) explanatory variables on the dependent variable. If the two explanatory variables separately explain part of the dependent variable but additionally possess a combined effect when combined through an interaction term, an interaction effect in present. Interaction effects are multiplicative and are formally obtained by multiplying two (or more) variables. As our interaction terms involve one dummy variable, i.e. Period, the interaction terms are defined as slope dummy variables, because they estimate and test the difference in slopes between the two scenarios Period = 0 and Period = 1. A further interpretation is provided in the discussion of the results from this robustness check.

An alternative approach to test for differences in the pre- and post-crisis periods would be by dividing the full sample into two separate samples with $N_1 = 158$ and $N_0 = 164$ and fit regressions for each group. The advantage of this approach is that it would facilitate an analysis of how the coefficients of each explanatory variable differ across the two groups without the use of interaction terms and would thus enable a simpler interpretation. However, one disadvantage is that the statistical inferences would be obtained from substantially smaller sample sizes and would thus contain higher uncertainty, everything else equal. We regard the use of interaction terms as the preferred approach as it sustains the full sample size and allows for similar interpretations as the split-sample method, by observing the coefficients of each interaction term simultaneously with the coefficients of the original explanatory variable and the regular Period dummy. To ease the interpretation of the impact of the interaction term, we have constructed regression models where pre-crisis takes the value 1 (i.e. post-crisis = 0) and oppositely where post-crisis = 1 (i.e. pre-crisis = 0). This is known as a technical trick in econometrical models including interaction terms as the total significance of a variable is difficult to estimate when the categorical dummy = 1. For instance, if we imagine a scenario where we would like to interpret the significance of Leverage in pre-crisis and post-crisis periods respectively and we only have one model where pre-crisis = 1 and post-crisis = 0 and Leverage is a continuous variable. The significance of Leverage in post-crisis is straightforward to determine because when the categorical variable is equal to 0, we can determine the significance from the p-value of the sole variable Leverage. However, if we want to determine the significance of Leverage in pre-

crisis (i.e. dummy = 1), we must look at the p-values of Leverage, Period dummy and Leverage * Period dummy. Instead of determining a joint significance for all these variables we prefer to run the model again, but with a reversion of the Crisis variable so we can easily interpret the level of significance of a variable in both periods. Hence, we are narrowing our precision of conclusion in terms of significance.

From this robustness check, we expect that the traditional theoretical motives can have been affected by the crisis and somewhat disregarded in the respective periods and that the empirical results from this robustness check therefore will be influenced compared to the results obtained in our main analysis of the full period.

Results from robustness check of length of event window

Multivariate results with the included Period dummy are reported in Appendix 14. From this examination we find four differences from our main model. First, we find the Stock Liquidity dependent on periodicity. Looking deeper into this relationship, we find that in the pre-crisis period, there was no significant relationship between the likelihood of being taken private by a PE investor and Stock Liquidity. However, in the post-crisis period we obtain results supporting Hypothesis 1, which indicate a higher (lower) level of Stock Liquidity to decrease (increase) the likelihood. Secondly, we find ROA dependent on periodicity, which suggests a rather interesting finding. From our analysis, ROA appears to have a significantly negative impact on the likelihood in the pre-crisis period, where it appears to have a significantly positive impact in the post-crisis period, suggesting that PE investors were looking for turnaround cases in the pre-crisis period and for high-performers in the post-crisis period. We do not have an independent hypothesis related to profitability but find the way PE investors have assessed targets depending on the economic cyclicality interesting. Third, the impact of size appears to be insignificant in the pre-crisis period. This indicates that PE investors have not focused on the size of target firms as an important criterion before the crisis. Finally, Undervaluation emerges as more important in the pre-crisis period than the post-crisis period. However, the difference is not highly significant. Independently of periodicity, we still find Sales Growth and Top 3 Holder significant. FCF Volatility is still significant depending on the composition of the model with a slightly smaller significance level in the pre-crisis period. Hence, from our robustness check related to periodicity, our main findings suggest that PE investors in post-crisis years have put larger attention to high profitability and low stock liquidity. However, in pre-crisis years we find Stock Liquidity insignificant and PE investors more interested in low profitability firms as potential turnaround cases.

4.3.3 Regionalization of UK and Continental Europe

Next, a third sensitivity test of data is based on the geographical selection of countries included in the regression analysis. As 41% of our target observations are headquartered in the United Kingdom, we add a dummy control variable called Region. This robustness check is fulfilled partly due to the large part of our sample located in UK and partly due to the practice in several former empirical studies where UK and Continental Europe were treated and investigated separately. From this analysis, the coefficient and significance of the added control variable is interpreted

to clarify if targets headquartered in UK possess an isolated effect on the likelihood of a PE bid. To supplement this, we create interaction terms between the Region dummy and the existing explanatory variables and thus follow an analogous approach as in the previous robustness check related to periodicity.

It is difficult to predict exact differences depending on regionalization. However, we consider it as an essential aspect to address as we have decided to merge Continental Europe and United Kingdom in our analysis. We will therefore, from this analysis, be able to conclude whether the consolidation of these regions has been appropriate.

Results from robustness check of regionalization

The output related to the robustness check is attached in Appendix 15. From our inclusion of the Region dummy in our model, we find a selection of variables depending on the categorical variable of whether the transaction was in UK or Non-UK. First, Stock Liquidity appears to be significantly dependent on the regionalization. From the regionalization we find that higher (lower) Stock Liquidity decreases (increases) the likelihood in Non-UK, which is in line with Hypothesis 1. Surprisingly, we find the opposite effect significant in UK, which contradicts our expectations. These two opposing effects may have implied the insignificance in the main model without interaction terms defining the regionalization, which we acknowledge as a potential weakness of combining these two regions in one sample. If we were to address how UK may differ from Non-UK in terms of Stock Liquidity it may be due to PE investors' interest in investing in firms with high investor interest. This is especially interesting when we look at the second variable depending on regionalization, which is Tobin's Q. From Tobin's Q, we can conclude that in UK, a lower valuation increases the likelihood of being taken private. Valuation does not have a significant impact in Non-UK. Combining this finding from UK with the finding related to Stock Liquidity, we can conclude that PE investors have been attracted by UK-based firms with a high investor interest, but a low valuation. Additionally, Size is a variable dependent on the regionalization, where it emerges as insignificant and negative in Non-UK, when we include variables related to the types of largest shareholders. This is surprising as we do not find any economic intuition supporting this finding. Hence, it is considered as a potential weakness of our matched paired sampling with respect to size. However, when we include the types of inside owners, the variable obtains a p-value of 0.13, which indicates a significantly smaller issue.

Finally, we find that the variable Largest Shareholder * Insider is dependent on regionalization as it has no significant effect in UK, but in Non-UK it has a significantly negative impact. An equivalent finding applies to Top 3 Holders suggesting that ownership concentration is lower in UK, which is in line with the findings of Faccio and Lang (2002), who also finds that widely held firms are more common in UK. Besides these four variables, we do not find any reasons to account for regionalization. However, we find FCF Volatility slightly less significant in Non-UK in the models including Largest Shareholders, Top 3 Holders and Largest Shareholder * Type. The p-value is ~0.25, which we do not consider as a critical change in insignificance.

4.3.4 Transaction status

This robustness check is related to the status of the going private transactions. As we have observed 161 **announced** GPTs, where 146 of these were additionally fully **completed**, it is regarded as an interesting perspective to exclude the 15 announced transactions which were never completed. Recall that we decided to apply the announcement criterion in the identification of delisting transactions, as the actual bid-action (followed by a public announcement) were evaluated as sufficient to indicate interest from a PE investor. Since the main analysis of this thesis differs by previous studies by selecting transactions solely based on the announcement, we consider this check as relevant. If this robustness check yields similar results as our main analysis, we consider our announcement-based selection criterion as a relevant contribution for future studies, as this methodology allows the researcher to obtain a higher number of unique observations in the data collection process. Had we simply applied the completion-based selection criterion as previous studies, our empirical results would thus be based on fewer observations and counteract the aim of achieving a sample as large as possible. Conclusively, we expect no substantial differences in the empirical results obtained when removing the 15 transactions (plus their matched control observations) that were never completed. However, we acknowledge that non-completed transactions consist of approximately 10% of our sample and such non-random exclusion of observations may have an impact from a statistical point of view.

Results from robustness check of transaction status

From our investigation of bias related to transaction status (Appendix 16), we find few modifications to our conclusions related to our main models. In all the models, we find an increase in the significance of FCF Volatility to a level accepted at 1 - 3%. On the other hand, the significance of Fixed Assets Ratio has moved in the opposite direction to a less significance level. However, we prioritize the significance of FCF Volatility higher as we used this variable for H3 whereas Fixed Asset Ratio was used as a supportive variable. One important variable to notice is Tobin's Q as it appears to be significant at a 10% level when only taking completed transactions into account and at a 5% level in model 2B and 2C. In our main models, we could not accept the undervaluation hypothesis at a 10% level, but at levels of 15 - 20%. Hence, the exclusion of non-completed transactions implies acceptance of Hypothesis 5 which stated that undervaluation increases the likelihood of being taken private by a PE investor. Statistically this means that non-completed transactions to some extent bias our results related to the undervaluation hypothesis.

We see small changes for the types of the largest shareholders as Insider appears to be insignificant at a 10% level in Model 1C, where Corporation appears to be significant at a 5% level. However, there have been no conclusive changes in Model 1D, where the types of shareholders also appear. Types of inside owners yields the same conclusion as was the case for our winsorized models. Only inside owners as directors with no management positions appears to be significant. It should still be addressed that Inside Ownership by Executive Directors is significant at a 11% level, which we observe as influential.

Conclusively, we only observe a noticeable change in relation to the undervaluation hypothesis, which indicates a point of awareness when we account for transaction status. An important remark to this point is that the insignificance of Tobin's Q in our main models was at a 10 - 20% level depending on the composition of variables, i.e. not far from significant levels.

4.3.5 Sector

Among the five data related checks, we consider this robustness check of sector as the least valuable, as it is the check least justifiable. From the descriptive summary of distribution across sectors, we found that ~33% of the transactions operated in the Consumer Discretionary sector. ~7% of the firms operated in the other consumer sector, Consumer Staples. Thus, on one hand it is an option to combine these two consumer sectors to one mutual sector group and separate the dataset into one group consisting of ~40% of the firms operating in the consumer sectors and ~60% in the remaining sectors. Conversely, we argued that the two sub-sectors within consumer goods are distinct and comprise different goods impacted differently by economic growth, hence we do not regard this action as optimal for testing the robustness across sectors. An alternative sensitivity is to exclude the transactions operating in the least represented sectors, as four different sectors in aggregate accounts for less than 10% of the observations in the dataset. This action is based on an assumption that these sectors, which are rarely targeted by PE investors, are targeted due to different motives. Despite associating least importance of this sector-based robustness check, we examine the latter approach, although we do not expect to discover any significant differences. The sectors excluded are Energy, Real Estate, Telecommunications and Materials which comprise 2, 2, 3 and 6 PE transactions respectively. By excluding these transactions and their control firms we now examine 296 observations (148 PE transactions).

Results from robustness check of sector

When we exclude minority sectors, we observe our models as fairly robust with few moderations (Appendix 17). First, the Fixed Assets Ratio becomes less significant, but still performs p-values between 15 - 25%. A reasonable explanation for this change is that Materials, Energy and Telecommunications are among the four industries with the largest average Fixed Assets Ratio at last financial year (Table 4.6).

Table 4.6 – Average Net PPE / Total Assets by Sector
Note: N includes both target and control firms

Sector	Rank	Net PPE / Total Assets (LFY)	N
Materials	1	42%	12
Energy	2	38%	4
Consumer Staples	3	34%	22
Telecommunication Services	4	33%	6
Consumer Discretionary	5	31%	106
Industrials	6	25%	62
Real Estate	7	25%	4
Healthcare	8	20%	38
Information Technology	9	8%	68

Secondly, Largest Shareholder * Inv. Mgmt. is insignificant at a 10% level, as the p-values in Model 1C and 1D is 14 - 16%. Finally, Inside Ownership by Executive Directors has developed as Largest Shareholder * Inv. Mgmt. to p-values above 10%. However, this variable still performs significance at levels of 12 - 14%.

4.3.6 Robust standard errors

There are different opinions regarding the application of robust standard errors in a logistic regression model. In a linear regression model, robust standard errors are usually applied to ensure robustness of heteroskedastic standard errors. In the logistic regression model, the outcome variable is binary, contradicting the assumption of a normal distribution in a linear regression model. Therefore, some statisticians suggest that the application of the robust variance estimator is of little utility. However, in practice the robust variance estimator may be beneficial when compared to the maximum likelihood estimator if the model is poorly specified or if the data shows clear indications of clustering. A model is in general perceived as well specified if it is driven by theory, which is the case of our model (Sribny, n.d.). Again, conceptually our aim of the models is not to achieve the highest possible goodness of fit but rather to test the significance of certain variables. Hence, we decided not to use the robust variance estimator in our main models, but we acknowledge that it may provide different results, which is our reason for comparison.

Results from robustness check of robust standard errors

When we apply the robust variance estimator, we find no reason to consider it as a source of bias as most conclusions are unchanged to our main models besides Largest Shareholder * Corp. which performs a p-value of 11% in Model 1D compared to 6% with non-robust standard errors (Appendix 18). Hence, we will not consider it as a critical point of our analysis.

4.3.7 Summary of robustness checks

The following Table 4.7 presents a concise overview of the six robustness checks discussed. A checkmark indicates consensus with the findings from our original regression analyses and thus illustrates whether the empirical results related to each hypothesis is robust to the distinct robustness checks. For the checkmarks in parentheses, there are minor changes in the robustness checks. When significant changes are observed, a comment is provided in the table.

Table 4.7 – Summary of robustness checks
Note: Checkmarks indicate consensus with main findings (aggregate evaluation across models)

	Outliers	Period (Crisis)		Region		Deal status	Sector	Robust SEs[6]
		Pre	Post	UK	Non-UK			
H1	✓	✓	Supporting H1	Opposing H1	Supporting H1	✓	✓	✓
H2	✓	✓	✓	✓	✓	✓	✓	✓
H3	✓	(✓)	✓	✓	(✓)	✓	✓	✓
H4	✓	Not significant	✓	✓	Not significant	✓	✓	✓
H5	✓	Supporting H5	✓	Supporting H5	✓	Supporting H5	✓	✓
H6	✓	✓	✓	✓	✓	✓	✓	✓
H7	(✓)	(✓)	✓	Not significant	✓	✓	(✓)	✓
Sales Growth	✓	✓	✓	✓	✓	✓	✓	✓
ROA	✓	Negative effect	Positive effect	✓	✓	✓	✓	✓
F. Assets Ratio	✓	✓	Not significant	✓	Not significant	(✓)	(✓)	✓
Appendix	**6 - 13**	**14A**	**14B**	**15A**	**15B**	**16**	**17**	**18**

[6] SEs = Standard errors

As seen in the table, Hypothesis 2, 3, and 6 seem robust to all different checks. Conversely, the robustness checks reveal alterations regarding Hypothesis 1, 4, 5 and 7 and thus indicates that our constructed dataset and the subsequent logistic regression analyses are not fully robust but contains different weaknesses. Most of the cases where a different result is obtained in a robustness check stems from the two robustness checks concerning Region and Period. This is in line with our expectations as these two checks contain more radical changes than the other five checks. Regarding the supporting variables, we find our results related to Sales Growth robust. ROA indicates a dependence on periodicity, whereas we observe variations to the variable of Fixed Assets Ratio when we control for periodicity and regionalization.

4.4 Interpretation of empirical results

Based on the primary multivariate logistic regression analyses and the succeeding robust checks testing alternative approaches regarding data classification and statistical methodologies, this section covers an interpretation of the empirical results in relation to the seven developed hypotheses. Systematically, we review and discuss each hypotheses and state if it has been accepted or rejected based on our results. Mainly for the rejected hypotheses, we provide critical reflections related to how the results can be explained and understood. Additionally, for the robustness checks from the previous section which revealed significant different results, the most significant and interesting changes are likewise discussed.

4.4.1 Hypothesis 1: Stock liquidity

H1: Low levels of stock liquidity increase the likelihood of being taken private by a PE investor

From the empirical results obtained in our initial logistic regression analysis covering the full sample without interaction terms, this hypothesis is **rejected** as no evidence was found associated to the relation between investor interest and going private likelihood. This is also the case when controlling for outliers through a winsorization process, when removing transactions which were only announced and never completed and when excluding the least targeted sectors. However, the hypothesis is **partly accepted** in other robustness checks, as the inclusion of Period dummy uncovered a significant negative impact of liquidity on the likelihood when the PE bids took place in the post-crisis period and thus supported Hypothesis 1. Similarly, the Region dummy included in another robustness check revealed new findings. Both aspects are discussed in the following.

In the pre-crisis period, the relationship was insignificant as for the original model. A reflection concerning the significant post-crisis result and the related pre-crisis insignificance, is related to the condition of the financial markets at their peak prior to the crisis. At this point in time, the volume traded of all listed firms are assumed to have been relatively higher than after the crisis. If this supposition holds, the volume traded among the observed target firms in the pre-crisis period, and thereby the computed relative stock liquidity measure, was higher than among the targets

observed in the post-crisis period. In such case, the relative difference in the stock liquidity between targets and control firms could have been lower in the pre-crisis period, thus minimizing the importance of investor interest as a going private motive leading to insignificant results in the pre-crisis period but on the contrary providing indications of a significant relation in the post-crisis period. When looking at the actual median values of stock liquidity in the two periods, the median in the pre-crisis is 0.20%, which as expected (based on the statistical significance in the robustness check) is higher than the median in the post-crisis period of 0.10%. Hence, the argumentation is supported by a stock liquidity twice as high in the pre-crisis period.

Next, the robustness check regarding regionalization indicated differences in our findings. Specifically, Hypothesis 1 is supported among the Non-UK countries, but is contradicted with opposing indicative results among the UK-based targets. As discussed in the presentation of the empirical results of the robustness checks, this difference is highly surprising. It may be due to differences in PE investors' interest in UK versus Non-UK when considering market interest of target firms or due to unobservable factors with no related theoretical explanation.

Consequently, our expected impact of stock liquidity on the likelihood of a PE bid is affected in two robustness checks. These results can naturally include uncertainty and should be interpreted cautiously, as different statistical errors such as endogeneity might, at least partly, have had an impact on the outcome. Specifically, endogeneity issues are present when one or more explanatory variables is correlated with the error term in the regression model. Common sources of endogeneity are measurement error, simultaneous causality, omitted selection and omitted variables (Antonakis *et al.*, 2010). First, we rule out simultanous causality as a potential issue for all of our variables, since we measure all independent variables prior to the going private announcements. In the case of our opposing results on stock liquidity from the main analysis and the robustness check of region, other potential causes of endogenity are plausible, especially taking into account that no theory supporting this counterintuitive result has been identified. As known, we have included stock liquidity as a market related measure, computed by average traded volume divided by number of shares outstanding. However, if we assume that an alternative stock market related measure, such as share price development in a given period up to the date of the going private announcement, would also have a significant impact on the likelihood of a PE bid, omitted variable bias might be a cause for a potential endogeneity issue. This is assessed as an undeniable and likely explanation of potential endogeneity issues, as PE investors might regard the share price development as a valid proxy for e.g. performance and might further consider the share price level when determining undervaluation (through valuation multiples, e.g. P/E or P/B).

The initial reason for not including share price development is due to the fact that we found no theory supporting the examination of share price development when assessing target firms. However, in practice, it is difficult to rule out that PE investors as potential new owners do not observe share price development. Instead, another reason concerns aspects of validity of our empirical analysis, as no clear cut-off date for a share price development can be justified

across all firms throughout all observed sectors. We regard the consideration of a share price development, from an investors' perspective, as somewhat subjective and based on each separate unique case. Additionally, the actual share price level and thus its related development up to the announcement of the PE bid, might have been a more important determinant of the timing of the bid and is not interpreted as a determinant of the actual decision of the bid.

Nevertheless, since our robustness checks of period and region indicate that the hypothesis is accepted in Non-UK countries and after the financial crisis, these results can still be compared with previous findings. The finding of stock liquidity having a negative impact on the likelihood when controlling for effects from region is in line with Achleitner *et al.* (2013) who also found negative significant evidence, as this study was also performed using Non-UK data only, i.e. Continental Europe. We have not identified any studies investigating the effect of stock liquidity on GPTs in the post-crisis period or in UK.

4.4.2 Hypothesis 2: Leverage

H2: Pre-existing leverage has no impact on the likelihood of being taken private by a PE investor

Based on our initial discussion of contradicting theories affecting the expected impact of pre-existing leverage on the likelihood of a PE bid, we found that the expected impact is ambiguous. This is based on the classical theory by Miller and Modigliani (1963) concerning tax shield benefits from higher leverage levels versus the opposing view based on PE investors' capabilities to identify targets with substantial upside potential in terms of refinancing. A third perspective is the practical approach to deal structures in LBO acquisitions elaborated by Rosenbaum and Pearl (2009), where pre-existing leverage will be replaced by the acquiring PE investor. In sum, various opposing views exist, and we decided to follow the practical approach to deal structuring with replacement of pre-existing leverage. Concerning the empirical results, the main models and all subsequent robustness checks follow one similar pattern and clearly reveal a very high degree of insignificance. Hypothesis 2 is therefore **accepted**.

The implications of this result are that, according to our dataset and our related analysis, PE investors do not attach any importance on the pre-existing leverage. This outcome indicates that pre-acquisition leverage and tax shield benefits are of little importance when PE investors assess potential targets and thus supports one of our emphasized contributions, i.e. the questioning of previous empirical studies by introducing contradicting practical aspects. In previous studies of PE-backed GPTs and GPTs in general, the findings on leverage are ambiguous as Achleitner *et al.* (2013) finds a significant negatively relation whereas Bharath and Dittmar (2010) finds a positive relation and North (2001) does not find any significant evidence. We therefore conclude that we observe no clear consensus regarding the impact of pre-existing leverage on the likelihood of PE-backed GPTs. Additionally, we want to emphasize that despite of the contradicting "applied" perspective stating that pre-existing leverage are of no importance, the targets' pre-existing debt obligations may affect PE investors' costs of replacing the debt. To sum up, our constructed regression

models indicate support of Hypothesis 2, but we still recognize the fact that the previous studies found highly significant evidence supporting the impact of pre-existing leverage.

4.4.3 Hypothesis 3: Volatility of free cash flows

H3: Low volatility of free cash flows increases the probability of being taken private by a PE investor

As we found empirical evidence of this hypothesis in most of our models, this hypothesis is **accepted**. This result is in line with Rosenbaum and Pearl (2009) who address the importance of stable cash flows for PE investors and Jensen (1986) who stated that companies with low FCF volatility are especially well-suited for financial leverage. Also, the result is relatively robust to all checks and even stronger evidence at a 1 - 3% level was obtained when investigating transaction status. However, we find lower levels of significance in the pre-crisis period and in the Non-UK region in the models including largest shareholders and ownership concentration. As this hypothesis is highly supported by our empirical analysis in opposition to the two preceding hypotheses regarding liquidity and leverage, no further discussion of the result is fulfilled. Instead, we emphasize that the empirical results related to this hypothesis are in line with the expectation obtained from the literature review.

4.4.4 Hypothesis 4: Firm size

H4: Larger firm size decreases/increases the likelihood of being taken private by a PE investor

As for the previous hypothesis concerning FCF volatility, this hypothesis is similarly **accepted** with strong empirical evidence. From our theoretical review we expected firm size to either have a positive or negative impact on the likelihood of a PE bid based on contradicting theories. In the models where we included log of assets as a proxy for size, the coefficient consistently expressed a significant negative sign, thus confirming that a larger firm size **decreases** the likelihood according to our analysis and supports the size hypothesis. The outcome is robust to most conducted checks. However, we find the variable insignificant for Non-UK firms in one of our models and in our pre-crisis models. Nevertheless, the variable is not driven by heavy outliers, which presumably could have been a worrying bias impacting the coefficient. An alternative explanation of this empirical outcome is by selection bias in our construction of control group. If the S&P Capital IQ platform, from which we identified control firms, tended to show larger firms among the 10 potential control matches and therefore "hided" relatively smaller and yet comparable firms, this acts as a potential source to a selection of larger firms and thereby selection bias. However, when examining our dataset, we discover that in 80 of the 161 matching cases, where we had to match a target firm with a control firm, the target firm is larger than the control firm (measured by revenue in last fiscal year). Correspondingly, the control firm has the largest revenue in the remaining 81 of the cases. This signals that no selection bias has been present, i.e. we have not consistently selected larger or smaller control firms but have instead achieved a random selection with an equal distribution of the two scenarios. Hence, the empirical result indicating a negative relationship between size (measured

by log of assets in regression models) does not seem to be biased by the sample construction process where size (measured by revenue) was used as the final selection parameter when we attempted to select control firms with the lowest absolute differences in revenue.

4.4.5 Hypothesis 5: Undervaluation

H5: Undervaluation increases the likelihood of being taken private by a PE investor

From our seven initial regression models, we found statistical significance of varying degree for this hypothesis. The models including controlling shareholder variables provided rather insignificant results with p-values of 20 - 25% for Tobin's Q, while the models including variables related to closely held shares performed p-values of 10 - 15%. From this, Hypothesis 5 is unexpectedly **rejected** in our main models as we find no evidence supporting that PE investors have targeted undervalued firms. Despite the fact that we find no evidence as hypothesized, the insignificant result is in line with findings by Kieschnisck (1998) and Lehn and Poulsen (1989) who find no significant impact of undervaluation. However, from the robustness check of transaction status, the undervaluation hypothesis is supported as Tobin's Q yields p-values of 5 - 10% in these modified models. Naturally, we cannot fully comprehend the complete background supporting this difference in the findings when considering transaction status, as we do not have the necessary insights to potential bid auctions, which may have affected the outcome such that another type of acquirer than PE investors have obtained the rights to take over the firm. To specify, if one of our observed transactions received a bid from a PE investor but a higher bid was submitted by a strategic acquirer, i.e. a corporation, this could explain why our observation was never completed. If we allow for some reflection, multiple factors could be the reason for higher valuation of lapsed deals such as high interest in the market from investors, which consequently has resulted in a competitive bid auction.

Likewise, the robustness check of length of event window indicated support of Hypothesis 5 in the pre-crisis period. This implies that undervalued firms, measured by Tobin's Q, were more likely to be targeted by PE investors before the crisis, as reasonably expected from the undervaluation motive. Conversely, after the crisis, insignificant results are found. One reflection to this result is that the financial markets were highly impacted by the financial crisis and thereby included a high degree of uncertainty in the post-crisis years where traditional rational motives were to some extent overlooked by investors (Moosa and Ramiah, 2017).

Another potential source of the result from this robustness check is that before the crisis, the financial markets were at a boiling point and many securities were presumably incorrectly valued. With numerous overvalued securities and a general collapse in financial markets, the average ratios of Tobin's Q computed in our dataset in the pre-crisis years are expected to be larger than the post-crisis values, thus allowing for larger gaps between under- and overvalued firms. When looking at the actual numbers, the median Tobin's Q is 0.97 in the pre-crisis period and 0.86 in the post-crisis

period, thus indicating a slightly higher level before the crisis, everything else equal. This is naturally expected due to the significance discovered in the robustness check. In sum, we reflect that the significance of undervaluation pre-crisis can be driven by a general higher valuation level and thus a higher difference between over- and undervalued firms, whereas the difference is reduced after the crisis where the overall valuation levels are lower. Studies by e.g. Weir *et al.* (2005b) focusing on PE-backed GPTs in UK and Thomsen and Vinten (2014) focusing on general GPTs in Europe similarly finds significant evidence supporting Hypothesis 5 using pre-crisis data only.

Next, in opposition to our main regression models, the robustness check of region indicates support of Hypothesis 5 among UK targets. We are not aware of any obvious justification of this difference but evaluate that different sources might have impacted the result. Besides omitted variables discussed briefly in the following paragraph, the maturity of the UK market versus Continental Europe might have had an undistinguishable effect on this result. However, we can conclude that our finding on this matter is again in line with the study of PE-backed GPTs in UK by Weir *et al.* (2005b). Similarly, the study by Martinez and Serve (2011) who exclusively studies squeeze-outs in France, i.e. in a Non-UK European country, finds no significant relationship, which is in line with our Non-UK segmentation and with the results of our main models.

As for the case of Stock Liquidity, omitted variables related to undervaluation can potentially have impacted the result in the main models and contributed to the unanticipated rejection of Hypothesis 5. Other measures of undervaluation such as P/B ratios or EV-based multiples could potentially have indicated different results, but the metrics used to compute these measures can be negative and thus bias the ratios, as discussed in the definition of explanatory variables in Section 3.5.5. Nevertheless, the selection of Tobin's Q as a measure might be the actual cause of the three different results obtained in robustness checks of transaction status, period and region. Undervaluation is an ambiguous measure and can be defined and evaluated by numerous ratios. Even though Tobin's Q is commonly used in academia, alternative valuation measures are more often used in practice by financial professionals such as EV/EBITDA, EV/EBIT, P/E, P/B etc. (Rosenbaum and Pearl, 2009; Plenborg and Petersen, 2012).

4.4.6 Hypothesis 6: Levels of free cash flows

H6: High levels of free cash flows increase the likelihood of being taken private by a PE investor

No clear evidence is found supporting that high levels of free cash flows impact the likelihood of a PE bid and Hypothesis 6 is unambiguously **rejected.** Hence, we do not find evidence supporting the intuition of Jensen (1986) who suggests that high FCFs indicate a potential for value creation through reduction of agency costs. Additionally, this finding does not support Rosenbaum and Pearl (2009) who presents high FCFs as an indication of an attractive LBO candidate due to future debt capacity. Recall that the p-values for this variable reached levels of 25 - 35% in all our different model combinations and did not express any differences in the robustness checks. We collected actual

unlevered free cash flow values instead of testing the hypothesis with EBITDA as a common proxy variable. However, this approach which we evaluate to be more correct does not yield any evidence supporting the hypothesis. A potential reason for this unexpected result is that PE investors simply do not attach high importance to pre-existing levels of free cash flows but to a larger extent focus on other financial factors such as the Fixed Assets Ratio and the volatility of the cash flows. Additionally, there are different metrics to measure the level of cash flows relative to. We have defined FCF Level relative to book value of assets. Previous studies have used different metrics, i.e. Weir *et al.* (2005a) use FCF/Sales and Achleitner *et al.* (2013) use EBITDA/Assets. The insignificant result is in line with findings by these two different studies.

4.4.7 Hypothesis 7: Ownership concentration

H7: Larger ownership concentration decreases the likelihood of being taken private by a PE investor

Lastly, the ownership related Hypothesis 7 concerning ownership characteristics is **accepted** as it was strongly supported by empirical evidence in our constructed regression models and thus expressed the expected relation. The same finding applies when we measure the effect of Closely Held Shares. This result is, as anticipated, explained by the theory concerning monitoring incentives for large shareholders, where we expected that firms with a more concentrated ownership are less likely to be targeted by PE investors as a higher ownership concentration implies a lower potential for value creation through reduction of agency costs. From different robustness checks where our data was altered, observable changes related to this hypothesis were detected but the overall acceptance and significant relation sustains. As the variables related to this hypothesis in general expressed some of the strongest statistical evidence, it is regarded as an important finding that ownership concentration strongly affects the likelihood of a PE bid.

However, when we account for regionalization, we find that Top 3 Holders and Largest Shareholder * Insider are not significant determinants in UK but appear to be significant in Non-UK. These findings are in line with findings by Faccio and Lang (2002) and Andres *et al.* (2007) who found that publicly traded firms in UK have a higher ownership dispersion than firms in Continental Europe, which often have large dominant shareholders. Hence, with a larger ownership concentration in rest of Europe than in UK, a smaller difference in ownership concentration among target and control firms is expected in UK. This implies that PE investors do not consider ownership concentration as a significant factor when assessing firms where the general concentration level is relatively low. Without going into a detailed explanation, the findings related to this hypothesis, both regarding controlling shareholders and closely held shares, are in line with previous empirical findings of a negative relationship between these variables and the likelihood of a PE bid.

5. Conclusion and reflections

As the final part of this thesis, this part presents the conclusions obtained from the empirical analysis and conclude upon the initially stated problem statement. This includes a brief presentation of our findings regarding take-private motives among PE investors and a discussion of practical implications. The conclusion is followed by a discussion of the limitations of our research. To put this in a purposeful context, we supplement the limitations with suggestions for future research.

5.1 Conclusion

Various academic studies of going private transactions (GPTs) have analyzed the determinants affecting the decision for firms to opt out publicly traded markets, where most have paid attention to factors applicable in US and UK. Equivalently, PE-backed GPTs have mostly been covered in these regions by academia, where only one study by Achleitner *et al.* (2013) has examined determinants in Continental Europe before the occurrence of the financial crisis. We found it interesting to investigate the determinants of PE-backed GPTs in Europe including UK as we hypothesized a smaller distinction between Continental Europe and UK when including the post-crisis period, as the market for PE-backed GPTs in Continental Europe has developed substantially in the last ten years. Hence, we have challenged the widely used division of the European and British markets of PE-backed GPTs.

We have researched how firm characteristics of listed firms affect the likelihood of being targeted by PE investors to identify significant determinants using the following problem statement:

Which firm characteristics determine the likelihood for private equity backed bids on European publicly traded firms from 2004 – 2015?

Based on a theoretical foundation of relevant theories and previous empirical findings, we test the importance of the determinants addressed as most influential by literature on 161 PE-backed going private bids in Europe including a sample of control firms matched with each observation by industry, country and size. Hence, we have analyzed a sample of 322 observations with multivariate logistic regressions to estimate the directional effects of firm characteristics on the likelihood of a PE bid on a publicly traded firm.

Based on a theoretical review of the main drivers of GPTs in general and PE-backed GPTs, we investigate seven hypotheses asserting firm characteristics affecting the likelihood of being taken private by a PE investor. Six of these emphasize characteristics related to accounting and capital market data, whereas we test one hypothesis concerning the impact of ownership characteristics with respect to the largest shareholder's ownership stake, ownership concentration and shareholder types. Founded on these hypotheses, we analyze the impact of relevant determinants. We find no evidence supporting our hypotheses which suggest an increase in the likelihood of being taken private by

a PE investor from: low stock liquidity (H1), undervaluation (H5) and high level of free cash flows (H6). Moreover, as hypothesized, no evidence is obtained regarding the effect of pre-existing leverage (H2). Contradicting, we find significant statistical evidence supporting an increase in the likelihood from low free cash flow volatility (H3) and we find firm size as a significant determinant with a negative relation (H4). Further, our results regarding ownership characteristics support our hypothesis emphasizing a negative effect from large shareholders and high ownership concentration (H7). Our results suggest that PE investors dislike large ownership stakes by insiders as it reduces the potential for value creation through reduction of agency costs. Finally, by including supporting variables we find sales growth and fixed assets ratio as deterministic variables, where profitability appears to have no significant impact on the likelihood.

We address the reliability of our findings by initiating several robustness checks with respect to outliers, periodicity of pre- and post-crisis, regionalization of observations in UK and outside UK, transaction status excluding lapsed deals, exclusion of weakly represented sectors and implementation of robust standard errors. We observe our results as robust when we account for outliers, exclusion of weakly represented sectors and robust standard errors. When we exclude lapsed transactions, we find that undervalued firms are more likely to be targeted by PE investors.

From our study of the impact of periodicity, we obtain three contradicting findings to our initial results. In the pre-crisis period, our results indicate that undervaluation increases the likelihood of a PE bid whereas we find no significant effect in the post-crisis period, which may be affected by post-crisis irrationalities occurring in the financial markets. However, in the post-crisis period we find low stock liquidity increasing the likelihood. In addition, our results indicate that size is an insignificant determinant in the pre-crisis period. Hence, investigations of the impact from leverage, free cash flow volatility, free cash flow level and ownership characteristics on the likelihood of a PE-backed GPT can be fulfilled without controlling for periodicity. Conversely, according to our indicative results, researchers should treat pre- and post-crisis separately when examining the effect from stock liquidity, size and undervaluation.

From our study of regionalization, we find support for the negative effect of stock liquidity on the likelihood in Non-UK countries. Surprisingly, the opposite effect is present in UK. Additionally, we find undervaluation significant in UK, but ownership characteristics less significant. Finally, firm size appears insignificant in Non-UK. In sum, our findings imply that the two regions are not fully comparable when investigating the effect from stock liquidity, size, undervaluation and ownership characteristics.

Conclusively, our results contribute to the existing literature by finding that pre-existing leverage of a listed firm has no impact on the likelihood of being targeted by PE investors and by finding evidence of free cash flow volatility as significant. Moreover, our robustness checks of period and regionalization provide novel indications of how investor motives are affected by the financial crisis and by structural differences between UK and the rest of Europe.

5.1.1 Practical implications

From the empirical findings obtained in our analysis, this section seeks to provide practical implications relevant both for PE firms (acquirers) and for European listed corporations (targets).

Initially, our findings suggest a modest number of implications for PE firms targeting listed firms. Given our research design and our isolated focus of the "Intent" phase in a GPT process, we have no insights into whether the 161 observed GPTs have been (or will be) profitable investments for the PE firms. Hence, when providing suggestions to PE firms based on our results, we are not able to definitively emphasize which motives that should be followed from a perspective of return maximization. Instead, we can provide evidence that previous PE investors have been targeting listed firms with stable free cash flows, positive growth rates and low ownership concentration. Hence, if a PE investor seeks to acquire a listed firm and follows similar investment strategies, we can confirm that these strategies also have been followed in practice by previous PE investors. Due to the high degree of uncertainty concerning our possible recommendations to PE investors, we instead emphasize the practical implications for listed firms, as the foundation for applicable suggestions is stronger for this purpose.

From the perspective of a listed firm, which is determining whether to be privately or publicly owned, there exist benefits and costs of being listed as clarified in our theoretical discussion. In general, after a firm has decided to obtain public ownership status, it is the responsibility of the management and board of directors to act in interest of the shareholders and maximize firm value. As the management has a risk of being replaced by a new management if a PE firm acquires the firm, it is assumed that managers seek to avoid PE-backed takeover attempts and that a PE-backed delisting route is rather an exception than a strategic objective. Further, the management (and board of directors) should not pursue to directly attract PE investors, as this can be a costly approach from a value maximizing negotiation perspective. Instead, they are better able to maximize shareholder value with a defensive strategy. In cases where the management of a listed firm aims to avoid PE interest and act in the interest of shareholders, our findings indicate a series of implications.

First, our empirical results indicate that listed firms should seek to increase FCF volatility, as PE investors are attracted by stable cash flows. A risk averse management maintaining stable cash flows is an issue if projects with positive expected NPVs exist. A potential explanation to the presence of such risk avoiding managers is related to their compensation which may be linked to the stock price of the firm. Thus, changes affecting the firm will also affect the management's wealth. Conversely, if we assume that shareholders are holding well-diversified portfolios, there is a misalignment in risk attitudes between managers and shareholders. The effect of a risky investment will therefore have a higher impact on the management and a lower impact on the well-diversified shareholder. An initiative to increase management's willingness to undertake riskier projects, is to reassess firm policies concerning the link between executive compensation and stock price volatility, which could emphasize stock option-based compensation, as the

value of the option increases with stock volatility (Coles *et al.*, 2006). Such initiative can reduce risk avoidance by providing managers with protection against idiosyncratic risk and reduce the impact of risk aversion on investment decisions.

Additionally, firms should obtain a larger degree of insider ownership in order to avoid PE interest, as our results provide evidence that a higher level of insider ownership reduces the likelihood of a PE bid. The insignificant empirical findings related to leverage indicate that managers of listed firms should not prioritize to adjust capital structure when aiming to avoid PE interest, as this aspect is disregarded by PE investors. Besides solely implementing actions which contradict PE investor interest, an additional suggestion is that listed firms better should communicate such intentions to shareholders and to the public market in general. For instance, firms could notify shareholders about strategic intentions related to investment projects and disclose more details related to risk profiles of projects, expected value creation, required rate of return and similar information. Similarly, intentions related to future ownership structure should clearly be communicated to the market, e.g. if the management or board of directors seek to increase the level of closely held shares.

Cases where listed firms actually want to attract PE investors, they can naturally pursue opposite actions of the suggestions above. However, this is considered as a rare situation and might only be relevant if a going private solution is the only option to avoid insolvency or if the managers possess valid reasons to attract PE investors in pursuance of shareholder value maximization.

In sum and supplemental to the suggested practical implications for PE firms and listed firms, regulatory policy makers could consider modifying disclosure requirements concerning communication of future investment projects and targeted ownership structures.

5.2 Limitations and suggestions for future research

As for any quantitative study, there exist numerous different choices in the selection of theories, methodologies, explanatory variables, observations and the like. The extent of different routes to follow is reflected in the differences among existing literature within the research field, especially regarding empirical results. Despite our attempted contribution to the literature, we recognize limitations of our research, partially consisting of methodological limitations concerning variables of interest and partly related to broader limitations which surfaced from the robustness check of our empirical analysis and our overall research design. Both of the types of limitations are discussed in the following and are complemented by perspectives and suggestions for future research.

5.2.1 Variables of interest

As discovered in the quantitative analysis, our empirical results indicated no support of Hypothesis 1, 5 and 6. Thus, limitations to our variables and our established dataset are discussed in the following. First, the sample size itself is not perceived as an issue but is concluded to be sufficient for our research when compared to previous studies. Besides the variables included in our quantitative analysis, other variables might have been informative instead of some of the selected variables or as additional variables.

5.2.1.1 Alternative variables

First, among the already included variables, if our proxy variable related to H1 (stock liquidity) does not accurately capture the effect of investor interest, the results can have been affected. One alternative variable which could potentially replace stock liquidity in future research is analyst coverage. As mentioned in Section 2.3.1 it may be difficult to obtain such historical data. Hence, institutional ownership may be a more convenient measure as institutional investors prefer to invest in firms with noticeable analyst coverage (Bhushan and O'Brien, 1990; Falkenstein, 1996).

An analogous limitation applies to our inclusion of Tobin's Q to test H5, which might not be the best proxy for undervaluation although it is widely used and acclaimed in academia. As discussed in our interpretation of results, other valuation ratios were desired but were not deemed useful based on negative data points. Nevertheless, for future research we suggest that conventional valuation multiples used in practice are included and that observations with negative values are excluded. The definition of "conventional" valuation multiples naturally varies across sectors; hence we further suggest that the selection of valuation multiples controls for sectors. One approach to handle this is to select one (or few) "common" multiples for each general sector classification and benchmark the value of each observation with comparable peer firms or sector averages. From this, a ratio independent of sector could be created across all firms, which would express the valuation level relative to peers or sector averages.

Similarly, a relative approach could be used when testing the effect of levels of free cash flows (H6). Specifically, a suggested technique is to measure the cash flow level (e.g. FCF/Assets or FCF/Sales) relative to a peer group or a sector average. This enables sector-specific comparisons and would thereby enhance the reliability of the effect of cash flow levels.

5.2.1.2 Supplemental variables

Additional limitations to variables of interest is related to omitted variable bias in terms of variables which could have been included as supplementary variables in the logistic regression. Additional variables would require additional corresponding hypotheses or would simply act as supporting variables like Sales Growth, ROA and Fixed Assets Ratio did in the regression models. As stated in Section 3.3.3.4, voting rights were not obtainable. For future research

purposes, given a sufficient data access and time span with higher allowance for manual data collection work, we recommend a collection and inclusion of this.

Further, from the perspective of a PE investor assessing a potential target, we acknowledge that human capital factors reflected by management skills and competences often yield high importance. In some investment cases, the existing management team is replaced by a new management selected by the new PE owners, but in practice the existing management could also act as a determinant. From a data collection perspective, we regard this aspect as rather difficult and demanding to quantify. It would require a valid collection of somewhat intangible and advanced person-level data which would reliably represent management skills on a numerical scale. This could for instance be measured in terms of years and degree of education, relevant industry experience, tenure, number of board positions or other factors. Realistically, this is perceived as impractical for all our target and control firms and have not been prioritized above our already included variables but is nevertheless regarded as an unignorable limitation to our research.

Outside monitoring by directors of the board is seen as another area of interest for future research. This would require deeper insights related to variables on historical board composition. Specific examples of variables which should be collected for this purpose are number and type of board members, i.e. to determine how many board members that are defined as outside- and inside directors respectively. Additionally, we could have specified the types of shareholders into more subcategories. Achleitner *et al.* (2013) analyzed the effect of large shareholders with respect to their types. They found that the only type of shareholder having a significant impact on the likelihood of being delisted is "family" shareholders, which have a negative impact. Hence, a similar analysis investigating the impact of family owners and additional types of owners in UK and Continental Europe would have been relevant.

Further, to ensure an isolated investigation of firm characteristics, we suggest controlling for previous PE interest with a dummy variable indicating if each firm has previously been rumored as a takeover target by PE investors. Such data can be manually collected from Mergermarket's Intelligence database, which sources global M&A news and rumors. The interpretation of such variable would then indicate if firms with prior take-private rumors have a significantly higher likelihood of being targeted by PE investors again.

Finally, in our empirical analysis we do not account for how many years a firm has been publicly traded but simply have a criterion of at least three years of financial data available. To test the intuition presented by Filatotchev et al. (2006), we could have included a continuous variable representing number of years as a listed firm to test the effect of this aspect on the likelihood of being targeted by a PE investor. For future research, we therefore suggest collecting IPO dates of each observed firm.

5.2.2 Research design

From our overall research design of examining Europe including UK in the period from 2004 - 2015, we identified a few unanticipated empirical results from our robustness checks. Among these we want to emphasize the differences related to Hypothesis 1 and 5 which were indicated in the robustness checks of regionalization and length of event window. The fact that significant differences emerged in the two essential robustness checks signals that the research design of our main model contained noticeable limitations.

Starting with the robustness check of period, our empirical results deviated significantly with regards to H1 (stock liquidity) and H5 (undervaluation). As reflected in our interpretation, the dynamics and reactions of the financial markets related to the financial crisis function as a possible explanation for the observable differences. Hence, for future research, it would be interesting to enhance focus on why H1 was supported post-crisis and why H5 was conversely supported pre-crisis. We suggest that our analysis could be repeated with alternative variables used for these two hypotheses, i.e. some of the variables discussed in Section 5.2.1, in order to test if similar indicative results are obtained in parallel robustness checks. If alternative measures and proxies for investor interest and undervaluation then supports the significant effect of the crisis, a subsequent in-depth investigation is suggested into more theoretical aspects of how the financial crisis impacted investor behavior. Likewise, given a sufficient amount of research resources, a qualitative study involving interviews with investment professionals could provide a different and interesting perspective and contribute as a potential verification of whether PE investors can recognize these patterns in practice.

Next, concerning the different results obtained in the robustness check of region, an in-depth examination of structural differences in stock market dynamics and corporate ownership structures between UK and the rest of Europe is suggested as a research strategy. This approach might facilitate a better understanding of why our robustness check indicated unexpected results when controlling for UK, especially regarding the result opposing H1 and indicating that a higher level of stock liquidity increases the likelihood of a PE bid.

On a more general level unspecific to individual hypotheses, a repetition of our main analysis in the future with a larger sample size over an extended period with additional economic cycles is desirable. This could presumably shed additional light on the general validity of our results and minimize the impact of the financial crisis. Analogously, an extended global geographical focus might illuminate the magnitude of structural differences between continents and not only between UK and the rest of Europe.

6. References

Achleitner, A. K., Betzer, A., Goergen, M. and Hinterramskogler, B. (2013). Private Equity Acquisitions of Continental European Firms - The Impact of Ownership and Control on the Likelihood of Being Taken Private. *European Financial Management*, Vol. 19 (1). 72-107.

Allayannis, G., Rountree, B., Weston, J. (2008). Do investors value smooth performance?. *Journal of Financial Economics*, Vol. 90. 237-251.

Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate. *The Journal of Finance*, Vol. 23 (4). 589-609.

Altman, E. I. (1993). Corporate Financial Distress and Bankruptcy. John Wiley & Sons.

Amemiya, T. (1985). Advanced Econometrics. Blackwell, Oxford.

Amihud, Y. and Mendelson, H. (1998). Illiquidity and stock-returns cross-section and time series effects. *Journal of Financial Markets*, Vol. 5. 31–56.

Andres, C., Betzer, A. and Weir, C. (2007). Shareholder wealth gains through better corporate governance – the case of European LBO-transactions. *Financial Markets and Portfolio Management*, Vol. 21. 403-424.

Antonakis, J., Bendahan, S., Jacquart, P. and Lalive, R. (2010). On making causal claims: A review and recommendations. *The Leadership Quarterly*, Vol. 21 (6). 1086–1120.

Bain & Company. (2018). Global Private Equity Report 2018. Boston, Massachusetts: Bain & Company, Inc.

Bartlett, R. (2009). Going private but staying public: reexamining the effect of Sarbanes–Oxley on firms' going-private decisions. *The University of Chicago Law Review*, Vol. 76 (1). 7-44.

Bendel, R. B. and Afifi, A. A. (1977). Comparison of stopping rules in forward regression. *Journal of the American Statistical Association*, Vol. 72. 46-53.

Bharath, S. T. and Dittmar, A. K. (2010). Why do firms use private equity to opt out of public markets? *Review of Financial Studies*, Vol. 23. 1771-1818.

Bhushan, R. and O'Brien, P. (1990). Analyst following and institutional ownership. *Journal of Accounting Research*, Vol. 28. 55-65.

Bloch, D. (1966). A Note on the Estimation of the Location Parameter of the Cauchy Distribution. *The Journal of the American Statistical Association*, Vol. 61. 852 - 855.

Bogdan, R., and Biklen, S. K. (1982). Qualitative research for education: An introduction to theory and methods. Boston: Allyn and Bacon.

Bolton, P. and Von Thadden, E.L. (1998). Liquidity and control: a dynamic theory of corporate ownership structure. *Journal of Institutional and Theoretical Economics*, Vol. 154. 177-209.

Boot, A. W. A., Gopalan, R. and Thalor, A. V. (2006). The entrepreneur's choice between private and public ownership. *Journal of Finance*, Vol. 61. 803-836.

Boot, A. W. A., Gopalan, R. and Thakor, A. V. (2008). Market liquidity, investor participation, and managerial autonomy: why do firms go private? *Journal of Finance*, Vol. 63. 2013–2059.

Coles, J., Daniel, N., Naveen, L. (2006). Managerial incentives and risk-taking. *Journal of Financial Economics*, Vol. 79 431–468.

Cook, T. D. and Campbell, D. T. (1979). Quasi-experimentation: design & analysis issues for field settings. Houghton Mifflin.

Cosslet, S. (1981). Efficient Estimation of Discrete Choice Models. Structural Analysis of Discrete Data.

Dansk Aktionærforening. (2016). Dansk Aktionærforening kritiserer afnotering af Mols-Linien. February 26. https://www.shareholders.dk/pressemeddelelse/102142/dansk-aktionaerforening-kritiserer-afnotering-af-mols-linien.

DeAngelo, H., DeAngelo, A. and Rice, E. (1984). Going private: minority freeze outs and stockholder wealth. *Journal of Law & Economics*, Vol. 27 (2). 367-401.

Djama, C., Martinex, I. and Serve, S. (2014). What do we know about delistings? *Comptabilités et innovation.*

Dow Jones International News. (2005). NTC sees TDC as Growth Platform, Could make Acquisitions. November 30.

Engel, E., Hayes, R. M. and Wang, X. (2007). The Sarbanes–Oxley Act and firms' going-private decisions. *Journal of Accounting and Economics*, Vol. 44. 116-145.

European Parliament. (2004). Directive 2004/25/EC of the European Parliament and of the Council of 21 April 2004 on takeover bids. Office Journal of the European Union.

Faccio, M. and Lang, L. (2002). The ultimate ownership of western european corporations. *Journal of Financial Economics*, Vol. 65. 365-395.

Falkenstein, E. (1996). Preferences of stock characteristics as revealed by mutual fund portfolio holdings. *Journal of Finance*, Vol. 51. 111-135.

Filatotchev, I., Toms, S., and Wright, M. (2006). The firm's strategic dynamics and corporate life-cycle. *International Journal of Managerial Finance*. 256-279.

Guba, E. G. (1990). The Paradigm dialog. Sage Publications.

Hadlock, C., Houston, J. and Ryngaert, M. (1999). The role of managerial incentives in bank acquisitions. *Journal of Banking & Finance*, Vol. 23 (2-4). 221-249.

Hopland, A. (2015). Econometrics for Business Research. Bergen: Department of Business and Management Science, Norwegian Shool of Economics.

Hosmer, D. W., Lemeshow, S. and Studivant, R. X. (2013). Applied Logistic Regression. John Wiley & Sons.

Hostak, P., Lys, T. and Yang, Y. G. (2013). An examination of the impact of the Sarbanes–Oxley Act on the attractiveness of U.S. capital markets for foreign firms. *Review of Accounting Studies*, Vol. 18. 522-559.

Jensen, M. C. and Meckling, W. H. (1976). Theory of the firm: managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, Vol. 3. 305-360.

Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *American Economic Review*, Vol. 76. 323-329.

Jensen, M. C. (1989). Eclipse of the Public Corporation. *Harvard Business Review*, Vol. 67 (5). 61-74.

Jensen, M. C. (1993). The modern industrial revolution, exit, and the failure of internal control systems. *Journal of Finance*, Vol. 48. 831-80.

Kaplan, S. (1989a). The effects of management buyouts on operations and value. *Journal of Financial Economics*. Vol. 24. 217–254.

Kaplan, S. (1989b). Management buyouts: evidence of taxes as a source of value. *Journal of Finance,* Vol. 44. 611–632.

Kashefi Pour, E. and Lasfer, M. (2013). Why do companies delist voluntarily from the stock market? *Journal of Banking and Finance*, Vol. 37. 4850-4860.

Keller, G. (2009). Managerial Statistics. Mason: South-Western CENGAGE Learning.

Kieschnisck, R. L. (1998). Free cash-flow and stockholder gains in going private transactions revisited. *Journal of Business Finance and Accounting,* Vol. 25 (l & 2). 187–202.

Kim, W. S. and Lyn, E. O. (1991). Going private: corporate restructuring under information asymmetry and agency problems. *Journal of Business Finance & Accounting*, Vol. 18. 637-648.

Kim, W. and Weisbach, M. S. (2008). Motivations for public equity offers: an international perspective. *Journal of Financial Economics*, Vol. 87. 281-307.

Klein, A. and Zur, E. (2009). Entrepreneurial Shareholder Activism: Hedge Funds and Other Private Investors. *The Journal of Finance*, Vol. 64 (1). 187-229.

KPMG. (2018). Corporate tax rates table. https://home.kpmg.com/xx/en/home/services/tax/tax-tools-and-resources/tax-rates-online/corporate-tax-rates-table.html.

Krauss, S. E. (2005). Research Paradigms and Meaning Making: A Primer. *The Qualitative Report*, Vol. 10 (4). 758-770.

Kuhn, T. S. (1962). The structure of scientific revolutions. University of Chicago Press.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A. and Vishny, R. (1998). Law and finance. *Journal of Political Economy*, Vol. 106 (6). 1113–1155.

Laeven, L., Levine, R. (2008). Complex Ownership Structures and Corporate Valuations. *The Review of Financial Studies*, Vol. 2 (2). 579-604.

Leamer, E. (1983). Let's Take the Con Out of Econometrics. *American Economic Review*, Vol. 73 (1). 31-43.

Lehn, K. and Poulsen, A. (1989). Free cash flow and stock holder gains in going private transactions. *Journal of Finance*. 771-787.

Leuz, C., Triantis, A. and Wang, T. Y. (2008). Why do firms go dark? Causes and economic consequences of voluntary SEC deregistrations. *Journal of Accounting & Economics*, Vol. 45. 181-208.

London Stock Exchange. (2017). Admission and Disclosure Standards.

Lu, X. and White, H. (2014). Robustness checks and robustness tests in applied economics. *Journal of Econometrics*, Vol. 178 (1). 194-206.

Macey, J., O'Hara, M. and Pompilio, D. (2008). Down and Out in the Stock Market: The Law and Economics of the Delisting Process. *The Journal of Law & Economics*, Vol. 51 (4). 683-713.

Martinez, I. and Serve, S. (2011). The delisting decision: the case of buyout offer with squeeze-out (BOSO). *International Review of Law and Economics*, Vol. 31 (4). 229-239.

Martinez, I. and Serve, S. (2017). Reasons for Delisting Consequences: A Literature Review and Research Agenda. *Journal of Economic Surveys*, Vol. 31 (3). 733-770.

Maupin, R. J., Bidwell, C. M. and Ortegren, A. K. (1984). An empirical investigation of the characteristics of publicly-quoted corporations which change to closely-held ownership through management buyouts. *Journal of Business Finance and Accounting*, Vol. 11 (4). 435-450.

Mehran, H. and Peristiani, S. (2010). Financial visibility and the decision to go private. *Review of Financial Studies*, Vol. 23. 519–547.

Mergermarket Limited. (2018). Nets A/S: Deal Details: Mergermarket Limited Web site. http://www.mergermarket.com/Common/Mergermarket/Deals/DealDetails.aspx?dealsysid=834202&extern=19&id=655186&contextid=897342014&zone=205&currencyCode=EUR.

Mickey, R. M. and Greenland, S. (1989). The impact of confounder selection criteria on effect estimation. *American Journal of Epidemiology*, Vol. 129 (1). 125-137.

Miller, M. H. and Modigliani, F. (1963). Corporate income taxes and the cost of capital: a correction. *American Economic Review*, Vol. 53. 433-443.

Moon, J. (2006). Public versus private equity. *Journal of Applied Corporate Finance*, Vol. 18 (3). 76-82.

Moosa, I. A. and Ramiah, V. (2017). The Financial Consequences of Behavioural Biases. Palgrave Macmillan.

Nordic Telephone Company's Bid for TDC. (2008). Harvard Business School, November 18. 9-207-122.

North, D. S. (2001). The role of managerial incentives in corporate acquisitions: evidence from the 1990s. *Journal of Corporate Finance*, Vol. 7. 25–49.

Offen, S. and Baumgartner, E. (2013). Share Repurchase: Potential Signal of Undervaluation and Outperformance. Fidelity Investments.

Opler, T. and Titman, S. (1993). The determinants of leveraged buyout activity: free cash flow vs. financial distress costs. *Journal of Finance*, Vol. 48. 1985-1999.

Pedhazur, E. J. (1997). Multiple regression in behavioral research (3rd ed.). Orlando: Harcourt Brace.

Plenborg, T. and Petersen, C. (2012). Financial Statement Analysis. Pearson Education .

Popper, K. R. (1959). The logic of scientific discovery. London: Hutchinson.

Pownall, G. and Wieczynska, M. (2017). Deviations from the mandatory adoption of IFRS in the European Union: implementation, enforcement, incentives, and compliance. Working paper. January 25. http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1919805.

PwC. (2017). Private Equity Trend Report 2017. PricewaterhouseCoopers.

Ranganathan, P., Pramesh, C. S. and Aggarwal, R. (2017). Common pitfalls in statistical analysis: Logistic regression. *Perspectives in Clinical Research.* 148-151.

Renneboog, L. D. R. and Simon, T. (2005). Public-to-Private Transactions: LBOs, MBOs, MBIs and IBOs. *CentER Discussion Paper,* Vol. 98.

Renneboog, L., Simons, T. and Wright, M. (2007). Why do public firms go private in the UK? The impact of private equity investors, incentive realignment and undervaluation. *Journal of Corporate Finance*, Vol. 13. 591–628.

Rosenbaum, J., Pearl, J. (2009). Investment Banking - Valuation, Leveraged Buyouts and Mergers & Acquisitions. John Wiley & Sons.

Sarkar, S. and Rana, S. (2013). Collinearity diagnostics of binary logistic regression model. *Journal of Interdisciplinary Mathematics*, Vol. 13. 253-267.

Shah, S. and Thakor, A. (1988). Private versus public ownership: Investment, ownership distribution and optimality. *Journal of Finance*, Vol. 43. 41-59.

Shivdasani, A. (1993). Board composition, ownership structure, and hostile takeovers. *Journal of Accounting and Economics*, Vol. 16 (1-3). 167-198.

Sidney, S. (1956). Non-parametric statistics for the behavioral sciences. McGraw-Hill.

Sribney, Bill. (n.d.). Advantages of the robust variance estimator. https://www.stata.com/support/faqs/statistics/robust-variance-estimator/.

Stock, H. J. and Watson, M. W. (2012). Introduction to Econometrics. Pearson.

Thomsen, S. and Vinten, F. (2014). Delistings in Europe and the Cost of Governance. *Journal of Management & Governance*, Vol. 18 (3). 793-833.

UCLA Institute for Digital Research and Education. (n.d.). Stata - Logistic Regression Diagnostics. https://stats.idre.ucla.edu/stata/webbooks/logistic/chapter3/lesson-3-logistic-regression-diagnostics-2/.

Vittinghoff, E. and McCulloch, C. E. (2007). Relaxing the rule of ten events per variable in logistic and Cox regression. *American Journal of Epidemiology*, Vol. 165 (6). 710-718.

Vulcheva, M. I. (2011). International accounting standardization across countries with unequal enforcement – questionable benefits at a high price? PhD dissertation at Faculty of the James T. Laney School, Emory University.

Webb, A. R. and Copsey, K. D. (2011). Statistical Pattern Recognition (3rd ed). John Wiley & Sons.

Weir, C., Laing, D. and Wright, W. (2005a). Incentive effects, monitoring mechanisms and the market for corporate control: an analysis of the factors affecting Public to Private transactions in the UK. *Journal of Business Finance and Accounting*, Vol. 32 (5). 909-943.

Weir, C. M., Laing, D. and Wright, M. (2005b). Undervaluation, private information, agency costs and the decision to go private. *Applied Financial Economics*, Vol. 15. 947-961.

Weir, C. and Wright, M. (2006). Governance and takeovers: are public-to-private transactions different from traditional acquisitions of listed corporations? *Accounting and Business Research*, Vol. 36 (4). 289-307.

Weir, C., Wright, M. and Scholes, L. (2008). Public-to-private buy-outs, distress costs and private equity. *Applied Financial Economics*, Vol. 18. 808-19.

Wilcoxon, F. (1945). Individual comparisons by ranking methods. *Biometrics Bulletin*, Vol. 1 (6). 80-83.

Winsor, C. P., Hastings, C., Mosteller, F. and Tukey, J. W. (1947). Low moments for small samples: a comparative study of order statistics. *Annals of Mathematical Statistics*, Vol. 18 (3). 413-426.

Zhang, Z. (2016). Residuals and regression diagnostics: focusing on logistic regression. *Annals of Translational Medicine*, Vol. 4 (10). 195.

7. Appendices

Appendix 1. Examples of PE-backed squeeze-outs

Example 1 illustrates a potential combination of an LBO and BOSO (Buyout with Squeeze-Out). Example 2 illustrates that corporations can be delisted with acceptance from 90% of the voting rights. The examples are based on two Danish corporations.

Example 1: The attempt to delist TDC A/S in 2005. One historic example of a case where the ownership structure became critical for the completion of an LBO with BOSO, was when the PE consortium of Permira, Apax, Blackstone, Providence and KKR attempted to delist the Danish telephone company, TDC A/S, through the shell company Nordic Telephone Company. The consortium had achieved acceptance from 88.2% of the shareholders for its tender offer and acquired the 88.2% of the public equity to mark their interest in acquiring 100% of TDC. However, they hit a major roadblock as the Danish pension fund, ATP, would not accept the offer on its 5.5% stake. The goal of the PE consortium was to achieve at least 90% of the share capital to squeeze out the minority investors and be the drivers of the historically largest LBO in Europe. The tender offer was based on DKK 382 per share, but ATP would only sell its share for at least DKK 400. Subsequently, TDC remained public and the PE consortium did not succeed in its BOSO attempt (Nordic Telephone Company's Bid for TDC, 2008). The big question in the case of the tender offer on TDC was based on whether the PE consortium should accept that a 90% stake was not achievable and still be satisfied with the premium they paid for the 88.2% of the shares? One of the benefits for TDC in the private ownership by the PE consortium was that PE owners like the consortium were able to go deeper into debt than a public held company. As a public firm, TDC had to use its capital to maintain its credit rating and relatively high dividend policy and was limited in what acquisitions it could make (Dow Jones International News, 2005).

Example 2: The delisting of Mols-Linien A/S in 2016. An interesting case to illustrate the combination of an LBO and a squeeze-out is based on the Nordic PE firm Polaris Private Equity's delisting of Mols-Linien A/S in 2016. 21% of the share capital, held by more than 1,000 private investors, declined Polaris' tender offer. However, as Polaris received acceptance from more than 2/3 of the votes in favor of a delisting from the Copenhagen Stock Exchange, NASDAQ OMX Copenhagen accepted the delisting of Mols-Linien. Polaris' acquisition of Mols-Linien caught a lot public attention as the case indicated a pitfall in the investor protection of public investors against public takeovers (i.e. the minimum requirement of 90% of the share capital). As a private investor who does not have the same network as large pension funds and asset management firms, it may be much more difficult to sell shares in a private market. Hence, the incentive for minority shareholders to retain its stock holding post to a delisting, who have denied to divest its stake to an acquirer, may be weakened. The criticism was therefore based on the fact that acquirers like PE investors would only need to buy a sufficiently large stake to obtain 2/3 of the votes to delist the firm and not pay a premium for 90% of the share capital. Thus, the remaining ~23% of the shareholders may not find their holdings attractive as

their stock holding has lost its liquidity and the acquirer may after all be able to squeeze out all of the shareholders in the corporation (Dansk Aktionærforening, 2016).

From the two examples above, two different thresholds to delist a company is presented. In 2005, the PE consortium needed 90% of the shareholders' acceptance to delist TDC. Approximately 11 years later, the PE firm Polaris succeeded in taking Mols-Linien private by only 66.67% acceptance as NASDAQ OMX Copenhagen accepted this threshold. From these two cases it is illustrated how minority investor protection impact the completion of a GPT with and without a squeeze-out. The minority investor protection's impact on GPT has previously been addressed by Thomsen and Vinten (2014), who used the minority investor index, developed by La Porta *et al.* (1998), as a proxy for corporate governance regulation. Thomsen and Vinten (2014) used this index and concluded that stronger minority investor protection and the implementation of corporate governance regulation are associated with a higher delisting frequency by GPTs and M&As in general but reduce the probability of bankruptcy and liquidation.

Appendix 2. Comparison of thesis results with empirical literature

Author	Year	Geography	N	Period	Methodology and data			Hypotheses (H1 - H7)							Support variables		
					Econo-metric technique	Data type	Control group?	Stock liqui-dity	Leve-rage	FCF vola-tility	Size	Under-valu-ation	FCF level	Owner-ship	Growth	Perfor-mance	Collate-raliza-tion
Panel A: Thesis																	
Thesis	2018	UK and CE	161	2004-2015	Logistic	LBOs	Yes	NS	NS	-	-	(NS)	NS	-	+	NS	+
Panel B: European studies																	
Thomsen and Vinten	2014	UK and CE	3,577	1995-2005	Logistic	Delistings	No	-			-	+		+	-	-	
Achleitner et al.	2013	CE	115	1997-2007	Logistic	LBOs	Yes	-	-	NS	(NS)		NS	-			
Martinez and Serve	2011	CE (France)	70	1997-2006	Logistic	Squeeze-outs	Yes	-				NS				-	
Panel C: UK studies																	
Kashefi Pour and Lasfer	2013	UK	380	1995-2009	Logistic	Delistings	Yes	-	+		-				+		
Weir et al.	2008	UK	115	1998-2001	Logistic	GPTs	Yes				-						
Weir and Wright	2006	UK	96	1998-2000	Logistic	LBOs	Yes								-		
Weir et al. (2005a)	2005	UK	95	1998-2000	Logistic	LBOs	Yes								-	NS	
Weir et al. (2005b)	2005	UK	84	1998-2000	Logistic	LBOs	Yes					+					
Panel D: US studies																	
Bharath and Dittmar	2010	US	1,023	1980-2004	Logistic	GPTs	Yes	-	+			+					
Mehran and Peristiani	2010	US	262	1990-2007	Hazard	GPTs / LBOs	Yes	-									
Leuz et al.	2008	US	484	1998-2004	Probit	GPTs	Yes		+		-				-	-	
Engel et al.	2007	US	237	1998-2005	Logistic	GPTs	Yes	-			-						
North	2001	US	342	1990-1997	Logistic	GPTs	Yes		NS		NS	NS		+/-	-	NS	
Kieschnisck	1998	US	263	1980-1987	Logistic	LBOs	Yes				-	NS					
Opler and Titman	1993	US	180	1980-1990	Logistic	LBOs	Yes					+					
Kim and Lyn	1991	US	53	1976-1984	OLS	LBOs	Yes				-	+			-		
Lehn and Poulsen	1989	US	263	1980-1987	Logistic	LBOs	Yes					NS			-		
Maupin et al.	1984	US	63	1973-1983	Discriminant	MBOs	Yes					+					

Appendix 3. Pairwise correlations of independent variables

Note: Pairwise correlations above |0.70| marked in **red**.

	PE bid	Stock liquidity (LTM)	Total Debt / Equity (LFY)	Total Debt / Mcap (LFY)	Total Debt / EV (LFY)	FCF Volatility (L3Y)	Log of Assets (LFY)	Tobin's Q (LFY)	EV/Sales (LFY)	Levels of Cash Flow (LFY)	Sales CAGR (L3Y)	EBITDA-% (L3Y)	EBIT-% (L3Y)	Profit margin (L3Y)	RoA (L3Y)	Net PPE / Assets (LFY)	Largest shareholder (LS)	LS * Inv. Mgmt.	LS * Insider	LS * Corp.	LS * Other	Top 3 holders ownership	Closely held shares	Ownership by Exec. Dir.	Ownership by Directors	Ownership by Managers
PE bid	1.00																									
Stock liquidity (LTM)	0.02	1.00																								
Total Debt / Equity (LFY)	-0.07	-0.02	1.00																							
Total Debt / Mcap (LFY)	0.05	-0.06	0.05	1.00																						
Total Debt / EV (LFY)	0.07	-0.02	0.29	0.34	1.00																					
FCF Volatility (L3Y)	-0.07	0.18	0.11	0.13	0.14	1.00																				
Log of Assets (LFY)	-0.06	0.18	0.12	0.06	0.05	**0.80**	1.00																			
Tobin's Q (LFY)	-0.05	0.18	-0.13	-0.08	-0.24	-0.01	-0.04	1.00																		
EV/Sales (LFY)	-0.08	0.06	-0.05	-0.05	-0.08	0.01	0.06	0.31	1.00																	
Levels of Cash Flow (LFY)	0.04	0.17	-0.09	0.10	-0.06	0.11	0.14	0.15	-0.05	1.00																
Sales CAGR (L3Y)	0.12	-0.02	-0.05	0.15	-0.05	-0.05	-0.09	0.10	0.06	-0.01	1.00															
EBITDA-% (L3Y)	-0.01	-0.09	0.08	-0.01	0.04	0.16	0.30	-0.15	-0.12	0.18	-0.06	1.00														
EBIT-% (L3Y)	-0.03	-0.14	0.08	-0.03	-0.01	0.10	0.25	-0.20	-0.14	0.15	-0.03	**0.97**	1.00													
Profit margin (L3Y)	-0.10	-0.11	0.01	-0.10	-0.26	0.03	0.20	-0.13	-0.10	0.10	-0.10	**0.78**	**0.80**	1.00												
RoA (L3Y)	-0.07	-0.14	0.04	-0.25	-0.28	0.05	0.24	-0.05	-0.01	0.16	-0.01	**0.72**	**0.77**	**0.74**	1.00											
Net PPE / Assets (LFY)	0.07	-0.02	0.19	0.14	0.23	0.21	0.25	-0.07	0.04	-0.12	-0.07	0.13	0.07	-0.06	0.02	1.00										
Largest shareholder (LS)	-0.13	-0.20	0.03	-0.01	0.04	0.03	0.04	-0.01	-0.03	-0.03	-0.02	0.07	0.07	0.04	0.06	-0.03	1.00									
LS * Inv. Mgmt.	0.16	0.14	0.02	0.00	0.00	0.07	0.04	-0.06	0.01	0.03	0.03	0.01	0.01	-0.10	0.00	-0.03	-0.15	1.00								
LS * Insider	-0.14	-0.15	0.06	0.01	0.01	-0.15	-0.18	0.00	0.00	-0.15	0.06	0.01	0.04	0.05	0.04	-0.07	0.40	-0.29	1.00							
LS * Corp.	-0.12	-0.12	-0.05	-0.01	0.03	0.07	0.13	0.01	-0.02	0.04	-0.10	0.07	0.05	0.05	0.05	0.06	0.64	-0.25	-0.18	1.00						
LS * Other	0.04	-0.05	0.04	-0.02	0.01	0.09	0.06	0.02	-0.04	0.06	0.03	-0.01	-0.02	-0.02	-0.02	-0.05	0.29	-0.18	-0.13	-0.11	1.00					
Top 3 holders ownership	-0.12	-0.17	0.06	-0.02	0.03	-0.01	-0.01	-0.03	-0.05	-0.04	0.02	0.08	0.08	0.05	0.06	-0.06	**0.92**	-0.06	0.42	0.52	0.25	1.00				
Closely held shares	-0.17	-0.19	0.05	-0.01	0.01	-0.26	-0.32	-0.02	-0.06	-0.13	0.10	-0.01	0.03	0.04	0.01	-0.16	0.38	-0.22	**0.83**	-0.13	-0.06	0.52	1.00			
Ownership by Exec. Dir.	-0.07	-0.14	0.08	0.03	0.06	-0.19	-0.22	-0.06	-0.03	-0.10	0.04	0.00	0.03	0.04	0.01	-0.15	0.31	-0.10	0.64	-0.13	-0.02	0.39	**0.72**	1.00		
Ownership by Directors	-0.19	-0.15	-0.01	-0.05	-0.03	-0.19	-0.23	0.02	-0.03	-0.07	0.11	-0.01	0.01	0.02	0.00	-0.08	0.26	-0.22	0.59	-0.06	-0.06	0.38	**0.72**	0.09	1.00	
Ownership by Managers	0.00	-0.01	0.01	0.00	-0.04	0.02	-0.04	0.02	0.00	-0.03	0.00	0.03	0.04	0.04	0.03	0.03	0.05	-0.10	0.19	-0.05	0.00	0.07	0.22	0.12	0.04	1.00

Appendix 4. Variance Inflation Factor analysis

Analysis of Variance Inflation Factor								
Variables	Models							
	0A	1A	1B	1C	1D	2A	2B	2C
Stock Liquidity	2.00	1.83	1.82	1.90	2.01	1.82	1.82	1.95
Leverage	1.29	1.29	1.29	1.30	1.28	1.29	1.30	1.29
FCF Volatility	5.62	2.64	2.64	2.60		2.43	2.44	
Size	11.86				5.51			4.63
Tobin's Q	2.45	2.20	2.22	2.18	2.40	2.16	2.16	2.41
FCF Level	1.30	1.28	1.28	1.30	1.31	1.29	1.29	1.29
Sales Growth	1.33	1.28	1.30	1.31	1.32	1.31	1.32	1.33
ROA	1.27	1.21	1.21	1.22	1.27	1.21	1.21	1.27
Fixed Assets Ratio	2.27	1.93	1.95	1.95	2.26	1.90	1.92	2.28
Largest Shareholder	2.79	1.82						
Top 3 Holders			2.07					
Largest Shareholder * Inv. Mgmt.				1.47	1.61			
Largest Shareholder * Insider				1.24	1.34			
Largest Shareholder * Corp.				1.25	1.36			
Closely Held Shares	1.80					1.28		
Inside Ownership by Directors							1.26	1.28
Inside Ownership by Ex. Dir.							1.16	1.20
Inside Ownership by Managers							1.07	1.07

Appendix 5. Regression excluding Stock Liquidity and Leverage

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Liquidity	Omitted	Omitted	Omitted	Omitted	Omitted
Leverage	Omitted	Omitted	Omitted	Omitted	Omitted
FCF Volatility	-0.064	-0.139 *	-0.140 *	-0.188 **	
	(0.635)	(0.099)	(0.096)	(0.031)	
Size	-0.187				-0.204 **
	(0.222)				(0.035)
Tobin's Q	-0.220	-0.191	-0.191	-0.176	-0.192
	(0.130)	(0.181)	(0.178)	(0.221)	(0.180)
FCF Level	1.269	1.562	1.545	1.497	1.518
	(0.366)	(0.251)	(0.260)	(0.282)	(0.275)
Sales Growth	1.694 ***	1.428 **	1.466 **	1.604 **	1.605 **
	(0.007)	(0.015)	(0.013)	(0.011)	(0.011)
ROA	-0.670	-1.045	-1.046	-1.060	-0.674
	(0.449)	(0.205)	(0.205)	(0.201)	(0.432)
Fixed Assets Ratio	1.176 *	1.199 *	1.190 *	1.339 **	1.438 **
	(0.076)	(0.060)	(0.063)	(0.040)	(0.029)
Largest Shareholder	-0.749	-1.882 **			
	(0.407)	(0.026)			
Largest Shareholder * Inv. Mgmt.				4.497 *	4.359 *
				(0.076)	(0.085)
Largest Shareholder * Insider				-2.046 *	-2.159 *
				(0.093)	(0.078)
Largest Shareholder * Corp.				-2.007 *	-1.913 *
				(0.051)	(0.061)
Top 3 Holders			-1.553 **		
			(0.014)		
Closely Held Shares	-2.740 ***				
	(0.002)				
Constant	0.791	-0.283	-0.165	-0.589	0.054
	(0.400)	(0.706)	(0.828)	(0.449)	(0.949)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.118	0.095	0.097	0.118	0.118
AIC	483.674	490.177	489.091	483.572	483.797
LR Chi^2	52.713	42.210	43.296	52.815	52.589

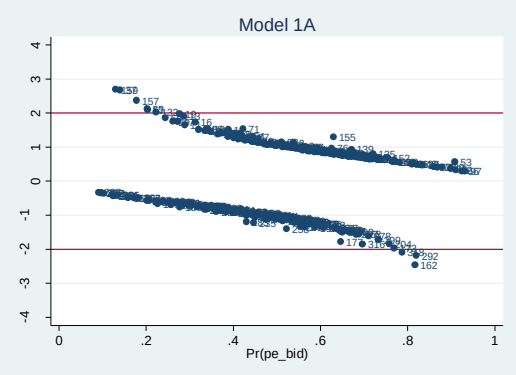
Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Liquidity	Omitted	Omitted	Omitted	Omitted
Leverage	Omitted	Omitted	Omitted	Omitted
FCF Volatility	-0.064	-0.198 **	-0.203 **	
	(0.635)	(0.024)	(0.023)	
Size	-0.187			-0.245 **
	(0.222)			(0.013)
Tobin's Q	-0.220	-0.207	-0.227	-0.248 *
	(0.130)	(0.154)	(0.126)	(0.093)
FCF Level	1.269	1.242	1.485	1.565
	(0.366)	(0.374)	(0.291)	(0.268)
Sales Growth	1.694 ***	1.703 ***	1.834 ***	1.846 ***
	(0.007)	(0.006)	(0.004)	(0.004)
ROA	-0.670	-1.042	-1.206	-0.742
	(0.449)	(0.211)	(0.154)	(0.396)
Fixed Assets Ratio	1.176 *	1.060	1.103 *	1.255 *
	(0.076)	(0.103)	(0.095)	(0.061)
Largest Shareholder	-0.749			
	(0.407)			
Closely Held Shares	-2.740 ***	-2.828 ***		
	(0.002)	(0.000)		
Inside Ownership by Directors			-4.424 ***	-4.546 ***
			(0.001)	(0.000)
Inside Ownership by Ex. Directors			-1.889	-2.010 *
			(0.100)	(0.082)
Inside Ownership by Managers			1.943	1.255
			(0.714)	(0.812)
Constant	0.791	0.160	0.106	0.899
	(0.400)	(0.836)	(0.891)	(0.304)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.118	0.113	0.121	0.123
AIC	483.674	482.019	482.444	481.494
LR Chi^2	52.713	50.367	53.943	54.893

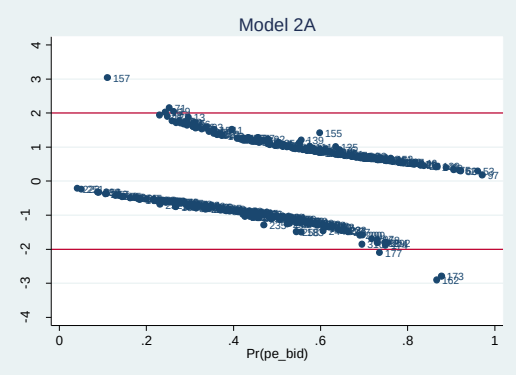
Appendix 6. Robustness check 1 - Outliers (Winsorization of 98%)

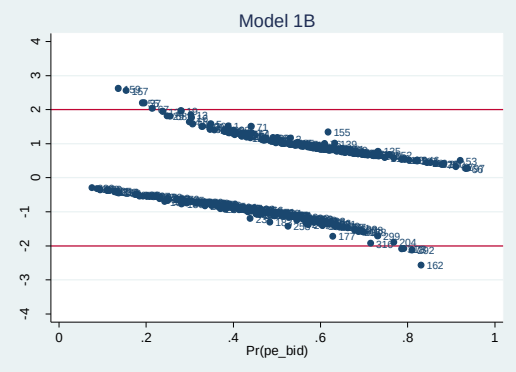
Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	0.012	0.063	0.086	0.004	0.082
	(0.985)	(0.916)	(0.887)	(0.995)	(0.893)
Leverage	0.089	0.039	0.048	0.064	0.064
	(0.661)	(0.839)	(0.807)	(0.752)	(0.748)
FCF Volatility	-0.043	-0.148	-0.151	-0.205 **	
	(0.767)	(0.119)	(0.114)	(0.037)	
Size	-0.233				-0.235 **
	(0.138)				(0.025)
Tobin's Q	-0.228	-0.182	-0.185	-0.156	-0.195
	(0.199)	(0.288)	(0.281)	(0.371)	(0.269)
FCF Level	1.071	1.357	1.332	1.308	1.392
	(0.477)	(0.353)	(0.364)	(0.383)	(0.355)
Sales Growth	1.915 ***	1.605 **	1.650 **	1.807 ***	1.833 ***
	(0.005)	(0.012)	(0.010)	(0.008)	(0.008)
ROA	0.183	-0.595	-0.533	-0.491	0.006
	(0.906)	(0.684)	(0.716)	(0.743)	(0.997)
Fixed Assets Ratio	1.124 *	1.141 *	1.125 *	1.271 *	1.423 **
	(0.097)	(0.077)	(0.082)	(0.055)	(0.035)
Largest Shareholder	-0.917	-2.148 **			
	(0.342)	(0.015)			
Largest Shareholder * Inv. Mgmt.				4.640 *	4.591 *
				(0.076)	(0.080)
Largest Shareholder * Insider				-2.080	-2.166 *
				(0.107)	(0.094)
Largest Shareholder * Corp.				-2.296 **	-2.193 **
				(0.037)	(0.046)
Top 3 Holders			-1.665 **		
			(0.010)		
Closely Held Shares	-2.780 ***				
	(0.002)				
Constant	1.005	-0.166	-0.055	-0.512	0.161
	(0.283)	(0.831)	(0.944)	(0.523)	(0.850)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.117	0.093	0.095	0.116	0.118
AIC	488.089	494.845	494.164	488.577	487.890
LR Chi^2	52.298	41.542	42.223	51.810	52.497

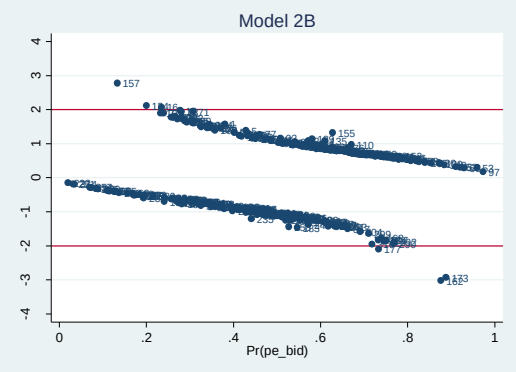
Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	0.012	-0.104	-0.076	0.032
	(0.985)	(0.866)	(0.903)	(0.959)
Leverage	0.089	0.058	0.026	0.038
	(0.661)	(0.771)	(0.894)	(0.847)
FCF Volatility	-0.043	-0.212 **	-0.213 **	
	(0.767)	(0.031)	(0.033)	
Size	-0.233			-0.268 **
	(0.138)			(0.012)
Tobin's Q	-0.228	-0.191	-0.211	-0.257
	(0.199)	(0.274)	(0.233)	(0.148)
FCF Level	1.071	1.035	1.390	1.520
	(0.477)	(0.490)	(0.356)	(0.316)
Sales Growth	1.915 ***	1.894 ***	2.003 ***	2.047 ***
	(0.005)	(0.005)	(0.003)	(0.003)
ROA	0.183	-0.427	-0.755	-0.154
	(0.906)	(0.775)	(0.614)	(0.920)
Fixed Assets Ratio	1.124 *	0.963	1.021	1.212 *
	(0.097)	(0.145)	(0.127)	(0.076)
Largest Shareholder	-0.917			
	(0.342)			
Closely Held Shares	-2.780 ***	-2.926 ***		
	(0.002)	(0.000)		
Inside Ownership by Directors			-4.562 ***	-4.708 ***
			(0.001)	(0.000)
Inside Ownership by Ex. Directors			-1.696	-1.788
			(0.172)	(0.151)
Inside Ownership by Managers			-0.626	-1.604
			(0.942)	(0.852)
Constant	1.005	0.322	0.296	1.080
	(0.283)	(0.688)	(0.713)	(0.218)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.117	0.11	0.114	0.118
AIC	488.089	487.434	489.374	487.517
LR Chi^2	52.298	48.953	51.013	52.870

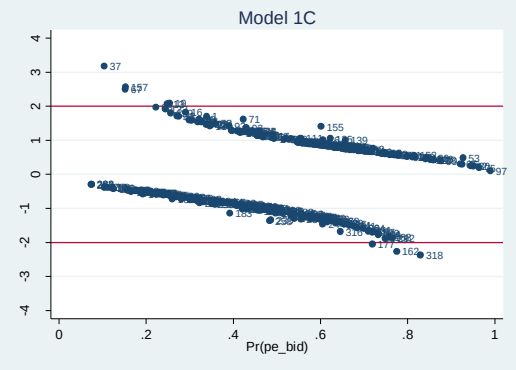
Appendix 7. Studentized Pearson Residuals vs. Predicted Value

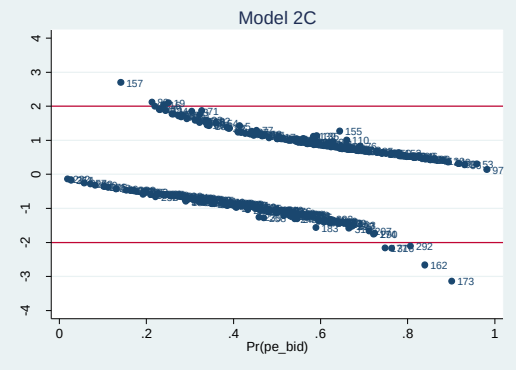


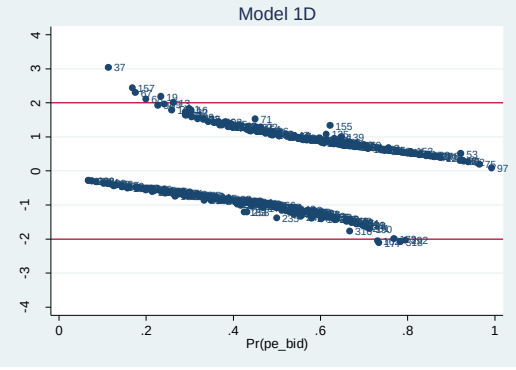




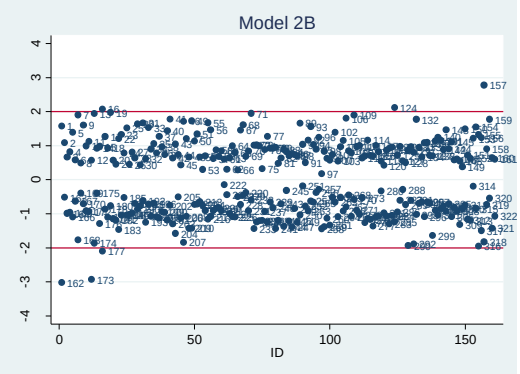


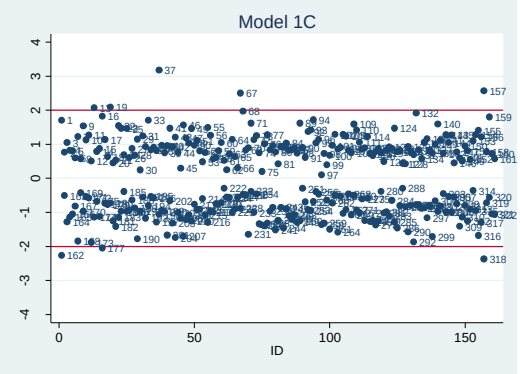


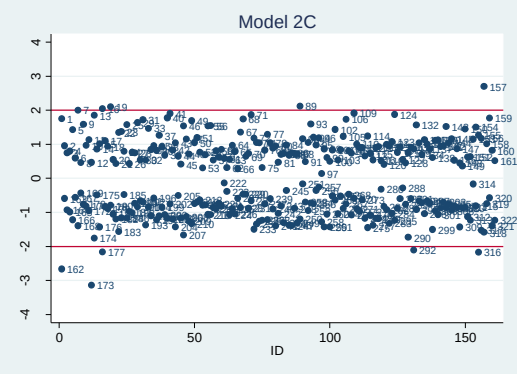


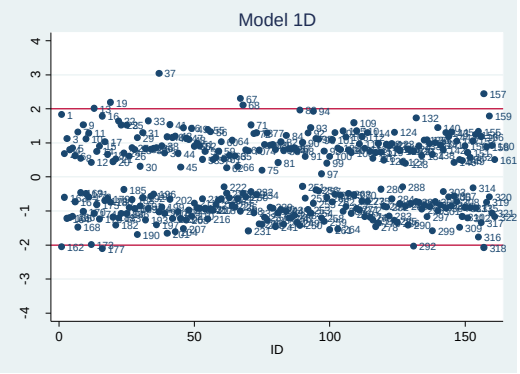


Appendix 8. Studentized Pearson Residuals vs. Matched Pair ID

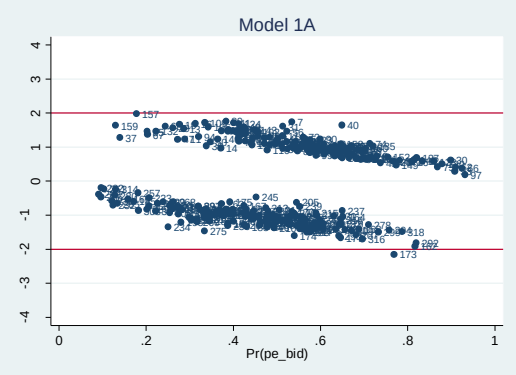


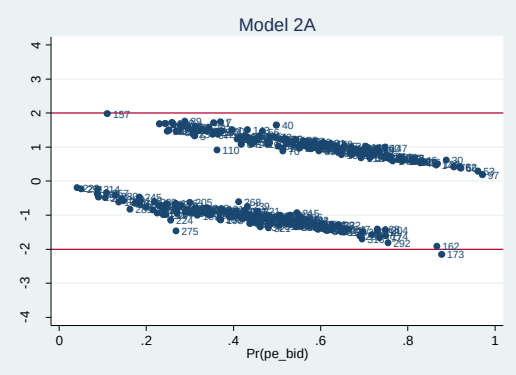


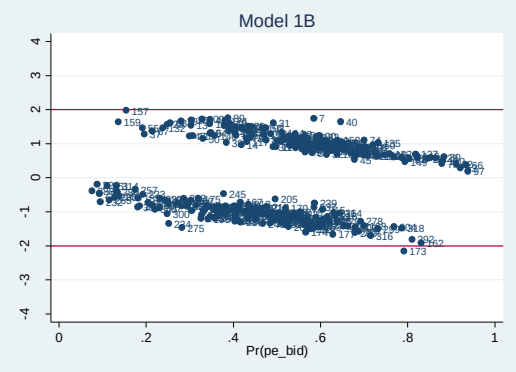


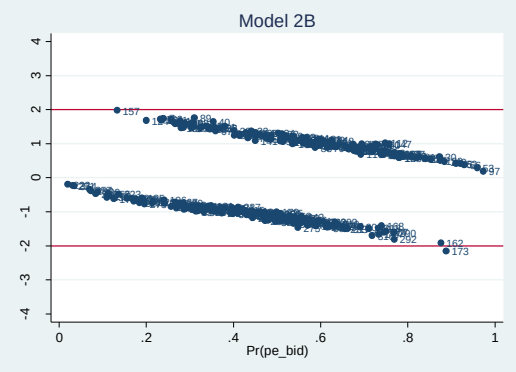


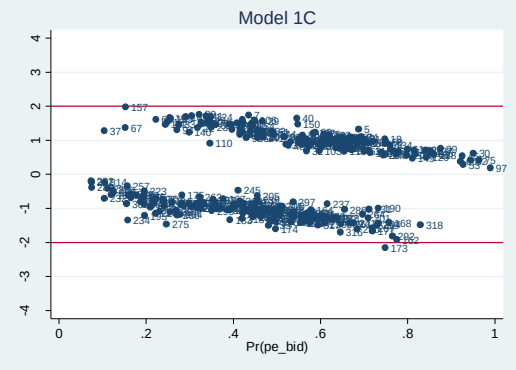
Appendix 9. Deviance Residuals vs. Predicted Value

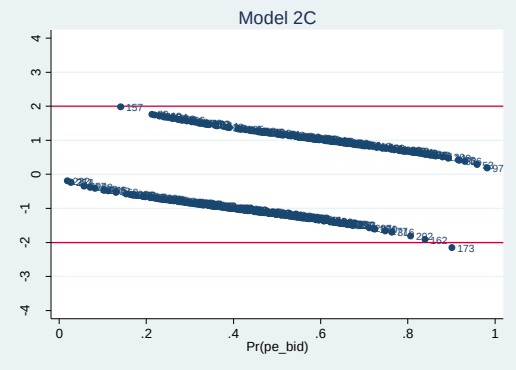


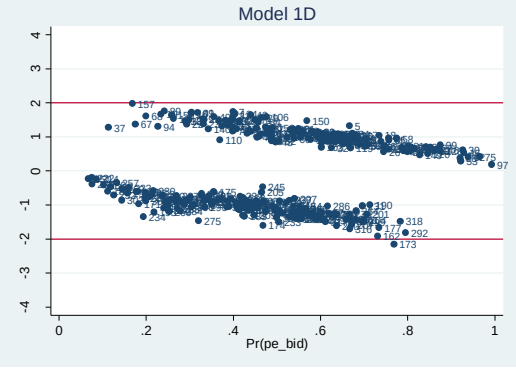




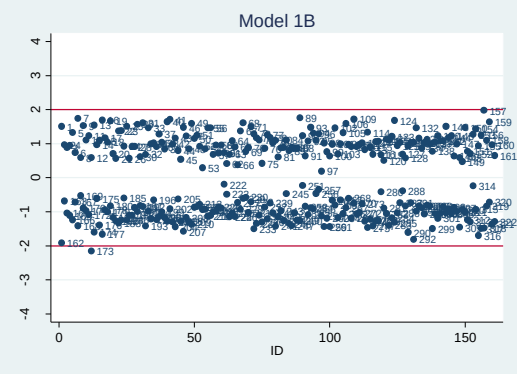


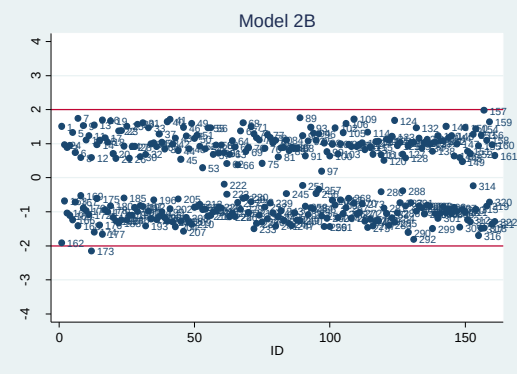


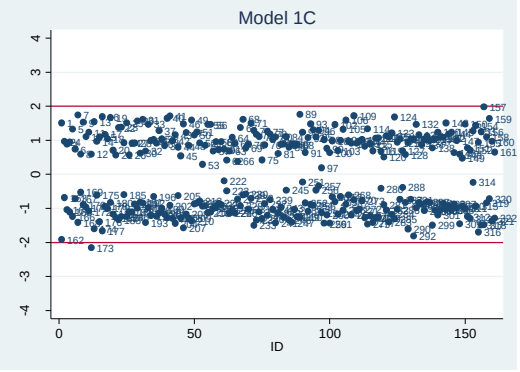


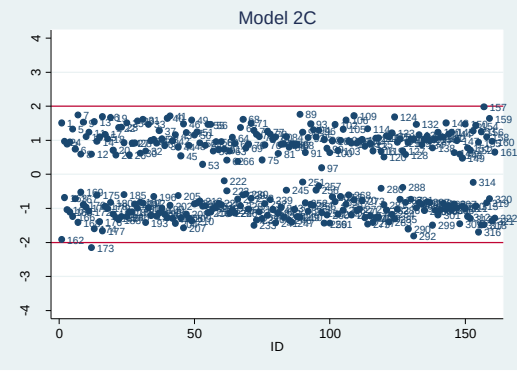


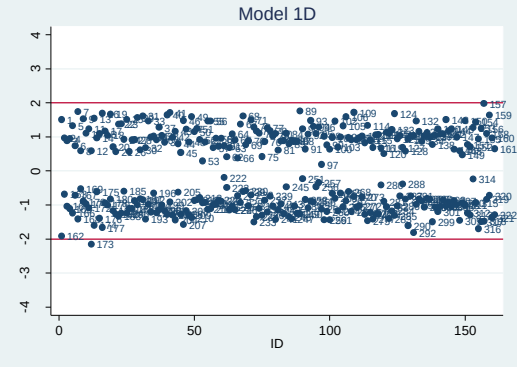
Appendix 10. Deviance Residuals vs. Matched Pair ID



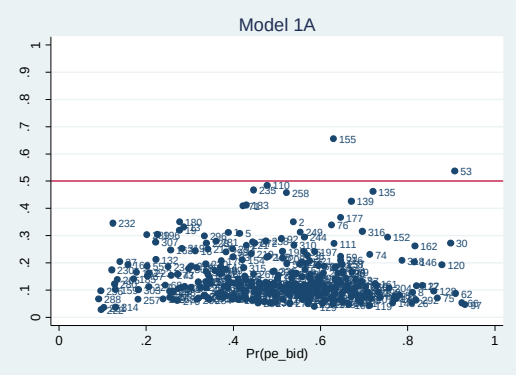


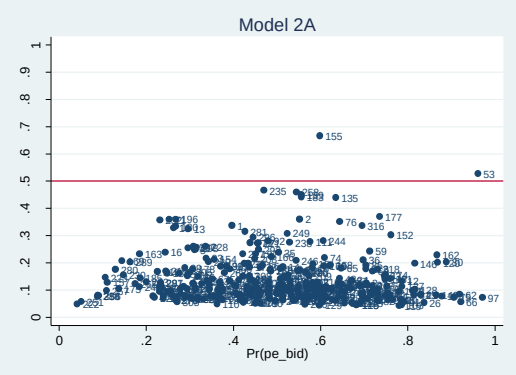


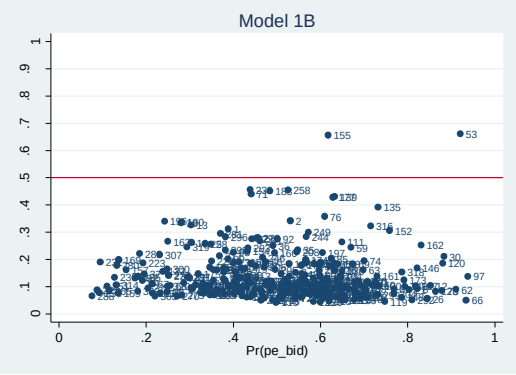


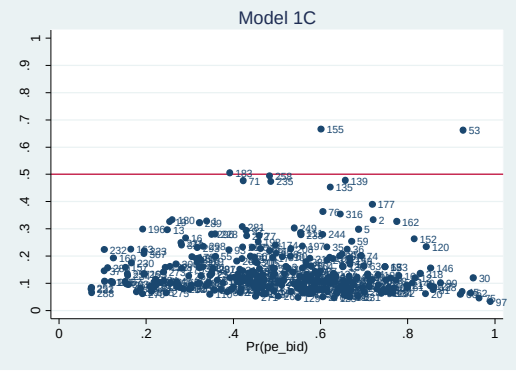


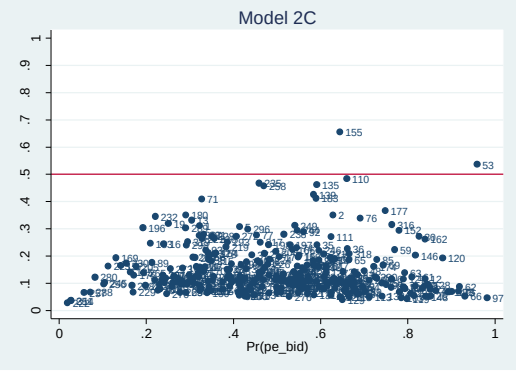
Appendix 11. Leverage vs. Predicted Value

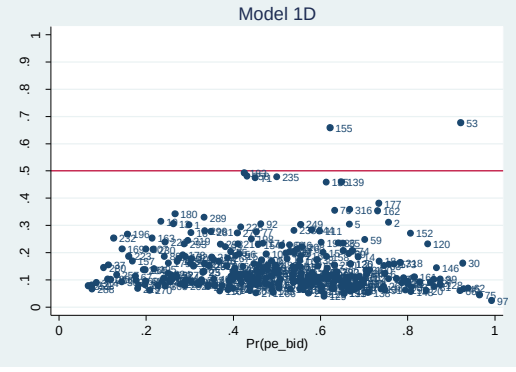




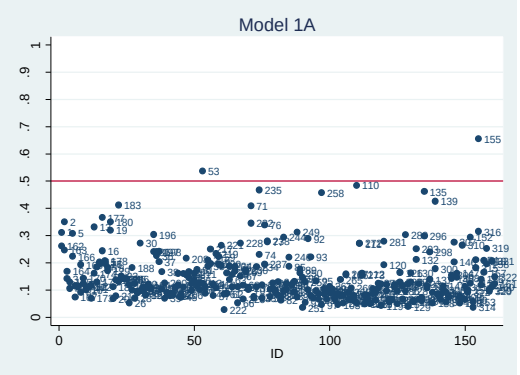


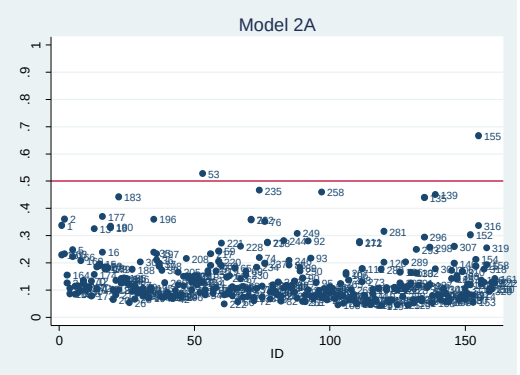


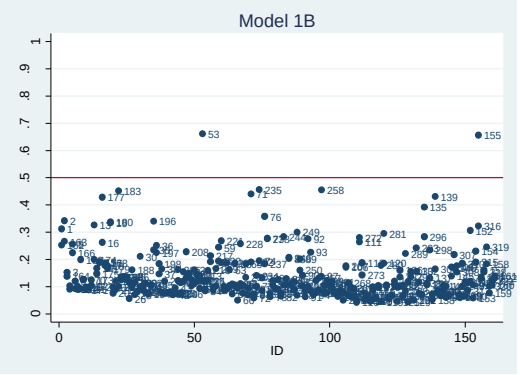


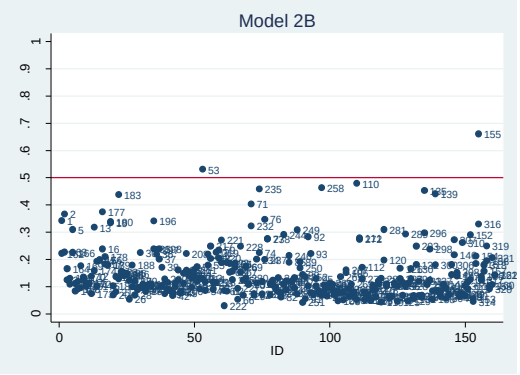


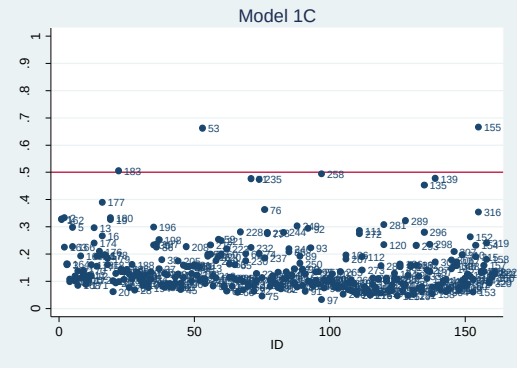
Appendix 12. Leverage vs. Matched Pair ID

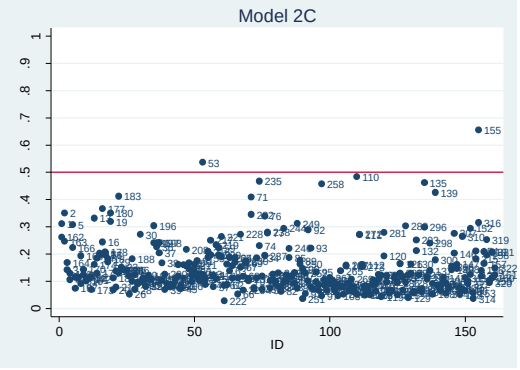


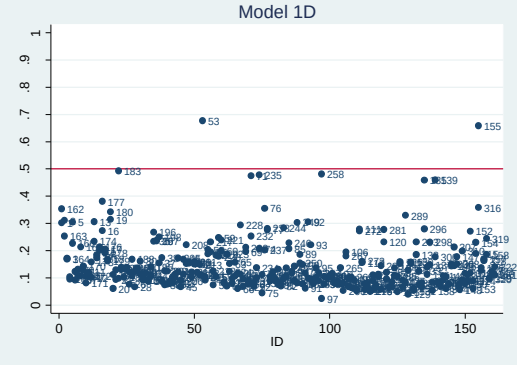




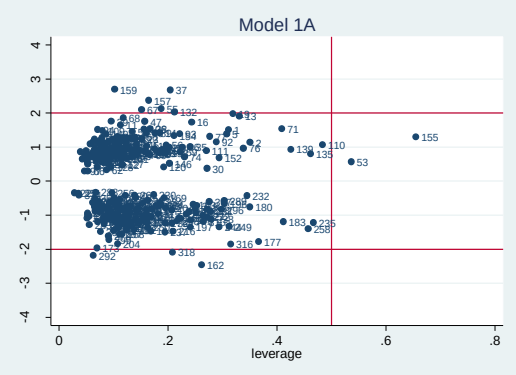


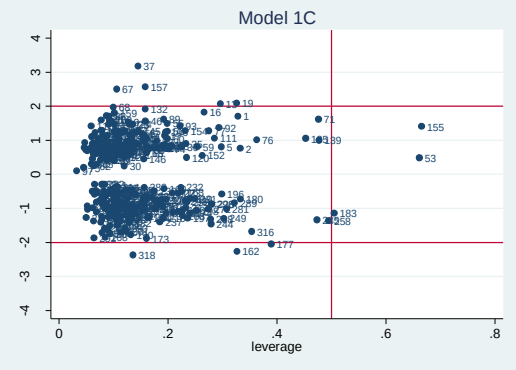


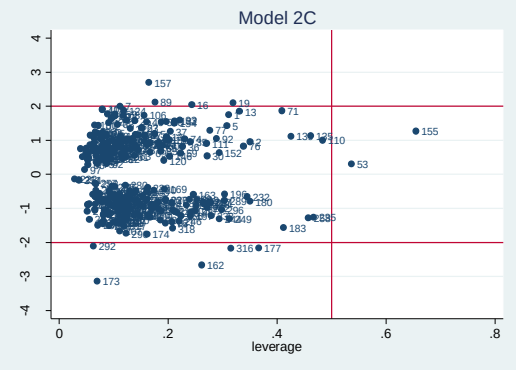


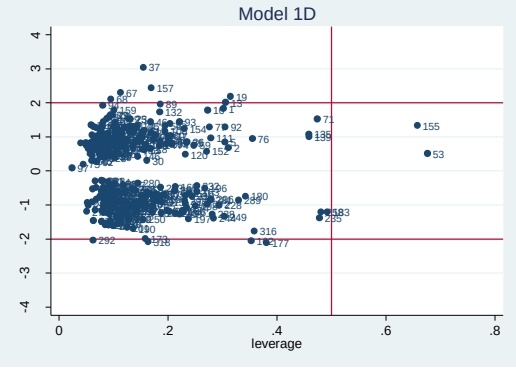


Appendix 13. Studentized Pearson Residuals vs. Leverage









Appendix 14. Robustness check 2: Length of event window

14A Interpretation of variables in pre-crisis period

Model with post-crisis dummy = 1

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	-0.089	0.052	0.058	0.097	0.042
	(0.884)	(0.930)	(0.922)	(0.870)	(0.943)
Leverage	-0.005	-0.004	-0.003	0.004	-0.028
	(0.973)	(0.976)	(0.982)	(0.978)	(0.854)
FCF Volatility	-0.209	-0.136	-0.141	-0.154	
	(0.273)	(0.250)	(0.238)	(0.196)	
Size	0.061				-0.086
	(0.780)				(0.522)
Tobin's Q	-0.443 *	-0.413 *	-0.400 *	-0.393 *	-0.382 *
	(0.050)	(0.060)	(0.068)	(0.078)	(0.084)
FCF Level	2.138	2.150	2.043	1.911	1.702
	(0.306)	(0.294)	(0.324)	(0.351)	(0.401)
Sales Growth	2.054 **	1.591 *	1.675 *	1.952 *	1.892 *
	(0.046)	(0.096)	(0.084)	(0.053)	(0.063)
ROA	-2.604 *	-2.394 *	-2.302	-2.238	-2.083
	(0.098)	(0.099)	(0.110)	(0.113)	(0.171)
Fixed Assets Ratio	0.536	0.598	0.579	0.742	0.798
	(0.502)	(0.438)	(0.456)	(0.346)	(0.313)
Largest Shareholder	-0.633	-1.934			
	(0.668)	(0.140)			
Largest Shareholder * Inv. Mgmt.				4.027	4.109
				(0.343)	(0.335)
Largest Shareholder * Insider				-3.061	-3.091
				(0.187)	(0.185)
Largest Shareholder * Corporation				-1.541	-1.415
				(0.311)	(0.349)
Top 3 Holders			-1.795 *		
			(0.052)		
Closely Held Shares	-3.451 *				
	(0.055)				

Interpretation of variables in pre-crisis period

Continued

Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Period dummy (Post-crisis = 1)	1.130	-0.157	-0.217	0.012	0.610
	(0.408)	(0.826)	(0.777)	(0.987)	(0.585)
Period * Stock Volume	-2.338 *	-2.239 *	-2.176 *	-2.863 **	-2.654 **
	(0.063)	(0.068)	(0.073)	(0.027)	(0.040)
Period * Leverage	0.040	0.040	0.033	0.041	0.061
	(0.818)	(0.810)	(0.840)	(0.809)	(0.713)
Period * FCF Volatility	0.100	-0.016	-0.012	-0.111	
	(0.719)	(0.925)	(0.942)	(0.520)	
Period * Size	-0.265				-0.165
	(0.393)				(0.381)
Period * Tobin's Q	0.106	0.149	0.112	0.100	0.062
	(0.736)	(0.626)	(0.715)	(0.748)	(0.840)
Period * FCF Level	-1.660	-1.122	-0.940	-1.235	-0.579
	(0.567)	(0.690)	(0.740)	(0.671)	(0.841)
Period * Sales Growth	-0.408	-0.079	-0.118	-0.333	-0.277
	(0.748)	(0.947)	(0.922)	(0.793)	(0.829)
Period * ROA	6.811 ***	6.267 ***	6.128 **	6.414 ***	6.136 **
	(0.007)	(0.009)	(0.010)	(0.008)	(0.013)
Period * Fixed Assets Ratio	1.326	1.105	1.162	1.389	1.508
	(0.278)	(0.347)	(0.325)	(0.252)	(0.220)
Period * Largest Shareholder	-0.324	-0.132			
	(0.865)	(0.941)			
Period * Largest Shareholder * IM				1.692	1.169
				(0.740)	(0.819)
Period * Largest Shareholder * I				0.772	0.828
				(0.779)	(0.764)
Period * Largest Shareholder * C				-0.730	-0.837
				(0.719)	(0.679)
Period * Top 3 Holders			0.427		
			(0.743)		
Period * Closely Held Shares	0.703				
	(0.733)				
Constant	0.967	0.823	1.045	0.340	0.564
	(0.344)	(0.187)	(0.102)	(0.627)	(0.527)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.145	0.119	0.120	0.148	0.144
AIC	477.45	481.383	480.619	476.462	478.196
LR Chi^2	64.937	53.004	53.768	65.925	64.191

Interpretation of variables in pre-crisis period

Model with post-crisis dummy = 1

Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	-0.089	-0.102	-0.161	-0.177
	(0.884)	(0.865)	(0.789)	(0.767)
Leverage	-0.005	0.006	0.014	-0.012
	(0.973)	(0.967)	(0.926)	(0.935)
FCF Volatility	-0.209	-0.165	-0.165	
	(0.273)	(0.172)	(0.184)	
Size	0.061			-0.124
	(0.780)			(0.360)
Tobin's Q	-0.443 *	-0.436 *	-0.435 *	-0.421 *
	(0.050)	(0.054)	(0.060)	(0.066)
FCF Level	2.138	2.118	2.335	2.105
	(0.306)	(0.309)	(0.266)	(0.311)
Sales Growth	2.054 **	2.062 **	2.242 **	2.203 **
	(0.046)	(0.044)	(0.032)	(0.037)
ROA	-2.604 *	-2.441 *	-2.643 *	-2.343
	(0.098)	(0.086)	(0.076)	(0.140)
Fixed Assets Ratio	0.536	0.538	0.511	0.620
	(0.502)	(0.496)	(0.526)	(0.443)
Largest Shareholder	-0.633			
	(0.668)			
Closely Held Shares	-3.451 *	-3.905 **		
	(0.055)	(0.016)		
Inside Ownership by Directors			-6.569 **	-6.598 **
			(0.029)	(0.029)
Inside Ownership by Ex. Directors			-3.087	-2.961
			(0.186)	(0.200)
Inside Ownership by Managers			3.808	3.395
			(0.606)	(0.645)

Interpretation of variables in pre-crisis period

Continued

Variables	Model 0A	Model 2A	Model 2B	Model 2C
Period dummy (Post-crisis = 1)	1.130	0.070	0.095	0.776
	(0.408)	(0.923)	(0.898)	(0.507)
Period * Stock Volume	-2.338 *	-2.366 *	-2.246 *	-2.083 *
	(0.063)	(0.052)	(0.068)	(0.089)
Period * Leverage	0.040	0.030	0.016	0.033
	(0.818)	(0.860)	(0.926)	(0.847)
Period * FCF Volatility	0.100	-0.109	-0.123	
	(0.719)	(0.536)	(0.492)	
Period * Size	-0.265			-0.185
	(0.393)			(0.338)
Period * Tobin's Q	0.106	0.107	0.073	0.019
	(0.736)	(0.731)	(0.819)	(0.953)
Period * FCF Level	-1.660	-1.858	-1.869	-1.140
	(0.567)	(0.519)	(0.521)	(0.693)
Period * Sales Growth	-0.408	-0.341	-0.395	-0.347
	(0.748)	(0.787)	(0.759)	(0.790)
Period * ROA	6.811 ***	6.603 ***	6.632 ***	6.300 **
	(0.007)	(0.007)	(0.008)	(0.012)
Period * Fixed Assets Ratio	1.326	1.116	1.198	1.340
	(0.278)	(0.353)	(0.326)	(0.282)
Period * Largest Shareholder	-0.324			
	(0.865)			
Period * Closely Held Shares	0.703	1.014		
	(0.733)	(0.589)		
Period * Inside Ownership by D			2.707	2.732
			(0.412)	(0.407)
Period * Inside Ownership by ED			1.111	0.973
			(0.680)	(0.715)
Period * Inside Ownership by M			-7.446	-8.569
			(0.499)	(0.439)
Constant	0.967	1.192 *	1.169 *	1.499 *
	(0.344)	(0.066)	(0.072)	(0.087)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.145	0.142	0.150	0.148
AIC	477.450	471.203	475.613	476.299
LR Chi^2	64.937	63.184	66.774	66.088

14B Interpretation of variables in post-crisis period

Model with pre-crisis dummy = 1

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	-2.426 **	-2.188 *	-2.118 *	-2.766 **	-2.612 **
	(0.036)	(0.051)	(0.057)	(0.019)	(0.028)
Leverage	0.035	0.035	0.030	0.046	0.034
	(0.667)	(0.594)	(0.652)	(0.517)	(0.631)
FCF Volatility	-0.108	-0.152	-0.153	-0.265 *	
	(0.604)	(0.239)	(0.236)	(0.052)	
Size	-0.204				-0.251 *
	(0.359)				(0.078)
Tobin's Q	-0.338	-0.264	-0.288	-0.293	-0.320
	(0.135)	(0.231)	(0.189)	(0.193)	(0.151)
FCF Level	0.478	1.028	1.103	0.676	1.123
	(0.813)	(0.597)	(0.571)	(0.744)	(0.587)
Sales Growth	1.646 **	1.511 **	1.556 **	1.618 **	1.615 **
	(0.030)	(0.040)	(0.034)	(0.045)	(0.044)
ROA	4.207 **	3.874 **	3.827 **	4.176 **	4.053 **
	(0.033)	(0.045)	(0.048)	(0.036)	(0.039)
Fixed Assets Ratio	1.862 *	1.703 *	1.741 *	2.132 **	2.306 **
	(0.065)	(0.075)	(0.069)	(0.034)	(0.024)
Largest Shareholder	-0.957	-2.066 *			
	(0.424)	(0.073)			
Largest Shareholder * Inv. Mgmt.				5.719 *	5.278 *
				(0.071)	(0.093)
Largest Shareholder * Insider				-2.288	-2.263
				(0.138)	(0.137)
Largest Shareholder * Corp.				-2.271 *	-2.252 *
				(0.093)	(0.094)
Top 3 Holders			-1.368		
			(0.125)		
Closely Held Shares	-2.748 ***				
	(0.009)				

Interpretation of variables in post-crisis period

Continued

Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Period dummy (Pre-crisis = 1)	-1.130	0.157	0.217	-0.012	-0.610
	(0.408)	(0.826)	(0.777)	(0.987)	(0.585)
Period * Stock Volume	2.338 *	2.239 *	2.176 *	2.863 **	2.654 **
	(0.063)	(0.068)	(0.073)	(0.027)	(0.040)
Period * Leverage	-0.040	-0.040	-0.033	-0.041	-0.061
	(0.818)	(0.810)	(0.840)	(0.809)	(0.713)
Period * FCF Volatility	-0.100	0.016	0.012	0.111	
	(0.719)	(0.925)	(0.942)	(0.520)	
Period * Size	0.265				0.165
	(0.393)				(0.381)
Period * Tobin's Q	-0.106	-0.149	-0.112	-0.100	-0.062
	(0.736)	(0.626)	(0.715)	(0.748)	(0.840)
Period * FCF Level	1.660	1.122	0.940	1.235	0.579
	(0.567)	(0.690)	(0.740)	(0.671)	(0.841)
Period * Sales Growth	0.408	0.079	0.118	0.333	0.277
	(0.748)	(0.947)	(0.922)	(0.793)	(0.829)
Period * ROA	-6.811 ***	-6.267 ***	-6.128 **	-6.414 ***	-6.136 **
	(0.007)	(0.009)	(0.010)	(0.008)	(0.013)
Period * Fixed Assets Ratio	-1.326	-1.105	-1.162	-1.389	-1.508
	(0.278)	(0.347)	(0.325)	(0.252)	(0.220)
Period * Largest Shareholder	0.324	0.132			
	(0.865)	(0.941)			
Period * Largest Shareholder * IM				-1.692	-1.169
				(0.740)	(0.819)
Period * Largest Shareholder * I				-0.772	-0.828
				(0.779)	(0.764)
Period * Largest Shareholder * C				0.730	0.837
				(0.719)	(0.679)
Period * Top 3 Holders			-0.427		
			(0.743)		
Period * Closely Held Shares	-0.703				
	0.733				
Constant	2.097 **	0.666	0.828	0.352	1.174
	(0.033)	(0.198)	(0.163)	(0.530)	(0.123)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.145	0.119	0.12	0.148	0.144
AIC	477.450	481.383	480.619	476.462	478.196
LR Chi^2	64.937	53.004	53.768	65.925	64.191

Interpretation of variables in post-crisis period

Model with pre-crisis dummy = 1

Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	-2.426 **	-2.468 **	-2.408 **	-2.259 **
	(0.036)	(0.028)	(0.033)	(0.046)
Leverage	0.035	0.037	0.031	0.020
	(0.667)	(0.630)	(0.679)	(0.787)
FCF Volatility	-0.108	-0.274 **	-0.288 **	
	(0.604)	(0.046)	(0.039)	
Size	-0.204			-0.309 **
	(0.359)			(0.035)
Tobin's Q	-0.338	-0.328	-0.362	-0.402 *
	(0.135)	(0.143)	(0.113)	(0.076)
FCF Level	0.478	0.260	0.466	0.965
	(0.813)	(0.897)	(0.817)	(0.631)
Sales Growth	1.646 **	1.722 **	1.847 **	1.856 **
	(0.030)	(0.023)	(0.017)	(0.017)
ROA	4.207 **	4.162 **	3.989 **	3.957 **
	(0.033)	(0.037)	(0.047)	(0.046)
Fixed Assets Ratio	1.862 *	1.653 *	1.709 *	1.959 *
	(0.065)	(0.092)	(0.088)	(0.057)
Largest Shareholder	-0.957			
	(0.424)			
Closely Held Shares	-2.748 ***	-2.890 ***		
	(0.009)	(0.004)		
Inside Ownership by Directors			-3.862 ***	-3.865 ***
			(0.008)	(0.007)
Inside Ownership by Ex. Directors			-1.976	-1.987
			(0.156)	(0.153)
Inside Ownership by Managers			-3.638	-5.174
			(0.661)	(0.536)

Interpretation of variables in post-crisis period

Continued

Variables	Model 0A	Model 2A	Model 2B	Model 2C
Period dummy (Pre-crisis = 1)	-1.130	-0.070	-0.095	-0.776
	(0.408)	(0.923)	(0.898)	(0.507)
Period * Stock Volume	2.338 *	2.366 *	2.246 *	2.083 *
	(0.063)	(0.052)	(0.068)	(0.089)
Period * Leverage	-0.040	-0.030	-0.016	-0.033
	(0.818)	(0.860)	(0.926)	(0.847)
Period * FCF Volatility	-0.100	0.109	0.123	
	(0.719)	(0.536)	(0.492)	
Period * Size	0.265			0.185
	(0.393)			(0.338)
Period * Tobin's Q	-0.106	-0.107	-0.073	-0.019
	(0.736)	(0.731)	(0.819)	(0.953)
Period * FCF Level	1.660	1.858	1.869	1.140
	(0.567)	(0.519)	(0.521)	(0.693)
Period * Sales Growth	0.408	0.341	0.395	0.347
	(0.748)	(0.787)	(0.759)	(0.790)
Period * ROA	-6.811 ***	-6.603 ***	-6.632 ***	-6.300 **
	(0.007)	(0.007)	(0.008)	(0.012)
Period * Fixed Assets Ratio	-1.326	-1.116	-1.198	-1.340
	(0.278)	(0.353)	(0.326)	(0.282)
Period * Largest Shareholder	0.324			
	(0.865)			
Period * Closely Held Shares	-0.703	-1.014		
	(0.733)	(0.589)		
Period * Inside Ownership by D			-2.707	-2.732
			(0.412)	(0.407)
Period * Inside Ownership by ED			-1.111	-0.973
			(0.680)	(0.715)
Period * Inside Ownership by M			7.446	8.569
			(0.499)	(0.439)
Constant	2.097 **	1.262 **	1.264 **	2.275 ***
	(0.033)	(0.026)	(0.027)	(0.008)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.145	0.142	0.150	0.148
AIC	477.450	471.203	475.613	476.299
LR Chi^2	64.937	63.184	66.774	66.088

Appendix 15. Robustness check 3: Regionalization of UK and Continental Europe

15A Interpretation of variables in Non-UK region

Model with UK dummy = 1

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	-1.195 *	-1.176 *	-1.130 *	-1.359 **	-1.383 **
	(0.072)	(0.074)	(0.084)	(0.044)	(0.044)
Leverage	0.124	0.093	0.085	0.175	0.191
	(0.467)	(0.555)	(0.589)	(0.347)	(0.316)
FCF Volatility	-0.145	-0.121	-0.121	-0.133	
	(0.418)	(0.265)	(0.268)	(0.236)	
Size	-0.019				-0.081
	(0.923)				(0.496)
Tobin's Q	0.093	0.087	0.073	0.081	0.078
	(0.639)	(0.624)	(0.685)	(0.682)	(0.701)
FCF Level	1.874	2.112	2.044	2.687	2.698
	(0.310)	(0.238)	(0.258)	(0.147)	(0.150)
Sales Growth	2.007 **	1.470	1.603 *	1.813 *	1.904 *
	(0.047)	(0.108)	(0.086)	(0.068)	(0.056)
ROA	-2.338	-1.909	-2.027	-2.319	-2.343
	(0.228)	(0.220)	(0.201)	(0.215)	(0.247)
Fixed Assets Ratio	0.587	0.697	0.728	0.698	0.680
	(0.492)	(0.404)	(0.384)	(0.420)	(0.432)
Largest Shareholder	-1.658 *	-2.313 **			
	(0.075)	(0.011)			
Largest Shareholder * Inv. Mgmt.				2.801	2.986
				(0.474)	(0.445)
Largest Shareholder * Insider				-4.613 ***	-4.692 ***
				(0.004)	(0.004)
Largest Shareholder * Corp.				-2.439 **	-2.409 **
				(0.015)	(0.016)
Top 3 Holders			-1.910 ***		
			(0.006)		
Closely Held Shares	-2.872 ***				
	(0.007)				

Interpretation of variables in Non-UK region

Continued

Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Region dummy (UK=1)	0.565	-0.298	-0.603	-0.857	0.417
	(0.669)	(0.679)	(0.434)	(0.247)	(0.707)
Region * Stock Volume	3.511 ***	3.263 ***	3.346 ***	3.508 ***	3.883 ***
	(0.002)	(0.003)	(0.003)	(0.001)	(0.001)
Region * Leverage	-0.177	-0.185	-0.182	-0.280	-0.309
	(0.491)	(0.447)	(0.457)	(0.321)	(0.270)
Region * FCF Volatility	0.046	-0.096	-0.101	-0.224	
	(0.864)	(0.589)	(0.568)	(0.244)	
Region * Size	-0.283				-0.371 *
	(0.357)				(0.097)
Region * Tobin's Q	-0.777 **	-0.787 **	-0.778 **	-0.808 **	-0.784 **
	(0.018)	(0.013)	(0.014)	(0.016)	(0.021)
Region * FCF Level	-2.290	-2.177	-2.211	-2.622	-2.012
	(0.438)	(0.445)	(0.439)	(0.382)	(0.505)
Region * Sales Growth	-0.479	-0.009	-0.159	-0.049	-0.206
	(0.711)	(0.994)	(0.896)	(0.971)	(0.878)
Region * ROA	2.094	0.840	0.848	1.237	1.974
	(0.413)	(0.706)	(0.706)	(0.623)	(0.458)
Region * Fixed Assets Ratio	0.882	0.555	0.630	1.225	1.589
	(0.450)	(0.616)	(0.572)	(0.300)	(0.193)
Region * Largest Shareholder	2.949	1.834			
	(0.213)	(0.336)			
Region * Largest Shareholder * IM				5.852	5.369
				(0.264)	(0.304)
Region * Largest Shareholder * I				5.758 **	5.670 **
				(0.020)	(0.023)
Region * Largest Shareholder * C				3.409	2.941
				(0.283)	(0.356)
Region * Top 3 Holders			2.069		
			(0.110)		
Region * Closely Held Shares	0.647				
	(0.725)				
Constant	0.204	-0.048	0.037	-0.192	-0.088
	(0.849)	(0.951)	(0.963)	(0.813)	(0.929)
Year dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.113	0.088	0.091	0.129	0.128
AIC	481.964	485.178	483.926	474.977	475.113
LR Chi^2	50.422	39.209	40.461	57.410	57.273

Interpretation of variables in Non-UK region

Model with UK dummy = 1

Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	-1.195 *	-1.107 *	-1.183 *	-1.172 *
	(0.072)	(0.091)	(0.076)	(0.077)
Leverage	0.124	0.086	0.037	0.047
	(0.467)	(0.576)	(0.799)	(0.756)
FCF Volatility	-0.145	-0.176	-0.182	
	(0.418)	(0.113)	(0.109)	
Size	-0.019			-0.179
	(0.923)			(0.135)
Tobin's Q	0.093	0.068	0.077	0.055
	(0.639)	(0.725)	(0.697)	(0.786)
FCF Level	1.874	1.998	2.118	2.072
	(0.310)	(0.271)	(0.252)	(0.265)
Sales Growth	2.007 **	2.030 **	2.266 **	2.332 **
	(0.047)	(0.041)	(0.030)	(0.025)
ROA	-2.338	-2.412	-2.535	-2.291
	(0.228)	(0.190)	(0.166)	(0.233)
Fixed Assets Ratio	0.587	0.611	0.773	0.806
	(0.492)	(0.469)	(0.369)	(0.351)
Largest Shareholder	-1.658 *			
	(0.075)			
Closely Held Shares	-2.872 ***	-3.263 ***		
	(0.007)	(0.001)		
Inside Ownership by Directors			-5.462 ***	-5.591 ***
			(0.001)	(0.000)
Inside Ownership by Ex. Directors			-0.903	-0.951
			(0.571)	(0.553)
Inside Ownership by Managers			-2.989	-3.460
			(0.800)	(0.770)

Interpretation of variables in Non-UK region

Continued

Variables	Model 0A	Model 2A	Model 2B	Model 2C
Region dummy (UK=1)	0.565	-0.041	-0.044	0.434
	(0.669)	(0.955)	(0.952)	(0.708)
Region * Stock Volume	3.511 ***	2.956 ***	3.051 ***	3.293 ***
	(0.002)	(0.006)	(0.005)	(0.003)
Region * Leverage	-0.177	-0.153	-0.119	-0.140
	(0.491)	(0.526)	(0.613)	(0.557)
Region * FCF Volatility	0.046	-0.072	-0.089	
	(0.864)	(0.693)	(0.634)	
Region * Size	-0.283			-0.162
	(0.357)			(0.443)
Region * Tobin's Q	-0.777 **	-0.743 **	-0.784 **	-0.738 **
	(0.018)	(0.021)	(0.018)	(0.026)
Region * FCF Level	-2.29	-2.350	-2.363	-1.856
	(0.438)	(0.415)	(0.415)	(0.524)
Region * Sales Growth	-0.479	-0.561	-0.708	-0.838
	(0.711)	(0.657)	(0.590)	(0.522)
Region * ROA	2.094	1.545	1.418	1.738
	(0.413)	(0.525)	(0.561)	(0.494)
Region * Fixed Assets Ratio	0.882	0.573	0.398	0.602
	(0.450)	(0.611)	(0.728)	(0.607)
Region * Largest Shareholder	2.949			
	(0.213)			
Region * Closely Held Shares	0.647	1.816		
	(0.725)	(0.240)		
Region * Inside Ownership by D			3.210	3.378
			(0.184)	(0.163)
Region * Inside Ownership by ED			-0.200	-0.221
			(0.930)	(0.923)
Region * Inside Ownership by M			8.742	8.000
			(0.514)	(0.549)
Constant	0.204	0.068	0.027	0.582
	(0.849)	(0.932)	(0.973)	(0.563)
Year dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.113	0.101	0.117	0.117
AIC	481.964	479.190	480.346	480.064
LR Chi^2	50.422	45.197	52.041	52.323

15B Interpretation of variables in UK region

Model with Non-UK dummy = 1

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	2.315 **	2.087 **	2.216 **	2.149 **	2.500 ***
	(0.014)	(0.019)	(0.014)	(0.014)	(0.009)
Leverage	-0.053	-0.092	-0.097	-0.105	-0.118
	(0.787)	(0.628)	(0.613)	(0.630)	(0.578)
FCF Volatility	-0.099	-0.217	-0.222	-0.357 **	
	(0.626)	(0.129)	(0.122)	(0.026)	
Size	-0.302				-0.451 **
	(0.212)				(0.020)
Tobin's Q	-0.684 ***	-0.699 ***	-0.706 ***	-0.727 ***	-0.706 **
	(0.009)	(0.007)	(0.007)	(0.008)	(0.011)
FCF Level	-0.416	-0.065	-0.167	0.065	0.686
	(0.858)	(0.977)	(0.941)	(0.978)	(0.774)
Sales Growth	1.528 *	1.461 *	1.444 *	1.764 **	1.698 *
	(0.056)	(0.060)	(0.064)	(0.047)	(0.056)
ROA	-0.244	-1.070	-1.179	-1.082	-0.369
	(0.885)	(0.502)	(0.462)	(0.525)	(0.833)
Fixed Assets Ratio	1.468 *	1.252	1.358	1.923 **	2.269 **
	(0.095)	(0.126)	(0.101)	(0.031)	(0.016)
Largest Shareholder	1.291	-0.478			
	(0.560)	(0.781)			
Largest Shareholder * Inv. Mgmt.				8.653 **	8.354 **
				(0.015)	(0.018)
Largest Shareholder * Insider				1.145	0.978
				(0.550)	(0.609)
Largest Shareholder * Corporation				0.970	0.531
				(0.751)	(0.862)
Top 3 Holders			0.159		
			(0.891)		
Closely Held Shares	-2.225				
	(0.140)				

Interpretation of variables in UK region

Continued

Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Region dummy (Non-UK = 1)	-0.565	0.298	0.603	0.857	-0.417
	(0.669)	(0.679)	(0.434)	(0.247)	(0.707)
Region * Stock Volume	-3.511 ***	-3.263 ***	-3.346 ***	-3.508 ***	-3.883 ***
	(0.002)	(0.003)	(0.003)	(0.001)	(0.001)
Region * Leverage	0.177	0.185	0.182	0.280	0.309
	(0.491)	(0.447)	(0.457)	(0.321)	(0.270)
Region * FCF Volatility	-0.046	0.096	0.101	0.224	
	(0.864)	(0.589)	(0.568)	(0.244)	
Region * Size	0.283				0.371 *
	(0.357)				(0.097)
Region * Tobin's Q	0.777 **	0.787 **	0.778 **	0.808 **	0.784 **
	(0.018)	(0.013)	(0.014)	(0.016)	(0.021)
Region * FCF Level	2.290	2.177	2.211	2.622	2.012
	(0.438)	(0.445)	(0.439)	(0.382)	(0.505)
Region * Sales Growth	0.479	0.009	0.159	0.049	0.206
	(0.711)	(0.994)	(0.896)	(0.971)	(0.878)
Region * ROA	-2.094	-0.840	-0.848	-1.237	-1.974
	(0.413)	(0.706)	(0.706)	(0.623)	(0.458)
Region * Fixed Assets Ratio	-0.882	-0.555	-0.630	-1.225	-1.589
	(0.450)	(0.616)	(0.572)	(0.300)	(0.193)
Region * Largest Shareholder	-2.949	-1.834			
	(0.213)	(0.336)			
Region * Largest Shareholder * IM				-5.852	-5.369
				(0.264)	(0.304)
Region * Largest Shareholder * I				-5.758 **	-5.670 **
				(0.020)	(0.023)
Region * Largest Shareholder * C				-3.409	-2.941
				(0.283)	(0.356)
Region * Top 3 Holders			-2.069		
			(0.110)		
Region * Closely Held Shares	-0.647				
	(0.725)				
Constant	0.769	-0.347	-0.566	-1.049	0.329
	(0.522)	(0.693)	(0.531)	(0.248)	(0.755)
Year dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.113	0.088	0.091	0.129	0.128
AIC	481.964	485.178	483.926	474.977	475.113
LR Chi^2	50.422	39.209	40.461	57.410	57.273

Interpretation of variables in UK region

Model with Non-UK dummy = 1

Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	2.315 **	1.850 **	1.868 **	2.121 **
	(0.014)	(0.031)	(0.029)	(0.020)
Leverage	-0.053	-0.067	-0.083	-0.093
	(0.787)	(0.724)	(0.664)	(0.622)
FCF Volatility	-0.099	-0.248 *	-0.270 *	
	(0.626)	(0.091)	(0.073)	
Size	-0.302			-0.341 *
	(0.212)			(0.054)
Tobin's Q	-0.684 ***	-0.675 ***	-0.706 ***	-0.683 ***
	(0.009)	(0.009)	(0.008)	(0.009)
FCF Level	-0.416	-0.352	-0.245	0.216
	(0.858)	(0.876)	(0.913)	(0.924)
Sales Growth	1.528 *	1.469 *	1.558 **	1.495 *
	(0.056)	(0.059)	(0.049)	(0.058)
ROA	-0.244	-0.867	-1.118	-0.552
	(0.885)	(0.590)	(0.492)	(0.743)
Fixed Assets Ratio	1.468 *	1.184	1.171	1.408
	(0.095)	(0.154)	(0.160)	(0.106)
Largest Shareholder	1.291			
	(0.560)			
Closely Held Shares	-2.225	-1.447		
	(0.140)	(0.222)		
Inside Ownership by Directors			-2.253	-2.213
			(0.222)	(0.229)
Inside Ownership by Ex. Directors			-1.104	-1.173
			(0.508)	(0.477)
Inside Ownership by Managers			5.752	4.540
			(0.382)	(0.483)

Interpretation of variables in UK region

Continued

Variables	Model 0A	Model 2A	Model 2B	Model 2C
Region dummy (Non-UK = 1)	-0.565	0.041	0.044	-0.434
	(0.669)	(0.955)	(0.952)	(0.708)
Region * Stock Volume	-3.511 ***	-2.956 ***	-3.051 ***	-3.293 ***
	(0.002)	(0.006)	(0.005)	(0.003)
Region * Leverage	0.177	0.153	0.119	0.140
	(0.491)	(0.526)	(0.613)	(0.557)
Region * FCF Volatility	-0.046	0.072	0.089	
	(0.864)	(0.693)	(0.634)	
Region * Size	0.283			0.162
	(0.357)			(0.443)
Region * Tobin's Q	0.777 **	0.743 **	0.784 **	0.738 **
	(0.018)	(0.021)	(0.018)	(0.026)
Region * FCF Level	2.290	2.350	2.363	1.856
	(0.438)	(0.415)	(0.415)	(0.524)
Region * Sales Growth	0.479	0.561	0.708	0.838
	(0.711)	(0.657)	(0.590)	(0.522)
Region * ROA	-2.094	-1.545	-1.418	-1.738
	(0.413)	(0.525)	(0.561)	(0.494)
Region * Fixed Assets Ratio	-0.882	-0.573	-0.398	-0.602
	(0.450)	(0.611)	(0.728)	(0.607)
Region * Largest Shareholder	-2.949			
	(0.213)			
Region * Closely Held Shares	-0.647	-1.816		
	(0.725)	(0.240)		
Region * Inside Ownership by D			-3.210	-3.378
			(0.184)	(0.163)
Region * Inside Ownership by ED			0.200	0.221
			(0.930)	(0.923)
Region * Inside Ownership by M			-8.742	-8.000
			(0.514)	(0.549)
Constant	0.769	0.027	-0.017	1.017
	(0.522)	(0.975)	(0.985)	(0.344)
Year dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.113	0.101	0.117	0.117
AIC	481.964	479.190	480.346	480.064
LR Chi^2	50.422	45.197	52.041	52.323

Appendix 16. Robustness check 4: Transactions status

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	0.333	0.371	0.354	0.275	0.341
	(0.587)	(0.532)	(0.552)	(0.646)	(0.575)
Leverage	0.037	0.022	0.022	0.027	0.017
	(0.703)	(0.758)	(0.769)	(0.730)	(0.822)
FCF Volatility	-0.132	-0.210 **	-0.212 **	-0.267 ***	
	(0.366)	(0.028)	(0.027)	(0.007)	
Size	-0.191				-0.275 **
	(0.254)				(0.014)
Tobin's Q	-0.362 **	-0.335 *	-0.335 *	-0.322 *	-0.333 *
	(0.042)	(0.055)	(0.054)	(0.066)	(0.055)
FCF Level	1.290	1.696	1.646	1.527	1.649
	(0.410)	(0.268)	(0.286)	(0.334)	(0.297)
Sales Growth	1.773 ***	1.516 **	1.548 **	1.712 **	1.713 **
	(0.008)	(0.017)	(0.015)	(0.012)	(0.012)
ROA	0.861	0.179	0.239	0.304	0.754
	(0.544)	(0.895)	(0.860)	(0.825)	(0.590)
Fixed Assets Ratio	0.674	0.771	0.735	1.008	1.169
	(0.344)	(0.255)	(0.281)	(0.152)	(0.101)
Largest Shareholder	-0.932	-2.027 **			
	(0.324)	(0.022)			
Largest Shareholder * Inv. Mgmt.				5.365 *	5.030 *
				(0.051)	(0.065)
Largest Shareholder * Insider				-2.026	-2.163 *
				(0.116)	(0.095)
Largest Shareholder * Corp.				-2.285 **	-2.150 *
				(0.041)	(0.052)
Top 3 Holders			-1.728 **		
			(0.010)		
Closely Held Shares	-2.865 ***				
	(0.004)				
Constant	1.280	0.189	0.338	-0.186	0.664
	(0.209)	(0.820)	(0.686)	(0.827)	(0.473)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
N	292	292	292	292	292
Pseudo R^2	0.138	0.115	0.119	0.143	0.140
AIC	442.787	448.181	446.735	440.974	442.176
LR Chi^2	56.011	46.617	48.063	57.823	56.622

Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	0.333	0.214	0.231	0.335
	(0.587)	(0.721)	(0.701)	(0.584)
Leverage	0.037	0.037	0.023	0.013
	(0.703)	(0.696)	(0.800)	(0.880)
FCF Volatility	-0.132	-0.265 ***	-0.265 ***	
	(0.366)	(0.007)	(0.008)	
Size	-0.191			-0.303 ***
	(0.254)			(0.007)
Tobin's Q	-0.362 **	-0.344 *	-0.361 **	-0.376 **
	(0.042)	(0.053)	(0.046)	(0.036)
FCF Level	1.290	1.202	1.535	1.717
	(0.410)	(0.440)	(0.327)	(0.276)
Sales Growth	1.773 ***	1.789 ***	1.894 ***	1.902 ***
	(0.008)	(0.007)	(0.005)	(0.005)
ROA	0.861	0.470	0.191	0.720
	(0.544)	(0.732)	(0.890)	(0.611)
Fixed Assets Ratio	0.674	0.522	0.600	0.817
	0.344	(0.454)	(0.395)	(0.254)
Largest Shareholder	-0.932			
	(0.324)			
Closely Held Shares	-2.865 ***	-3.062 ***		
	(0.004)	(0.001)		
Inside Ownership by Directors			-4.261 ***	-4.345 ***
			(0.002)	(0.001)
Inside Ownership by Ex. Directors			-2.028	-2.084
			(0.118)	(0.110)
Inside Ownership by Managers			-0.374	-1.091
			(0.944)	(0.837)
Constant	1.280	0.663	0.634	1.569 *
	(0.209)	(0.437)	(0.456)	(0.097)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
N	292	292	292	292
Pseudo R^2	0.138	0.132	0.136	0.136
AIC	442.787	441.223	443.831	443.595
LR Chi^2	56.011	53.575	54.966	55.203

Appendix 17. Robustness check 5: Sector

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	-0.220	-0.078	-0.079	-0.113	-0.106
	(0.675)	(0.877)	(0.876)	(0.823)	(0.835)
Leverage	-0.001	0.001	-0.003	0.007	0.000
	(0.986)	(0.988)	(0.963)	(0.912)	(0.995)
FCF Volatility	-0.119	-0.156 *	-0.156 *	-0.210 **	
	(0.392)	(0.078)	(0.079)	(0.023)	
Size	-0.132				-0.197 *
	(0.413)				(0.057)
Tobin's Q	-0.248	-0.227	-0.228	-0.211	-0.224
	(0.103)	(0.127)	(0.123)	(0.159)	(0.132)
FCF Level	1.163	1.271	1.293	1.227	1.247
	(0.444)	(0.394)	(0.388)	(0.419)	(0.409)
Sales Growth	1.474 **	1.265 **	1.304 **	1.406 **	1.431 **
	(0.021)	(0.038)	(0.034)	(0.031)	(0.028)
ROA	-0.795	-1.040	-1.037	-1.073	-0.719
	(0.401)	(0.237)	(0.237)	(0.224)	(0.435)
Fixed Assets Ratio	0.862	0.950	0.948	1.164 *	1.261 *
	(0.211)	(0.154)	(0.156)	(0.087)	(0.067)
Largest Shareholder	-1.082	-2.345 ***			
	(0.271)	(0.009)			
Largest Shareholder * Inv. Mgmt.				3.802	3.578
				(0.140)	(0.163)
Largest Shareholder * Insider				-2.260 *	-2.373 *
				(0.085)	(0.072)
Largest Shareholder * Corp.				-2.848 **	-2.693 **
				(0.013)	(0.017)
Top 3 Holders			-1.768 ***		
			(0.008)		
Closely Held Shares	-2.800 ***				
	(0.004)				
Constant	1.037	0.060	0.198	-0.289	0.312
	(0.288)	(0.940)	(0.804)	(0.725)	(0.722)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
N	296	296	296	296	296
Pseudo R^2	0.118	0.097	0.097	0.122	0.118
AIC	447.763	452.737	452.442	446.239	447.869
LR Chi^2	48.580	39.606	39.901	50.104	48.474

Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	-0.220	-0.257	-0.254	-0.214
	(0.675)	(0.619)	(0.626)	(0.685)
Leverage	-0.001	-0.003	-0.017	-0.021
	(0.986)	(0.963)	(0.807)	(0.762)
FCF Volatility	-0.119	-0.217 **	-0.218 **	
	(0.392)	(0.018)	(0.020)	
Size	-0.132			-0.242 **
	(0.413)			(0.023)
Tobin's Q	-0.248	-0.240	-0.267 *	-0.287 *
	(0.103)	(0.112)	(0.083)	(0.061)
FCF Level	1.163	1.149	1.449	1.521
	(0.444)	(0.448)	(0.343)	(0.320)
Sales Growth	1.474 **	1.490 **	1.650 **	1.692 **
	(0.021)	(0.019)	(0.012)	(0.010)
ROA	-0.795	-1.071	-1.276	-0.826
	(0.401)	(0.226)	(0.154)	(0.377)
Fixed Assets Ratio	0.862	0.777	0.865	1.030
	(0.211)	(0.251)	(0.208)	(0.139)
Largest Shareholder	-1.082			
	(0.271)			
Closely Held Shares	-2.800 ***	-3.089 ***		
	(0.004)	(0.000)		
Inside Ownership by Directors			-4.733 ***	-4.822 ***
			(0.000)	(0.000)
Inside Ownership by Ex. Directors			-1.823	-1.915
			(0.144)	(0.127)
Inside Ownership by Managers			0.550	-0.050
			(0.916)	(0.992)
Constant	1.037	0.629	0.559	1.293
	(0.288)	(0.442)	(0.497)	(0.153)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
N	296	296	296	296
Pseudo R^2	0.118	0.113	0.122	0.121
AIC	447.763	445.886	446.374	446.619
LR Chi^2	48.580	46.457	49.969	49.724

Appendix 18. Robustness check 6: Robust standard errors

Largest shareholders, ownership concentration and types of largest shareholders					
Variables	Model 0A	Model 1A	Model 1B	Model 1C	Model 1D
Stock Volume	-0.156	-0.075	-0.083	-0.117	-0.080
	(0.799)	(0.891)	(0.882)	(0.828)	(0.886)
Leverage	0.009	0.005	0.003	0.010	0.006
	(0.863)	(0.901)	(0.944)	(0.810)	(0.885)
FCF Volatility	-0.064	-0.137	-0.138	-0.186 **	
	(0.616)	(0.110)	(0.110)	(0.029)	
Size	-0.180				-0.201 *
	(0.247)				(0.051)
Tobin's Q	-0.212	-0.187	-0.188	-0.170	-0.187
	(0.149)	(0.189)	(0.183)	(0.239)	(0.185)
FCF Level	1.328	1.586	1.581	1.533	1.545
	(0.347)	(0.243)	(0.247)	(0.262)	(0.257)
Sales Growth	1.680 **	1.416 **	1.457 **	1.586 **	1.594 **
	(0.011)	(0.023)	(0.021)	(0.014)	(0.012)
ROA	-0.696	-1.043	-1.055	-1.052	-0.678
	(0.453)	(0.209)	(0.208)	(0.204)	(0.425)
Fixed Assets Ratio	1.144 *	1.182 *	1.176 *	1.309 *	1.418 **
	(0.096)	(0.077)	(0.082)	(0.053)	(0.036)
Largest Shareholder	-0.760	-1.893 **			
	(0.438)	(0.044)			
Largest Shareholder * Inv. Mgmt.				4.513 *	4.369 *
				(0.075)	(0.082)
Largest Shareholder * Insider				-2.064 *	-2.169 *
				(0.080)	(0.065)
Largest Shareholder * Corporation				-2.014 *	-1.918
				(0.098)	(0.110)
Top 3 Holders			-1.560 **		
			(0.016)		
Closely Held Shares	-2.765 ***				
	(0.002)				
Constant	0.827	-0.255	-0.134	-0.545	0.075
	(0.424)	(0.770)	(0.878)	(0.525)	(0.935)
Country dummies	YES	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES	YES
N	322	322	322	322	322
Pseudo R^2	0.118	0.095	0.097	0.119	0.118
AIC	487.558	494.143	493.058	487.484	487.76
Wald Chi^2	50.121	37.144	39.205	48.379	51.244

Inside ownership and types of inside owners				
Variables	Model 0A	Model 2A	Model 2B	Model 2C
Stock Volume	-0.156	-0.222	-0.226	-0.163
	(0.799)	(0.699)	(0.698)	(0.791)
Leverage	0.009	0.006	-0.005	-0.008
	(0.863)	(0.902)	(0.911)	(0.866)
FCF Volatility	-0.064	-0.191 **	-0.194 **	
	(0.616)	(0.033)	(0.035)	
Size	-0.180			-0.237 **
	(0.247)			(0.030)
Tobin's Q	-0.212	-0.197	-0.221	-0.243 *
	(0.149)	(0.177)	(0.142)	(0.098)
FCF Level	1.328	1.342	1.613	1.661
	(0.347)	(0.340)	(0.256)	(0.246)
Sales Growth	1.680 **	1.687 **	1.824 ***	1.840 ***
	(0.011)	(0.012)	(0.009)	(0.007)
ROA	-0.696	-1.077	-1.274	-0.818
	(0.453)	(0.209)	(0.133)	(0.350)
Fixed Assets Ratio	1.144 *	1.025	1.082	1.239 *
	(0.096)	(0.130)	(0.122)	(0.079)
Largest Shareholder	-0.760			
	(0.438)			
Closely Held Shares	-2.765 ***	-2.877 ***		
	(0.002)	(0.000)		
Inside Ownership by Directors			-4.468 ***	-4.574 ***
			(0.001)	(0.001)
Inside Ownership by Ex. Directors			-1.929 *	-2.032 *
			(0.092)	(0.077)
Inside Ownership by Managers			1.831	1.207
			(0.708)	(0.804)
Constant	0.827	0.248	0.198	0.937
	(0.424)	(0.776)	(0.823)	(0.331)
Country dummies	YES	YES	YES	YES
Sector dummies	YES	YES	YES	YES
Year dummies	YES	YES	YES	YES
N	322	322	322	322
Pseudo R^2	0.118	0.113	0.121	0.123
AIC	487.558	485.805	486.245	485.390
Wald Chi^2	50.121	48.003	48.257	48.381