Short- versus long-termism in private equity buyouts: Evidence from the Netherlands

Author:

F. J. van Beek

Tilburg University

Supervisor:

Prof. dr. H.A. Benink

Tilburg University

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Abstract:

This paper examines the effects of private equity buyouts on long-term investment and the probability of bankruptcy for a sample of 107 buyouts in the Netherlands between 1999 and 2012. Long-term investment in target companies post-buyout neither increases nor decreases, while the probability of bankruptcy post-buyout is higher for target companies compared to a control group. The effect on the probability of bankruptcy is larger for management buyouts compared to regular buyouts, and also larger for targets of private equity funds compared to independent private equity firms.

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1. Introduction

The past financial crisis encompassed a large public outcry over the excesses of the financial sector. Policy makers face a difficult challenge stimulating growth in struggling economies, while imposing a strict regulatory framework on financial institutions to curb its negative externalities. The financial services industry as a whole has come under heightened scrutiny with Private Equity (PE) as an intricate part (EVCA, 2009). PE receives high returns and has seen tremendous growth since the mid-1990s as a result (Guo, Hotchkiss & Song, 2011; Gompers, Kaplan & Mukharlyamov, 2016). There is a long-standing controversy however if these high returns are due to value creation or mere transfers of wealth (Cumming, Siegel & Wright, 2007). These wealth transfers can come from stakeholders[1] or from a focus on short-term profits at the expense of long-term value (Harford & Kolasinski, 2013). The alleged short-termism of private equity is also frequently treated in politics[2] and the financial press (e.g. van Lieshout, 2016; and Kosterman, 2015), which give rise to popular terms such as 'cowboys' and 'locusts' to define the perceived greediness of private equity and the harm that is being done to society.

The debate centers around leveraged buyouts (LBOs), where PE firms use high amounts of debt secured against the target firm's assets and future cash flows to facilitate a transaction (Amess, Stiebale & Wright, 2016). Proponents argue that LBOs realign managerial incentives by improved equity compensation, increase monitoring due to concentrated ownership stakes and decrease investments in negative Net Present Value (NPV) projects by servicing higher levels of debt (Jensen, 1986; Jensen, 1989). In contrast, critics suggest PE's focus on short-term profits limits long-term investments while high debt levels in LBOs make companies in their portfolio (henceforth portfolio companies) vulnerable to distress (Rappaport, 1990; Long & Ravenscraft 1993; Kaplan & Stein, 1993).

A recent and growing body of research (e.g. Boucly et al., 2011; Amess et al., 2016) points towards a special role of private equity in alleviating financing constraints on portfolio companies. This long-termism view argues that an important value driver of private equity is creating growth in underdeveloped and credit-constrained firms. Alternatively, the short-termism view argues that the high returns to private equity investors are at least partly due to wealth transfers from stakeholders and long-term value. The relevance of this study lies in the fact that mere transfers of wealth are not beneficial to society, only value creation is. Therefore, recognizing these possible transfers of wealth

[1] Several possible wealth transfers are favorable tax treatment of corporate debt, favoritism of senior executives in accepting deals that adversely affect shareholders, or abrogating explicit and implicit contracts with employees (Schleifer & Summers 1988; Lerner, Sorensen & Strömberg, 2011; Harford & Kolasinski, 2013).
[2] See for example Nijboer (2015) and his twelve-step initiative to 'make an end to the excesses in private equity'.

is the first step into solving a wider societal problem, if there is of course such a problem. Furthermore, specific research regarding the investment horizon of private equity in the Netherlands is at most scarce. Therefore, the goal of this paper is to contribute to the wider debate regarding the effects of private equity buyouts and substantiating research on this topic in the Netherlands. In accordance with this goal, the research question will be the following: *Is private equity in the Netherlands short- or long-term oriented?*

The research question will be answered by testing empirically the implications of both the short-termism and the long-termism view. In respect to the short-termism view; long-term investment in target companies is said to decrease post-buyout in order to boost short-term performance (Harford & Kolasinski, 2013). In addition, higher leverage and reduced financial flexibility increases the probability of bankruptcy post-buyout (Kaplan & Stein, 1993). In respect to the long-termism view; private equity increases long-term investment in financially constrained firms (Boucly et al., 2011). Both implications of short-termism are basically variants of wealth transfers. Sacrificing long-term investments transfers wealth from future payouts to the present, while an increase in default rates transfers value from the 'financial system' (Tykvová & Borell, 2012; Harford & Kolasinski, 2013). In this sense, an LBO can be seen as a risky bet, where the PE sponsors benefit when it pays off, while the debtholders bear the largest burden when the deal turns sour.

Several researchers (e.g. Ughetto, 2010; Wilson and Wright, 2011) also point towards significant differences between private equity firms and transaction types such as regular buyouts and management buyouts (MBO's). For example, Ughetto (2010) found private equity firms that were not affiliated with financial institutions, to significantly decrease long-term investment, while Wilson and Wright (2011) found MBO's to decrease the probability of bankruptcy in comparison to regular buyouts. In order to expand research into the heterogeneity of private equity in both firm and transaction characteristics, both regular buyouts and MBO's, and independent PE firms and PE funds are examined.

The remainder of this thesis is organized as follows; section (2) reviews the existing literature to help explain how PE affect portfolio companies and the empirical results that stem from this research. Sections (3) and (4) discuss data and methodology respectively, followed by results (5), discussion (6) and the conclusion (7) of this paper.

2. Literature

Research on the effects of private equity buyouts has been largely conducted in the US and the UK. Especially the earlier body of research is concentrated in the US due to the emergence and subsequent boom of LBOs in the 1980s (Kaplan & Strömberg, 2009). This early body of research (e.g. Jensen 1989; Kaplan, 1989a; Kaplan 1989b) mainly focused on the organizational reforms and the consequential changes in enterprise value and its beneficiaries. The crash of the junk bond market and the subsequent default of high profile LBOs also gave rise to its critics (e.g. Rappaport, 1990; Long & Ravenscraft 1993). European (except UK) LBO transaction value as a percentage of total worldwide transaction value went from 3% during 1985-1989 to 32% in the period 2000-2004 (Kaplan & Strömberg, 2009). Not surprisingly, interest from academia (e.g. Renneboog, Scholes, Simons & Wright, 2005; Popov & Roosenboom, 2009) in the European LBO market came primarily in the early 2000s and onwards. However, specific research on the Netherlands related to LBOs is still relatively scarce. Papers (e.g. Popov & Roosenboom, 2009; Ughetto, 2010) that use European data mostly include the Netherlands in their sample as well, but it is not their focal point. In addition to being geographically diverse, researchers also use different types of private equity such as venture capital, and different transactions such as management buyouts in their analysis. The next section will therefore first introduce private equity and its different transaction types. This is followed by a literature review of the effects of LBOs on (1) long-term investment and (2) the probability of bankruptcy.

2.1 Private equity

In its most basic form, private equity is an asset class consisting of equity securities and debt in companies not quoted on a public exchange (Baker, Filbeck & Kiymaz, 2015). Private equity is an umbrella term for different kinds of private risk capital such as Venture Capital (VC), buyout funds and mezzanine capital (Metrick & Yasuda, 2010; Baker et al., 2015). Mezzanine capital refers to subordinated debt or preferred equity securities that is the most junior part of a company's liabilities, while being the most senior part of common equity (Baker et al., 2015). Venture Capital (VC) is distinct in the way that it invests in young or emerging businesses via different financing cycles such as seed financing, start-up financing and later stage financing (Freear & Wetzel, 1990). Hence, many scholars[3] refer to private equity when the private investment firm invests in more mature companies,

[3] See for example Ughetto (2010). In her research, she excludes venture capital from her sample while continuing to refer to private equity in general for simplicity. This paper will follow the same approach.

while referring to venture capital specifically when the investment firm invests in relatively young firms.

Private equity provides financing for a variety of goals such as bridge capital, growth capital, rescue capital, etc. with various transactions types such as the (leveraged) buyout, Management Buy In (MBI) and Management Buy Out (MBO). A buyout refers to PE or VC gaining a controlling stake in a target company. The MBI and MBO are different kinds of buyouts where respectively the outside and incumbent management gains a controlling stake in the target company adjacent to the private equity sponsor. A common feature of private equity buyouts is the use of leverage in their financial structure, which is why they are mostly referred to as leveraged buyouts (Davis, Haltiwanger, Jarmin, Lerner & Miranda, 2011). VC rarely carries out LBOs since the investment composition is mostly equity and they usually do not gain majority control (Kaplan & Strömberg, 2009). Therefore, research on venture capital is excluded from this paper or explicitly mentioned when referred to. Important to note is that research on private equity uses several definitions when referring to a leveraged buyout. The distinction lies mostly in the amount of leverage a private equity firm uses. Some (e.g. Kaplan & Strömberg, 2009) define the amount of leverage in an LBO as using a relatively small portion of equity and a relatively large portion of outside debt, which would mean a debt to equity ratio of at least 50%. This paper adopts the definition from Bertoni, Le Nadant and Perdreau (2014), in which a leveraged buyout is a private equity acquisition that facilitates increased leverage to finance the transaction in comparison to the initial leverage ratio of the target at buyout. This definition is used in order to increase the scope of this research and because the amount of leverage used in an LBO varies widely across transactions and time. This difference in leverage across transactions and time is due to for example debt market conditions, but also due to differences in collateral and cash flow generation (Axelson, Jenkinson, Strömberg & Weisbach; Baker et al., 2015). Abundant supply of debt financing in the late 1980's allowed for debt to equity ratios in excess of 90 percent, while tight market conditions after the recent Global Financial Crisis (GFC) led to median leverage ratios of around 54% (Axelson et al., 2015). More recent debt to equity ratios increased steadily to around 65% of total transaction value (Baker et al., 2015).

Private equity firms conduct an enormous amount of deals in both size and quantity. From January 2005 to June 2007, CapitalIQ recorded a total of 5188 buyout transactions worldwide amounting to a combined enterprise value of over $1.6 trillion, where the US contributed about half of that (Axelson, Strömberg & Weisbach, 2009). During this time, private equity was responsible for about one-quarter of all global merger and acquisition (M&A) activity (Metrick & Yasuda, 2010). In Europe, the private

equity industry invested slightly under 75 billion euro in 2007, of which 79% was allocated to buyouts (Ughetto, 2010). According to the statistics of the 'Nederlandse Vereniging van Participatiemaatschappijen'[4], around 1400 businesses in the Netherlands have a private equity firm as a shareholder, which accounts for about 14% of the gross domestic product and around 380,000 jobs.

Large private equity investments are made by funds that raise equity at inception and raise additional external capital when executing transactions (Axelson et al., 2009). When there are sufficient quality assets in the target company to serve as collateral, debt is preferred since it transfers risk to the debtholder and is generally less costly. Private equity funds are usually organized as limited partnerships, in which the limited partners such as large institutional investors and wealthy individuals provide most of the capital, while the general partners make the investment decisions (Metrick & Yasuda, 2010). In the case of VC, when the investments mostly cannot be collateralized, the additional capital is raised as equity from syndication partners.

The general partners receive a mixture of constant and variable payment components, which are defined at the fund's inception. The fixed component resembles the pricing term of mutual-fund like services and accounts for around two thirds of the total revenue to managers (Metrick and Yasuda, 2010). The variable component is in the form of a significant portion of the profits (around 20%) once the hurdle rate is crossed (around 8 to 12%) to provide the general partners with an incentive to maximize profits of the fund (Axelson et al., 2009; Baker et al., 2015).

Private equity funds exist for around 10 years, while successful PE firms stay in business by raising a new fund every three to five years. Limited partners actively seek out general partners that perform well which in turn raise their compensation, fund size or both (Metrick & Yasuda, 2010).
The top ten funds by size raised on average $10 billion, with J. P. Morgan Strategic Property Fund being the largest with $23 billion under control (Baker et al., 2015).

2.2 Value creation

An LBO is conducted with the purpose of generating returns for their PE investors (Baker et al. 2015). This goal can be accomplished by: (1) Restructuring the business in order to create economic value and (2) recapitalizing the portfolio company (Baker et al., 2015). Restructuring the business involves both changing corporate governance to reduce agency costs and engineering operations in order to

[4] 'The Dutch association of private equity'. The PE statistics from the NVP can be found on the following website: http://www.nvp.nl/pagina/wat_is_private_equity/#!lang=en

increase turnover or cash flows. Restructuring operations aims at increasing productivity, which often includes divesting unprofitable product lines and reducing overhead by laying off workers (Baker et al., 2015). Evidence on the effect of an LBO on employment is mixed; Amess and Wright (2007) find an overall negative effect of an LBO on both employment and wage growth. Davis et al. (2011) find a decrease in employment but also that PE adds jobs at an increasing rate in newly opened establishments. Boucly et al. (2011) find a positive effect of an LBO on employment which is strongest in private-to-private transactions. Evidence on growth in target companies post-buyout is similarly mixed; Wiersema and Liebeskind (1995) find a decrease in terms of sales and number of divisions, while Boucly et al. (2011) find an increase in sales overall, which is strongest in private-to-private transactions.

Change in governance structures aims at aligning the interests of managers with those of PE investors by for example awarding them with ownership stakes in the firm. Bruton, Keels and Scifres (2002) found higher performance among public-to-private transactions with increased managerial ownership, which persisted even after the firm went public again. PE also monitors management actively by claiming board seats for their general partners to oversee managers and their actions (Baker et al., 2015). Portfolio company boards are also smaller in size, meet more frequently and are replaced more frequently when performing poorly (Kaplan & Strömberg, 2009).

The leverage structure in an LBO creates value mostly twofold: (1) interest payments are tax deductible, which results in higher cash flows and therefore higher enterprise value, (2) by paying down debt, the equity stake increases in value over time, similar to a mortgage when financing real estate (Baker et al., 2015). The downside of financing with high levels of debt is increased financial risk, which will be treated more in detail in section 2.4.

2.3 Long-term investment

The LBO sprang up as an important phenomenon in the 1980s and was characterized by large public-to-private transactions in mature industries such as retail and manufacturing (Kaplan & Strömberg, 2009). The LBO organization with its highly concentrated ownership, active governance by PE's management professionals and highly levered structures, stood in stark contrast with the diluted ownership, weak corporate governance and low leverage of public corporations. These features of LBOs enable managers to make long-term investments without having to pander to the demand of public markets by steadily growing quarterly profits, which as Stein (1988) argues can myopically decrease long-term investments (Lerner et al., 2011). In his iconic paper, Jensen (1989) even predicted the 'eclipse' of the public corporation and the LBO as becoming the dominant form of

corporate organization. The prediction of Jensen (1989) turned out to be premature as the junk bond market collapsed only shortly afterwards (Kaplan & Strömberg, 2009). In addition, Rappaport (1990) came in defense of the public corporation. Although Rappaport (1990) was critical to the public corporation himself, he deemed the LBO organization having severe limitations to become the dominant corporate organizational form. Most limited partnership agreements provide a five-year period in which to invest the funds and a ten-year duration of the partnership itself. In addition, providers of mezzanine debt, which amounts to a significant portion of total capital provided, demand assurance of a feasible exit strategy that will yield a reasonable return. Therefore, Rappaport (1990) argues that LBO sponsors race to generate cash flows from operations and divestures to pay off debt towards pre-buyout levels. Furthermore, the massive amounts of debt impose real cost on business strategy and limits flexibility (Rappaport, 1990). Even Jensen (1989) acknowledged that LBOs run into financial trouble more frequently. These concerns about the short-term investment horizon of PE and the reduced financial flexibility are central to the debate on the 'real' economic consequences of LBOs (Cumming et al., 2007). This chapter will introduce the empirical research on long-term investment, discuss the results and elaborates further on how PE affect long-term investment in its portfolio companies.

Research on the effects of private equity on portfolio companies study a variety of investment metrics. Early studies (e.g. Lichtenberg and Siegel, 1990; Long & Ravenscraft, 1993) use R&D intensity, defined as R&D expenditures over sales. R&D expenses are used since these are immediate outgoing cash flows and are unlikely to produce any benefits for several years (Lerner et al., 2011). R&D expenses are then divided by sales to account for division acquisitions or divestures in order to get a better estimation of the effect of the LBO on long-term investments. However, Lerner et al. (2011) pose a significant impairment when using this proxy. R&D expenditures do not equal innovative output, which means that R&D expenses could be mismanaged or ill invested. Organizational change imposed by private equity could therefore positively affect innovative output without having to increase R&D investments. Therefore, some studies (e.g. Popov and Roosenboom, 2009; Ughetto 2010; Lerner et al. 2011) use patenting activity as a proxy for innovative output when assessing the impact of private equity on long-term investment. Patenting activity has an additional benefit since it is observable for both private and public companies, which would normally restrict available information regarding private equity transactions. A limitation on using patents is that not every innovation is patented (Ughetto, 2010). Still, patenting usually links to product innovation, which requires consistent investments and organizational commitment, and is therefore a generally accepted proxy for innovative output. The use of patents as a tool to protect innovations is mostly

limited to larger companies and the propensity to patent varies by industry (Ughetto, 2010). Research on LBOs of relatively small LBOs as in Boucly et al. (2011) would be severely limited when only focusing on patenting activity. Therefore, Boucly et al. (2011) use capital expenditures since these are long-term investments in capital goods and are readily available in financial statement databases.

An early study by Lichtenberg and Siegel (1990) found a negative but statistically insignificant effect of LBOs on R&D intensity. The study focused on US LBOs between 1978 to 1986, but was only able to assess the effect of LBOs on R&D investments on a smaller subset (48) and only the relatively short-term (2 years) effect. Furthermore, Long and Ravenscraft (1993) comment that the dataset used by Lichtenberg and Siegel (1990) was contaminated with substituted values, data errors and a survivorship bias. Long and Ravenscraft (1993) found a statistically significant negative effect of LBOs on R&D intensity for a sample of 72 US LBOs. They concluded that portfolio companies have a significantly lower R&D intensity prior to the buyout and attribute this to the avoidance of PE in industries with high R&D intensity. Furthermore, R&D intensity post-buyout lowers to around half of pre-buyout. However, the negative effect on R&D intensity post-buyout declines for larger firms and even switches for firms with size larger than 1.5 standard deviations in their sample. Most studies on patenting activity contrast with Long and Ravenscraft (1993) and find largely positive results. Lerner et al. (2011) find no evidence for deterioration in either the level of patenting or by patent 'originality' or 'generality', which are measures of patent importance. 'Originality' refers to patents that cite other patents in a broader group of technology classes and 'generality' refers to the patents that are themselves cited by a more technologically dispersed array of patents. However, Lerner et al. (2011) comment that they cannot formally distinguish whether private equity causes this change or if private equity actively seeks for firms that have room for improvement on innovative activity. They attribute this to the absence of an instrumental variable, which would resolve if the effect is causation or mere correlation. From the blue chip nature of most of the firms, such as Seagate Technologies in their case study, can be inferred that private equity companies most likely do not consider the innovative capacity in their investment decisions for these firms. Therefore, the case that private equity ownership actually enhances innovative output is most likely in the research of Lerner et al. (2011). Popov and Roosenboom (2009) find similar significant positive effects for a smaller panel of 18 European countries. In contrast to the research of Lerner et al (2011), whose research was only conducted in the US, Popov and Roosenboom (2009) use a cross-country environment that has the advantage of being able to control for other determinants of innovative activity such as government financed R&D, human capital, Gross Domestic Product (GDP), and patent

protection. Following a private equity investment, the number of successful patents increases significantly, however the amount of applications does not. This means that a private equity investment only increases the amount of innovative output in terms of ultimately successful applications rather than increasing the sheer number of applications. In addition to studying the effect of LBOs on long-term investment, Boucly et al. (2011) make a distinction between private-to-private and public-to-private transactions for a sample of 839 French deals. Boucly et al. (2011) find a significant increase in capital expenditures post-buyout for private-to-private deals while a weakly significant (10% level) decrease of capital expenditures for public-to-private deals. In addition, the effect increases for smaller firms and firms more dependent on external finance. Therefore, Boucly et al. (2011) argue that private equity relaxes financial constraints of its portfolio companies for especially smaller, private companies that rely on external finance. France has many family-managed businesses, which could lack the financial and managerial expertise to optimally benefit from growth opportunities. Private equity could help them take advantage of those opportunities by directly financing them, but also by increasing the portfolio company's debt capacity. PE brings financial expertise and connections to financial institutions that could increase the amount of debt the portfolio company could attract. Private equity firms may also be more patient than families, since they need dividends to consume. In addition, capital gains are taxed less than dividends, which give private equity firms an incentive to reinvest their earnings instead of paying out dividends. Amess et al. (2016) find similar results to Boucly et al. (2011) while focusing on patenting activity instead of capital expenditures. Amess et al. (2016) find for a sample of 407 UK LBOs, an increase in patenting activity that is concentrated among private-to-private transactions and financially constrained firms. Harford and Kolasinski (2013) find for a smaller subsample of 216 companies (from originally 877) US public-to-private LBOs neither an increase nor a decrease in bot capital expenditures and financial constraints post-buyout. Boucly et al. (2011) and Amess et al. (2016) found similar results as Harford and Kolasinski (2013) in their subsamples of public-to-private transactions.

Previous research treated private equity firms largely as a homogenous group. In contrast, Ughetto (2010) uses a comprehensive sample of 681 deals spreading over 10 European countries to determine the effect of private equity characteristics on patenting activity. Private equity firms that are affiliates of financial institutions show a positive effect on granted patents while independent private equity firms show the opposite. Ughetto (2010) attributes this to independent PE being profit maximizing in the shortest possible time and therefore rather reluctant to invest in uncertain long-term projects. In contrast, affiliates of financial institutions have less pressure to realize capital gains and have easier access to additional funding from their affiliate when needed. The number of

companies in a portfolio has a positive effect and Ughetto (2010) attributes this to economies of scale in innovation activity. The localization of the private equity company in relation to the target company has a negative effect when in the same country and when out of the European Union (EU). This could be due to cultural barriers when investors are non-EU and a closer monitoring of the portfolio company when close in geographical terms. When the equity stake of the investor falls into the highest quintile of the dataset, it is shown that it has a positive effect on both the frequency and probability of granted patents. The research of Ughetto (2010) does not show a general result of the effect of private equity on innovative activity since it makes no overall distinction between pre and post-buyout innovative activity. It does point to a significant heterogeneity of private equity firms and the effect it has on the innovative activity on its portfolio companies.

2.3 Bankruptcy

The private equity model aims at maximizing returns for their investors. Amassing large amounts of debt on their portfolio companies enables utilization of tax shields and magnify return on investment. In addition, interest and principal payments directly decrease the available amount of free cash flow that is available to the manager and is therefore forced to manage cash flow more efficiently by not wasting it on negative NPV projects (Jensen, 1986). However, massive amounts of debt may create problems in servicing debt, especially if cash flow projections are not met and predicated asset sales are not completed (Wilson, Wright, Siegel & Scholes, 2012). Hence, high levels of debt impose real cost on business strategy, limits flexibility and increases bankruptcy risk (Rappaport, 1990). This section will review the empirical research on LBO defaults and discuss how private equity affects financial risk of its portfolio companies.

An early study by Kaplan and Stein (1993) on a sample of 124 US LBOs found that high leverage, overpriced buyouts and poorly designed capital structures caused defaults in the late 1980s. This was mainly due to the surge of the junk bond market in the late 80s, which gave investors the funding to chase too few good deals that left many transactions overpriced and recklessly structured (Chancellor, 1999; Cotter & Peck, 2001). The massive use of junk bonds exacerbated the problem since these were less likely to have restrictive covenants compared to private or senior bank loans. Moreover, public debtholders were less likely to monitor the LBO companies' management, which incentivized them to take bigger risks and transfer value from bondholders to equity holders (Cotter & Peck, 2001).

Opler (1993) points to the special role of private equity in an LBO, which can reduce the cost of debt and financial distress in its portfolio companies. Opler (1993) examines a sample of 63 LBOs of which some were financed and executed by incumbent management. He primarily shows differences

in financing methods and covenants. One of the examples that is given is strip financing, in which equity and debt are hold by the same parties to minimize conflicts between stakeholders. Another example is covenants that require excess cash flow to be paid to debt holders and provisions that defer interest payments in periods of economic stress. These covenants and provisions reduce incentive problems and therefore financial distress risk. Halpern, Kieschnick and Rotenberg (2009) argue that governance of private equity could also play a part in distress risk of LBO targets. Halpern et al. (2009) examined a sample of Highly Levered Transactions (HLT) during 1985 and 1990 to distinguish between HLT's carried out by private equity and a company's own management. This way, Halpern et al. (2009) are able to examine the relative marginal contribution of control changes and debt composition. First, they found more changes in corporate governance and managerial incentives in private equity transactions. For example, equity stakes of management in LBOs increased significantly while they went unchanged in levered recapitalizations. Second, Halpern et al. (2009) found the bankruptcy risk of a firm post-HLT to be similar for private equity and management led transactions. Hence, Halpern et al. (2009) found private equity neither improving nor decreasing the probability of bankruptcy. Finally, they found debt composition to be a more significant factor than governance changes in explaining bankruptcy risk post-HLT. Tykvová and Borell (2012) examined the impact of private equity involvement on distress risk[5] and default rates for a sample of mostly private European companies between 2000 and 2008. They found that private equity investors selected companies with lower distress risk, which increased significantly post-buyout and decreased again to non-buyout levels within three years. Tykvová and Borell (2012) did not find that the initial increased distress risk led to higher bankruptcy rates, even for buyouts done in times with lower interest rates. Deals done by experienced private equity investors lowered the probability of bankruptcy, while deals done by PE syndicates were able to handle financial distress better. Wilson and Wright (2013) examined a very large sample of 25,484 buyouts between 1995 and 2010 in the UK and found a higher failure rate for buyouts (5,7%) than for non-buyout companies (5.3%). MBOs only had a higher insolvency risk before 2003, while MBI's always had a higher insolvency risk. MBIs carry greater risk since the management comes from the 'outside' and do not have insider information as in the case of an MBO. Incumbent management may proactively engage in an MBO due to their superior knowledge of future prospects. However, the incumbent management could also be overconfident in the assessment of their competences, skills and potential gains, which may lead to entrenchment and a lack of action towards the viability of the firm. Wilson and Wright (2013)

[5] Tykvová & Borell (2012) use several approaches such as the Altman Z-score and the Zmijewski-score to measure distress risk.

also found that default risk is associated with higher leverage, but more specifically with the capacity to service debt. Using data from CapitalIQ between 1970 and 2002, Kaplan and Strömberg (2009) found an overall bankruptcy rate of 7 percent for portfolio companies worldwide. The 7 percent bankruptcy rate translates to an annual default rate of 1.2 percent assuming an average holding period of six years. Comparing the 1.2 percent annual default rate to the 1.6 percent reported from Moody's for all US corporate bond issuers from 1980-2002, one would conclude a lower bankruptcy rate for portfolio companies. However, Kaplan and Strömberg (2009) report an important caveat when using the data from CapitalIQ since a large portion of exits (11%) is marked as unknown.

A common short-termism claim is that private equity issues debt to pay itself special dividends (Tykvová & Borell, 2012). Harford and Kolasinski (2013) test whether these special dividends are associated with higher bankruptcy probabilities on a comprehensive sample of 877 U.S buyouts by private equity. Harford and Kolasinski (2013) define a special dividend as one that amounts to 20% of the portfolio company's equity or when there is any kind of dividend when the portfolio company has negative equity. They find that special dividends from the portfolio company to the sponsor only occurs in 23% of the deals and do not increase the probability of bankruptcy on average. To the contrary, they find that a special dividend is actually associated with a decrease in its probability of default. However, Harford and Kolasinski (2013) do not make it clear whether the decreased probability of bankruptcy is due to the special dividend or that it is due to certain characteristics of the group of firms itself. For example, a subset of superior firms could give out a special dividend and still have a lower probability of default when compared to the inferior group of firms. There is, albeit weak, a positive association in a smaller subset of cases where the dividend payer's operating margin underperforms to the industry average. Harford and Kolasinski (2013) also investigated the possibility whether private equity gave out special dividends after firms were poorly performing and subsequently went bankrupt. They were only able to identify three firms where there was questionable behavior and comment that it is clearly not a characteristic of private equity buyouts.

3. Data

3.1 Data construction

I combine data from the NVP[6] on private equity transactions with financial statement data from AMADEUS to assess the effect of LBOs on target companies' long-term investment and bankruptcy risk. The NVP collects data from public sources such as press releases, to give an overview of private equity investments in the Netherlands. This database contains around 4200 transactions and has data on items such as PE sponsor, PE fund, portfolio company, year of investment, year of exit, share in portfolio company, transaction value and transaction type.

In order to restrict this research to private equity buyouts that entail some kind of leverage, I follow the sampling considerations as in Axelson, Stromberg, Jenkinson & Weisbach (2010). I drop transactions that are not buyouts such as where PE explicitly has a minority stake (<50%), that are marked as venture capital investments (e.g. seed and second stage financing) and transactions that are not or very little levered such as growth or expansion financing. Remaining transaction that are not marked as such, are looked up in the Zephyr database in order to ensure I only include private equity buyouts that have some kind of additional leverage.

The next step is to collect financial statement data on these target companies before and after the deal. First, I look up every unique Bureau van Dijk (BvD) identifier for each target. This will ensure me I draw the correct data for each target company in the AMADEUS datasets. I collect financial statement data for each company in both the AMADEUS database via Orbis and Wharton Research Data Services (WRDS). Both databases overlap in most instances, but have unique advantages and disadvantages. In general, Orbis is better suited for older data while WRDS includes more recent data. I merge these datasets based on the unique BvD identifiers and delete target companies lacking post or pre-buyout data. The combined dataset is fairly reliant when it comes to balance sheet data, but misses a lot of profit and loss items (e.g. depreciation, EBITDA). Moreover, certain data, such as the number of employees, is wrong in many occasions. In order to overcome this problem, I collect additional data from Company.info, which allows you to look into the actual financial statements of both private and public companies. Missing or faulty data is manually added or corrected.

I use data three years prior to the deal and three years after the deal in the analysis. Since data in Amadeus and Company.info is largely accessible up to 2015, I use the year 2012 as the cutoff for transactions taken into the analysis. The dataset from the NVP ranges from 1982 up to 2016, but only few transactions are recorded in the 1980s and early 1990s. In addition, data from Amadeus and

[6] The data from the NVP can be retrieved here: http://www.nvp.nl/pagina/overzicht_portefeuillebedrijven/

Company.info is largely accessible from around the mid-90s and onwards for medium and large sized Dutch companies. By doing some trial and error tests in regard to data availability, I determine the year 1999 as the starting point for my analysis. Most studies (e.g. Long & Ravenscraft, 1993; Lerner et al., 2011; Boucly et al. 2011) use a timeframe ranging from 8 to 16 years. My analysis therefore lies somewhat in the upper bound in respect to years studied, but is still acceptable when compared to other research. The end result is a sample of 107 LBO's ranging from 1999 to 2012.

3.2 Building the control group

To analyze the impact of LBO operations, I need to compare targets of such transactions with similar companies that were not subject to an LBO during 1999-2012. In order to establish a sample of control firms, I use matching criteria comparable to Boucly et al. (2011), who conduct similar research on a sample of French LBOs. These matching criteria are: (1) the control firm belongs to the same industry as the target company, (2) the number of employees one year before the LBO is in the ±50% bracket of the employment of the target company, and (3) ROA one year before the LBO is in the ±50% bracket of the ROA of the target company. If more than five companies match these criteria, the nearest five will be used in the analysis. If less than three control companies match the criteria, I drop criteria (2) and (3) and just use the five closest to the target company in the same industry. If there are still less than three matches, I drop the industry criterion and take the closest five in terms of ROA and employees.

The nearest control firms are determined by minimizing the sum of squared differences between ROA and number of employees between the control company and the target company. I match with replacement in order to make sure to have the closest control firm to the target firm, which produces less-biased results (Tykvová & Borell, 2012).

The industry in which a target firm operates is determined by its two-digit Dutch SBI code, which is similar to the US SIC or NAICS code. These two-digit SBI codes are collected from the AMADEUS database for every target and control firm. One problem in using the SBI codes from the AMADEUS dataset is that most larger companies are classified as holdings and therefore not to the individual industry in which they or their subsidiaries operate in. To overcome this problem, I look up the target company on Company.info and select its second SBI code or the primary code from its main subsidiary. The industry code is then used in the matching procedure previously described in order to ensure that they both operate in the same industry.

The control group consists of a total of 534 companies of which 437 are unique. Only one target company has four control companies, which translates to an average of 4.99 control companies for every target company.

3.3 Descriptive statistics

Figure 1 shows the number of deals in my sample executed between 1999 and 2012. One can clearly see a spike in 2007, a decline in the aftermath of the GFC and a resurgence in the last two years. When comparing with for instance Baker et al. (2015), one can see a similar picture of a boom and bust cycle before and after the GFC. The years 1999 to 2003 show a low number of deals in my sample, which is mainly due to a lack of financial statement data available for those years. When looking at Kaplan and Strömberg (2009) or Baker et al. (2015) one can see a small dip in 2002 due to the dot com bubble and a steady rise in buyouts up to the year 2007.

Fig. 1. Number of deals per year between 1999 and 2012

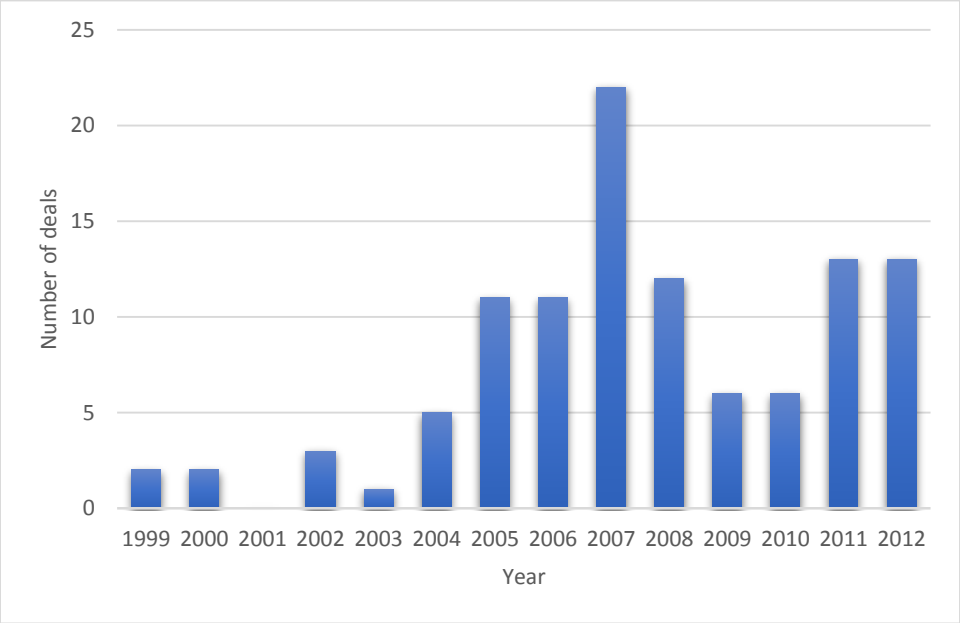

Table 1 shows the descriptive statistics of the entire sample of both target and control companies. The main differences between the target and control group lie mostly in ROA and bankruptcy rates. The default rate for target companies is 5.61%, while only being 2.43% for control companies. As there are of course no defaults prior to the buyout, I cannot for example use a t-test to see if there is a significant difference between mean bankruptcy rate in target and control firms prior to the buyout. Mean ROA for target companies is 11.9%, while only being 3.21% for control companies. Since the descriptive statistics are on the entire sample, the buyout could influence the ROA in such a way that

Table 1.

Descriptive statistics on the entire sample of both targets and their control firms. Sample period 1996-2015. Leverage is the ratio of total equity to total assets. ROA is the ratio of net income to total assets. Capex is capital expenditures. EBITDA is earnings before interest, taxes, depreciation and amortization. The amount of employees is stated in full time equivalents (fte), which is the total amount of paid working hours in a year divided by the number of full time working hours in a year. Age is in years. Other variables are self-explanatory.

Variable	Median	Mean	S.D.	Q1	Q3	Number of observations
Panel A: Targets						
Total assets (m€)	32	197.6	545.5	12.8	116.2	575
Fixed assets (m€)	11.5	112.1	365.5	2.87	46.5	575
Leverage	0.29	0.30	0.32	0.16	0.47	575
Sales (m€)	73.5	284	677.4	30.6	192	450
EBITDA (m€)	4.57	18.9	55.7	1.57	11.3	536
Net income (m€)	1.48	6.06	35.10	0	4.97	561
ROA (%)	4.72	11.9	88	-0.11	11.4	561
Capex (m€)	1.06	4	149	0.16	5.49	493
Employees (fte)	198	755	1675.5	80	584	557
Age (y)	27	44	45	15	52	575
Panel B: Control firms						
Total assets (m€)	37.4	206.1	708.2	16.1	117.3	2422
Fixed assets (m€)	9.38	96	469.7	1.71	36.9	2422
Leverage	0.32	0.33	0.35	0.17	0.50	2422
Sales (m€)	67.9	281.2	830.8	29.6	219.7	2170
EBITDA (m€)	3.64	12.8	77.4	0.97	11.1	1240
Net income (m€)	1.08	6.20	60.8	0	4.42	2269
ROA (%)	2.97	3.21	17.3	0.22	6.87	2262
Capex (m€)	0.90	12.5	223.3	0.11	4.76	1062
Employees (fte)	156	692.2	2029.7	64	397	2133
Age (y)	31	39.5	28.8	19	51	2422

it differs post-buyout. A t-test (see table 2 and appendix B for more details) between mean ROA of target and control companies determines there is a strongly significant difference in mean ROA prior to the buyout. This difference in ROA between control companies and targets has mainly two reasons. One, there are simply too little firms, or at least too little data on firms in the AMADEUS universe that were close enough to the target firms in terms of ROA (see section 3.2 on the matching criteria for more information). Otherwise, the matching procedure would simply pick control companies closer to the target, which would result in an insignificant difference between the mean ROA of targets and control companies. In terms of bankruptcy, AMADEUS is probably subject to survivorship bias, which lowers the overall bankruptcy rate of the control group. In contrast, the bankruptcy information on the targets is collected from the NVP database as well as

Company.info, which are at least less subjected to this bias. To illustrate this point, when one would collect bankruptcy data on the targets from AMADEUS, one would only find one firm marked as bankrupt, which would translate to a bankruptcy rate of 0.93% for the entire sample.

T-tests on means of other descriptive statistics (see table 2) between control companies and targets show they are not statistically different. This means that except for ROA, the control and target group do not statistically differ from each other one year prior to the buyout.

When comparing to Boucly et al. (2011), of whom I use similar matching criteria, the differences between control and target companies are somewhat the same with the exception for bankruptcy rates and ROA. Their default rates for control (6.70%) and target (6.67%) companies are almost identical to each other and also larger than in my sample. Boucly et al. (2011) also have higher ROA for both control (20%) and target (19%) companies. Mean and median sales for target companies in Boucly et al. (2011) are 32.64 million and 13.09 million respectively, making it small comparing to the 284 million and 73.5 million in mean and median sales in my sample. This is mainly due to the focus of Boucly et al. (2011) on relatively small family-owned businesses. The sample of Tykvová & Borell (2012) is also smaller in size with a median total assets of 19.8 million versus 28.9 million in mine and has also a lower median age of 14 versus 25 in my sample of target companies.

Table 2.

T-tests on means of descriptive statistics between control and target group 1 year prior to the buyout for the years 1998-2011. Leverage is total equity over total assets. EBITDA is Earnings Before Interest, Taxes, Depreciation and Amortization. ROA is return on assets. Capex is capital expenditures. See Appendix B for more information.

Variable	t-statistic	P-value	Conclusion
Total assets	0.45	0.65	Not statistically different
Fixed assets	0.07	0.94	Not statistically different
Leverage	-0.02	0.99	Not statistically different
Sales	-0.21	0.83	Not statistically different
EBITDA	0.72	0.47	Not statistically different
Net income	-0.16	0.87	Not statistically different
ROA	-3.80	0.0002	Statistically different to the 1% level
Capex	1.08	0.28	Not statistically different
Employees	-0.68	0.50	Not statistically different
Age	-1.15	0.25	Not statistically different

3.4 Dependence on external finance

Research from Boucly et al. (2011), Harford and Kolasinski (2013) and Amess et al. (2016) point towards a significant difference between private-to-private transactions and public-to-private transactions. Especially target companies that are credit constrained, tend to increase long-term investments post-buyout significantly in comparison to those that are less dependent on external

financing. Financial dependence could therefore prove a sound indicator whether long-term investment is expected to increase after a private equity takeover. Furthermore, it could indicate whether PE stimulates growth and therefore promotes economic efficiency.

There are several ways to include financial dependence in the analysis. Harford and Kolasinski (2013) use a traditional investment-cash-flow sensitivity regression pioneered by Fazzari, Hubbard, Petersen, Blinder and Poterba (1988). The investment-cash-flow hypothesis argues that investments of more financially constrained firms are sensitive to the internal availability of funds. A financially constrained firm does not have complete access to debt or equity financing and is thus more reliant on internal financing, which constraints the amount of investments the firm can undertake. The drawback of this analysis is a reliance on market values as an important control in the analysis. This makes it difficult to employ in a sample of mostly private-to-private transactions such as mine. Amess et al. (2016) and Boucly et al. (2011) use an industry-level financial dependence measure from Rajan and Zingales (1998). This measure is defined as the overall difference between investments and internal cash flow from operations in a given industry. Rajan and Zingales (1998) argue that some industries such as drugs and pharmaceuticals are more dependent on external finance than for example tobacco, which rely more on internal cash flows. The industry-level financial dependence measure is based on a technological difference between industries that makes them more dependent on external finance than others. This technological difference between industries could be due to project scale, period of development, period of returning cash flows and the requirement of continuing investments. Rajan and Zingales (1998) argue that if financial constraints are alleviated, industries dependent on external finance will grow faster than industries dependent on internal cash flows. Following this rationale, when a private equity firm would alleviate financing constraints on its portfolio firm, one would expect higher investments in industries more reliant on external finance in respect to those more reliant on internal cash flows. The advantage of the industry-level financial dependence measure is its reliance on accounting data in both the calculation of the measure and the methodology, making it suitable for my research.

In order to include the industry-level financial dependence measure in the analysis, I follow the computations as in Boucly et al. (2011). I calculate the financial dependence measure per industry using the universe of firms available at Amadeus with more than 100 employees. Boucly et al. (2011) only use firms with more than 100 employees in order to capture the technological effect of the financial dependence measure, since smaller firms are more likely to be financial constrained due to other factors than the technological effect. For each firm in the sample and for each year between 1996 and 2015 I will calculate the difference between capital expenditures and gross cash flows,

normalized by capital expenditures, and take the average for every industry. Gross cash flows are calculated by taking net income plus depreciation and amortization.

Capital expenditures cannot be directly extracted from AMADEUS, which means I have to calculate it from the balance sheet and profit and loss information. I follow the computations as in Faccio, Marchica and Mura (2016), which gives the following:

$$CAPEX_t = FA_t - FA_{t-1} + D_t$$

Where $CAPEX$ is the amount of capital expenditures, t is time in years, FA is fixed assets and D is depreciation and amortization. I use fixed assets instead of tangible fixed assets, since depreciation and amortization in AMADEUS contain both depreciation and amortization of intangible and tangible fixed assets. Using tangible fixed assets would therefore overstate capital expenditures. AMADEUS is also fairly bad in accurately representing the different fixed assets items, which would introduce an additional bias in the results when just using fixed assets in calculating capital expenditures.

Almost all LBO's are constructed by creating a new holding company that contains the target company as a financial fixed asset (Boucly et al., 2011). The LBO is financed by an equity part from the PE firm and debt from a third party. The increase in leverage does therefore not show up in the unconsolidated accounts I have access to. This will give an insight in the ability to raise debt by the target company after the buyout (Boucly et al., 2011). If PE indeed decreases financing constraints, one would expect targets to raise additional debt post-buyout in order to finance growth.

Appendix A shows the financial dependence measure for every industry where the target companies operate in.

3.5 Private equity funds

Large private equity investments are usually made by funds that are organized as limited partnerships. The limited partnership agreement provides a five-year period in which to invest the funds and a ten-year duration of the partnership itself (Axelson et al., 2009). As Rappaport (1990) argues, this limited time in which to invest and generate significant returns to the limited partners, makes LBO sponsors race to generate cash flows from operations and divestures to pay off debt towards pre-buyout levels. Independent private equity firms that do not attract external capital by entering in partnerships perhaps face less pressure to generate immediate returns. Ughetto (2010) points out that there are significant differences between private equity firms that influences the amount of long-term investment in their portfolio firms (see section 2.2). The research of Ughetto (2010) could therefore be extended by focusing on the difference between independent PE firms and

PE funds. My sample of Dutch LBOs is an interesting testing ground to see if LBOs made by private equity funds are indeed more focused on the short-term, since both are prevalent in my sample. I include two dummy variables in the analysis, where the first equals one if a firm is a target of an independent private equity firm and zero otherwise. The second dummy variable equals one if the firm is a target of a private equity fund and zero otherwise.

4. Methodology

This section is divided into three parts; (1) post-buyout characteristics (2) long-term investment and (3) probability of bankruptcy.

4.1 Post-buyout characteristics

In order to give a more complete overview of my sample of Dutch LBOs, I first employ a series of difference-in-difference regressions as in Boucly et al. (2011). This way, I will be able to determine the impact of the LBO on a variety of variables such as profitability and number of employees, which gives me the ability to reflect on my findings and compare them with other studies.

The difference-in-difference method aims at estimating the effect of a change on a group by comparing it with a control group. Simply tracking the group where the change occurs over time is insufficient, since the change you assess could also include a certain trend. Therefore, you want to compare the group where the change takes place to a similar group where the change does not take place, in order to rule out the trend. The simplest setup of a difference-in-difference method is one where outcomes of two groups for two time periods are observed. One of the groups is exposed to a 'treatment' in the second period, while the other group is not. The average increase in outcome of the control group is subtracted from the average increase in outcome of the 'treatment' group to give the difference-in-difference estimator. My 'treatment' group is the pool of portfolio firms I observe for multiple periods. In order to get the difference-in-difference estimator, I will conduct a series of Ordinary Least Squares (OLS) regressions (Amess et al., 2016). Time and firm fixed effects are included to control for unobservable variations between firms and time periods. As suggested by Bertrand, Duflo and Mullainathan (2004), I will cluster the errors at the firm level in order to control for correlation between errors within groups over time.

This gives the following regression:

$$(1)\ y_{jt} = \alpha + \beta_1\, POST_{jt} + \beta_2\, POST_{jt}\, LBO_j + \varepsilon_{jt}$$

where y_{jt} is the performance variable (sales, ROA, EBITDA, net income, employees, leverage and fixed assets) j is a firm index and t a time (year) index. $POST_{jt}$ is a dummy variable that, when j is an

LBO target, equals one after the deal and zero before. When $POST_{jt}$ is a control firm, it equals one when its matched target undergoes an LBO and zero before. LBO_j is another dummy variable that equals one when j is a target firm and zero when j is a control firm and ε_{jt} is an error term.

The difference-in-difference estimator is the interaction term $POST_{jt}\ LBO_j$, which equals one if j is an LBO target *and* if time t is post-buyout. The coefficient of the difference-in-difference estimator $POST_{jt}\ LBO_j$ shows the effect of the LBO on the dependent variable.

4.2 Long-term investment

This section will assess the effect of an LBO on long-term investment while continuing to build on the methodology of Boucly et al. (2011). First I will employ a similar difference-in-difference regression as in section 4.1 to determine the effect of an LBO on the dependent variable capital expenditures. I will include time and firm fixed effects and control for heteroscedasticity within firms over time by clustering the errors at the firm level. This gives the following regression:

$$(2)\ y_{jt} = \alpha + \beta_1\ POST_{jt} + \beta_2\ LBO_j + \beta_3\ POST_{jt}\ LBO_j + \varepsilon_{jt}$$

where y_{jt} is capital expenditures, j is a firm index, t a time (year) index. $POST_{jt}$ is a dummy variable that, when j is an LBO target, equals one after the deal and zero before. When $POST_{jt}$ is a control firm, it equals one when its matched target undergoes an LBO and zero before. LBO_j is another dummy variable that equals one when j is a target firm and zero when j is a control firm and ε_{jt} is an error term.

The difference-in-difference estimator is the interaction term $POST_{jt}\ LBO_j$, which equals one if j is an LBO target *and* if time t is post-buyout. The coefficient of the difference-in-difference estimator $POST_{jt}\ LBO_j$ shows the effect of the LBO on the dependent variable capital expenditures.

In regression (3), I will include the financial dependence measure as calculated in section 3.4. The financial dependence measure affects both the LBO targets as the control companies. However, the expectation is that a higher financial dependence has an increasing effect on the dependent variable capital expenditures when the company is an LBO target. Therefore, the changes in capital expenditures between the LBO targets and control group could be systematically different between industries due to their financial dependency. Simply tracking the LBO targets and introducing the financial dependence measure is insufficient, since the estimates for the effect of financial dependence could also be due to inherent industry effects. Therefore, I employ a control group that operates in the same industries as the LBO targets in order to control for these inherent industry

effects. This way, I am able to measure the effect of financial dependence on the dependent variable capital expenditures when the company is an LBO target. In order to estimate this relation, I will perform a difference-in-difference-in-differences regression. I will include time and firm fixed effects and cluster the errors at the firm level.

This will give the following regression:

$$(3)\ y_{jt} = \alpha + \beta_1\, POST_{jt} + \beta_2\, LBO_j + \beta_3\, FD_j + \beta_4\, POST_{jt}\, LBO_j + \beta_5\, POST_{jt}\, FD_j + \beta_6\, POST_{jt}\, FD_j\, LBO_j + \varepsilon_{jt}$$

where y_{jt} is capital expenditures, j is a firm index and t a time (year) index. FD_j is a financial dependence measure on the industry level. $POST_{jt}$ is a dummy variable that, when j is an LBO target, equals one after the deal and zero before. When $POST_{jt}$ is a control firm, it equals one when its matched target undergoes an LBO and zero before. LBO_j is another dummy variable that equals one when j is a target firm and zero when j is a control firm and ε_{jt} is an error term.

The difference-in-difference-in-differences estimator is $POST_{jt}\, FD_j\, LBO_j$. This interaction term equals the financial dependence measure of firm j if j is an LBO target *and* if time t is post-buyout. Therefore, the coefficient of $POST_{jt}\, FD_j\, LBO_j$ shows the effect of financial dependence on the dependent variable capital expenditures.

In regression (4), I include a separate difference-in-difference estimator for both dummy variable IND_j and $FUND_j$, as in Amess et al., (2016). Similarly, in regression (5) I include for both transaction types buyout and MBO dummy variables BO_j and MBO_j. This way I will be able to assess the difference between LBOs carried out by independent PE firms and PE funds, but also for transaction types such as regular buyouts and MBOs. I include time and firm fixed effects and control for heteroscedasticity within firms over time by clustering the errors at the firm level.

$$(4)\ y_{jt} = \alpha + \beta_1\, POST_{jt} + \beta_2\, LBO_j + \beta_3\, POST_{jt}\, IND_j + \beta_4\, POST_{jt}\, FUND_j + \varepsilon_{jt}$$

$$(5)\ y_{jt} = \alpha + \beta_1\, POST_{jt} + \beta_2\, LBO_j + \beta_3\, POST_{jt}\, MBO_j + \beta_4\, POST_{jt}\, BO_j + \varepsilon_{jt}$$

where y_{jt} is capital expenditures, j is a firm index and t a time (year) index. $FUND_j$ is a dummy variable that, when j is a target firm of a private equity fund, equals one and zero otherwise. IND_j is a dummy variable that, when j is a target firm of an independent private equity firm, equals one and zero otherwise. MBO_j is a dummy variable that, when j is a target firm in an MBO equals one and zero otherwise. BO_j is a dummy variable that, when j is a target firm in a regular buyout, equals one and

zero otherwise. When $POST_{jt}$ is a control firm, it equals one when its matched target undergoes an LBO and zero before. $POST_{jt}$ is a dummy variable that, when j is an LBO target, equals one after the deal and zero before. LBO_j is another dummy variable that equals one when j is a target firm and zero when j is a control firm and ε_{jt} is an error term.

The interaction terms of interest in these regressions are $POST_{jt}\ FUND_j$, $POST_{jt}\ IND_j$, $POST_{jt}\ MBO_j$ and $POST_{jt}\ BO_j$. In the case of $POST_{jt}\ FUND_j$, the interaction term equals one if firm j is an LBO target, if time t is post-buyout *and* if the LBO is carried out by a private equity fund. Therefore, the coefficient of $POST_{jt}\ FUND_j$ shows the effect of an LBO carried out by a PE fund on long-term investment of the target. For $POST_{jt}\ IND_j$, $POST_{jt}\ MBO_j$ and $POST_{jt}\ BO_j$, the effects are similar by replacing $FUND_j$ with the other PE firm type and transaction types MBO and regular buyout.

4.3 Bankruptcy risk

In this section, I examine whether portfolio companies enter in bankruptcy more often than comparable non-buyout companies. I will largely use the methodology as in Tykvová & Borell (2012), to assess the probability of bankruptcy of target companies. The dependent variable bankruptcy is a dummy variable, which takes one if the company defaulted and zero otherwise. Estimating the probability of such a dichotomous outcome is impossible with a simple OLS regression. I therefore employ a logistic regression that controls for other possible determinants of bankruptcy such as the level of concentration in a given industry, firm leverage, firm age and firm size.

The concentration measure I use is the Herfindahl-Hirschman Index (HHI). The HHI is a widely used proxy for competition in research and for the screening of mergers and acquisitions (Sapienza, 2002). The HHI takes on a value between 0 and 1000, where 0 is regarded as perfect competition and 1000 as a monopoly. In general, an HHI of more than 180 is considered as a monopolistic market, between 180 and 100 a monopolistic/oligopolistic market and below 100 a competitive market (Sapienza, 2002). The HHI is defined as the squared sum of market shares in a particular industry, which gives the following:

$$HHI = \sum_{j=1}^{N} s_j^2$$

where HHI is the level of concentration, N is the number of firms in a given industry and s_j is the market share of firm j. The market share of a company is determined by the operating income of firm

j relative to the operating income of the entire industry. One problem when estimating the HHI for every industry and year is a lack of data in AMADEUS between the mid-90s and early 00s. This means that the HHI is overstated in early years due to its reliance on market shares, which are relative to the total observable market. In order to illustrate this point, say a given industry has four firms equal in size, but two of them do not report their turnover. This would then give a HHI of $(0.5^2 + 0.5^2) * 100 = 500$ instead of $(0.25^2 + 0.25^2 + 0.25^2 + 0.25^2) * 100 = 250$. I therefore drop the HHI for an industry in a given year when it is above a level of 400, which is already heavily monopolistic and unlikely to occur in the industries I observe.

The other controls I include are leverage, which is defined as the ratio of total equity to total assets and firm size, which is defined as total assets. I include time and firm fixed effects to account for unobservable variations between firms and time and cluster the errors at the industry level to account for correlation of errors in industries over time.

This will give the following logistic regression:

$$(6)\ \ln\left(\frac{p_{jt}}{1-p_{jt}}\right) = \alpha + \beta_1\, POST_{jt}\, LBO_j + \beta_2\, HHI_{jt} + \beta_3\, LEV_{jt} + \beta_4\, AGE_{jt} + \beta_5\, SIZE_{jt} + \varepsilon_{jt}$$

where j is firm, t is time (year) and p_{jt} is the probability that y_{jt} is one. $POST_{jt}$ is a dummy variable that, when j is an LBO target, equals one after the deal and zero before. When $POST_{jt}$ is a control firm, it equals one when its matched target undergoes an LBO and zero before. LBO_j is another dummy variable that equals one when j is a target firm and zero when j is a control firm. HHI_{jt} is a measure of concentration, LEV_{jt} is the leverage of the firm in a given year, AGE_{jt} is the age of the company, $SIZE_{jt}$ is the size of the company and ε_{jt} is an error term.

$POST_{jt}\, LBO_j$ is an interaction term which equals one if j is an LBO target *and* if time t is post-buyout, thus the coefficient of $POST_{jt}\, LBO_j$ shows the effect of the LBO on the odds of bankruptcy.

In regression (7) and (8) I exclude the control firms and focus solely on the target companies in order to examine the difference of PE types and transaction types within the sample of LBO's. Time and firm fixed effect are included and I cluster at the industry level.

$$(7)\ \ln\left(\frac{p_{jt}}{1-p_{jt}}\right) = \alpha + \beta_1\, POST_{jt}\, FUND_j + \beta_2\, HHI_{jt} + \beta_3\, LEV_{jt} + \beta_4\, AGE_{jt} + \beta_5\, SIZE_{jt} + \varepsilon_{jt}$$

$$(8)\ \ln\left(\frac{p_{jt}}{1-p_{jt}}\right) = \alpha + \beta_1\, POST_{jt}\, MBO_j + \beta_2\, HHI_{jt} + \beta_3\, LEV_{jt} + \beta_4\, AGE_{jt} + \beta_5\, SIZE_{jt} + \varepsilon_{jt}$$

where j is firm, t is time (year) and p_{jt} is the probability that y_{jt} is one. $POST_{jt}$ is a dummy variable that, when j is an LBO target, equals one after the deal and zero before. $FUND_j$ is a dummy variable that, when j is a target firm of a private equity fund, equals one and zero otherwise. IND_j is a dummy variable that, when j is a target firm of an independent private equity firm, equals one and zero otherwise. MBO_j is a dummy variable that, when j is a target firm in an MBO equals one and zero otherwise. BO_j is a dummy variable that, when j is a target firm in a regular buyout, equals one and zero otherwise. HHI_{jt} is a measure of concentration, LEV_{jt} is the leverage of the firm in a given year, AGE_{jt} is the age of the company, $SIZE_{jt}$ is the size of the company and ε_{jt} is an error term.

For regression (7), $POST_{jt}\ FUND_j$ is an interaction term which equals one if j is a target firm of a private equity fund *and* if time t is post-buyout, thus the coefficient of $POST_{jt}\ FUND_j$ shows the effect of an LBO carried out by a PE fund on the odds of bankruptcy within the sample of LBO's. $POST_{jt}\ IND_j$ is not included since I want to estimate if there is a significant difference between LBO's carried out by PE funds and independent private equity funds on the dependent variable bankruptcy.

For regression (8), $POST_{jt}\ MBO_j$ is an interaction term which equals one if j is a target of an MBO *and* if time t is post-buyout, thus the coefficient of $POST_{jt}\ MBO_j$ shows the effect of an MBO carried on the odds of bankruptcy within the sample of LBO's. $POST_{jt}\ BO_j$ is not included since I want to estimate if there is a significant difference between MBO's and regular buyouts on the dependent variable bankruptcy.

5. Results

5.1 Buyout characteristics

Table 3 shows the results of regression equation (1), see section 4.1 for more details, with as dependent variable Ln(Sales), Ln(ROA), Ln(NI), Ln(EBITDA), Ln(Employees), leverage and Ln(Fixed). I use the natural logarithm of these variables in order to get a better approximation of a normal distribution in those variables. This improves the linear relationship between the independent variables and the dependent variable and hence betters the OLS model. Note that dummy variable LBO is omitted from the regression due to multicollinearity issues. Multicollinearity arises when a dependent variable highly correlates with other dependent variables in the regression. The OLS estimates are still BLUE (Best Linear Unbiased Estimators), but have higher standard errors and therefore have lower t-statistics and wider confidence intervals. In this case, the firm fixed effects capture the effect of the dummy variable LBO, which makes them correlate perfectly with the

POST*LBO interaction term. Dummy variable LBO is therefore omitted from the regression, which is not really a problem since I am not particularly interested in its coefficient or significance. A solution would be to exclude firm fixed effects, while including dummy LBO in the regression, but this would only increase omitted variable bias, since the firm fixed effects account for unobservable effects for both target and control companies. Including fixed effects seems to greatly improve the goodness of fit as measured by the R squared, which is a measure of how much variance in the dependent variable is explained by the independent variables. Furthermore, the research in Boucly et al. (2011) exhibits a similar issue and also omit dummy LBO from the regression and include the firm fixed effects.

The independent variable POST shows the overall results of the three year period post-buyout in relation to three years before the buyout, while the POST*LBO interaction term shows the difference between target firms and control firms post-buyout. The regression results show an increase in target size post-buyout as shown by sales (20%), employees (20%) and fixed assets (33%). Targets profitability as measured by ROA decreases post-buyout by 24%, but overall net income and EBITDA does not significantly differ between targets and control companies. For both control companies and targets profitability as measured by ROA increases by 29% post-buyout, but also net income and EBITDA increases by 36% and 28% respectively. This means that there is an overall increase in ROA and EBITDA post-buyout, however not for targets as the POST*LBO interaction term shows an insignificant effect. Profitability for targets decreases post-buyout as is shown by the POST*LBO interaction term. However, as the t-test in table 2 (see section 3.3) has shown, the mean profitability one year prior to the buyout between targets and control companies were already significantly different. This could possibly have an effect on profitability post-buyout for control companies as for example a mean reversing process could take place.

The regression results are mostly in line with Boucly et al. (2011), who state that PE increases growth post-buyout. This can be seen by the similar result in post-buyout growth for targets in sales, employees and fixed assets. In addition, leverage increases as well, which Boucly et al. (2011) attribute to the financing of investments that in turn causes the firm to grow. Note that the coefficient in regression (G) with dependent variable leverage is negative. This means that the ratio of equity over total assets decreases, which in turn means an increase in leverage. However, Boucly et al. (2011) also found both profitability, as measured by ROA, and EBITDA for targets to increase post-buyout.

Leverage ratio in a target company increases post-buyout, although the effect is only weakly significant. Note that in a usual LBO, the buyout is done by buying shares in a newly created holding (Newco), where the equity as well as the debt to finance the acquisition resides in (Boucly et al.,

Table 3.

OLS regression estimations of the impact of an LBO on targets' behavior between 1996 and 2015 on both target and control companies. Ln(Sales) is the natural logarithm of sales, Ln(ROA) is the natural logarithm of return on assets, Ln(NI) is the natural logarithm of net income, Ln(EBITDA) is the natural logarithm of earnings before interest taxes and depreciation, Ln(Employees) is the natural logarithm of employees, Ln(Fixed) is the natural logarithm of fixed assets and leverage is the ratio of equity over total assets. FE are fixed effects and are included in all regressions. POST is a dummy variable that equals 0 for the three years prior to the LBO and 1 three years following the LBO. LBO equals 1 if the firm is a target firm and 0 otherwise. Error terms are clustered at the firm level.

	(A)	(B)	(C)	(D)	(E)	(F)	(G)
	Ln(Sales)	Ln(ROA)	Ln(NI)	Ln(EBITDA)	Ln(Employees)	Ln(Fixed)	Leverage
POST	0.0014	0.29***	0.26**	0.28**	-0.23**	-0.015	0.013
	(0.044)	(0.11)	(0.11)	(0.11)	(0.096)	(0.067)	(0.015)
POST*LBO	0.20**	-0.24**	0.015	0.17	0.20**	0.33**	-0.075*
	(0.084)	(0.13)	(0.14)	(0.11)	(0.094)	(0.14)	(0.043)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2620	2165	2164	1607	2690	2942	2997
Adj. R^2	0.92	0.54	0.79	0.84	0.71	0.90	0.60

*Significant to the 10% level, **Significant to the 5% level, ***Significant to the 1% level.

(2011). This means that the leverage of the target company only increases if the subsidiary itself for example attracts additional debt. Thus, the additional leverage in the LBO does not show up in the target company.

The regression results only show an overall impact, which means that from these results it cannot be directly concluded that an LBO causes for example an increase in jobs. If the increase in sales and fixed assets is due to for example acquisitions, the jobs simply transfer from the seller to the acquirer ceteris paribus. Since I am not able to control for the possibility of acquisitions post-buyout, I cannot conclude that the increase is due to organic growth.

5.2 Long-term investment

Table 4 shows the results of regression equations (2), (3), (4) and (5), see section 4.2 for more details, with as dependent variable Ln(Capex) for all four regressions. Note that independent variables LBO and variable FD are omitted from the regression due to multicollinearity issues. Again, the fixed effects capture the effect of both LBO and FD, making them correlate perfectly with interaction terms POST*LBO and POST*FD respectively. Therefore, both variables are dropped from the regression.

The various POST interaction terms shows the difference between target firms and control firms post-buyout on the dependent variable Ln(Capex). All four regressions show similar results in that there is no statistically significant difference between capital expenditures in target firms and control firms. This means that target firms do not decrease nor increase capital expenditures post-buyout in comparison to the control firms. The results are consistent across regular buyouts and MBOs, and also for transactions carried out by independent private equity firms and PE funds.

Table 3 (section 5.1) shows an increase in fixed assets, while regression (A) in table 4 shows no increase in capital expenditures post-buyout for target firms. This could have several reasons. First, as Boucly et al. (2011) points out, private equity firms could impose a different depreciation schedule, which could lower capital expenditures in my calculations (see section 3.4). For example, if a private equity firm is confronted with significantly higher EBITDA post-buyout, it could prefer to increase depreciation in its target company to defer taxes. This would then show up as an increase in capital expenditures in the calculations. However, as regression (C) and (D) in table 3 show, net income and EBITDA do not significantly increase in a target company post-buyout. If the current cash flows only support the increased interest and principal payments from the LBO, the private equity company would possibly prefer to postpone depreciation, which in turn would show up as lower capital expenditures. Second, the increase in size of target companies could for also be due to acquisitions, which would subsequently not show up in capital expenditures.

Regression (D) shows that POST*FD is weakly significant, suggesting that firms operating in more financially dependent industries, have lower capital expenditures. However, POST*FD*LBO is not statistically different from zero, suggesting that financially dependent target firms do not decrease nor increase capital expenditures after an LBO. This means that there is neither evidence supporting the view that private equity is short-term in respect to capital expenditures, nor that private equity decreases financial dependence and increases investments in portfolio firms.

Table 4.

OLS regression estimations of the impact of an LBO on long-term investment between 1996 and 2015. Ln(Capex) is the natural logarithm of capital expenditures. POST is a dummy variable that equals 0 for the three years prior to the LBO and 1, three years following the LBO. LBO equals 1 if the firm is a target firm and 0 otherwise. MBO is a dummy variable that equals 1 if the transaction is a management buyout and zero otherwise. BO is a dummy variable that equals 1 if the transaction is a regular buyout and zero otherwise. FUND is a dummy variable that equals 1 if the transaction is done by a PE fund and zero otherwise. IND is a dummy variable that equals 1 if the transaction is done by an independent PE firm and zero otherwise. FD is the financial dependence measure, see section 3.4 for more details. FE are fixed effects and are included in all regressions. Error terms are clustered at the firm level.

	(A)	(B)	(C)	(D)
	Ln(Capex)	Ln(Capex)	Ln(Capex)	Ln(Capex)
POST	0.29	0.29	0.28	0.72***
	(0.22)	(0.22)	(0.34)	(0.27)
POST*LBO	0.11			-0.16
	(0.20)			(0.41)
POST*MBO		0.13		
		(0.35)		
POST*BO		0.11		
		(0.22)		
POST*FUND			0.20	
			(0.33)	
POST*IND			0.058	
			(0.30)	
POST*FD				-0.53*
				(0.29)
POST* LBO *FD				0.40
				(0.45)
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	1329	1329	1329	1329
Adj. R^2	0.73	0.73	0.73	0.73

*Significant to the 10% level, **Significant to the 5% level, ***Significant to the 1% level.

5.3 Bankruptcy risk

Table 5 show the regression results of equations (6), (7) and (8), see section 4.3 for more details, with as dependent variable bankruptcy for all three regressions. The control variables HHI and leverage both show a strongly significant impact on the probability of bankruptcy for all three regressions. This means for example in regression (A) that the odds of bankruptcy decrease by $(\exp(0.004) - 1) * 100\% = (e^{0.004} - 1) * 100\% = 0.40\%$ for every one unit increase in HHI. The result are in line with the general notion that increased competition and leverage lead to a higher probability of bankruptcy.

POST*LBO in regression (A) shows the effect of being a target company post-buyout on the probability of bankruptcy. The coefficient is positive and significant, which means that the probability of bankruptcy increases post-buyout for target companies overall. This is also true for both transaction types MBOs and buyouts (B), and for LBOs carried out by both independent PE firms and PE funds (C).

As both transaction types and both independent PE firms and PE funds increase the likelihood of bankruptcy, one cannot properly distinguish between those transaction types and PE types. In order to examine these differences into more detail, regressions (D) and (E) focus solely on target companies. Regression (D) shows a statistically significant effect for POST*MBO, suggesting that an MBO has a higher probability of bankruptcy than a regular buyout. Regression (E) shows a statistically significant increase in the probability of bankruptcy for transactions carried out by PE funds, suggesting that transactions carried out by PE funds have a statistically significant increase in the probability of bankruptcy in comparison to independent PE firms.

The regression shows an increase in the probability of bankruptcy, as can be seen by the significance of the various POST interaction terms. Still, the results are somewhat unclear whether private equity firms choose targets with higher risk ex ante or increase risk ex post. This means that it is unsure whether private equity firms invest in more risky firms or that they increase risk post-buyout. In the case of an MBO, where management has an adjacent controlling stake in the target company, it could for example happen that PE prefers this transaction type when the deal involves more risk. This could then a priori explain why MBO's are more risky in comparison to regular buyouts. Furthermore, the possibility of a significant survivorship bias could severely underestimate the bankruptcy rate in the control group, which negatively affects the probability of bankruptcy for control companies in relation to target companies.

Table 5.

Logit regression estimations of the impact of an LBO on the dependent variable bankruptcy, which takes a value of one if the firm goes bankrupt between 1996 and 2015 and zero otherwise. Regressions (A), (B) and (C) contain both targets and control firms. Regressions (D) and (E) only contain target firms. Ln(SIZE) is the natural logarithm of total assets. LEV is the ratio of equity over total assets. AGE is firm age in years. HHI is the Herfindahl-Hirschman index, see section 4.3 for more details. POST is a dummy variable that equals 0 for the three years prior to the LBO and 1 three years following the LBO. LBO equals 1 if the firm is a target firm and 0 otherwise. MBO is a dummy variable that equals 1 if the transaction is a management buyout and zero otherwise. BO is a dummy variable that equals 1 if the transaction is a regular buyout and zero otherwise. FUND is a dummy variable that equals 1 if the transaction is done by a PE fund and zero otherwise. IND is a dummy variable that equals 1 if the transaction is done by an independent PE firm and zero otherwise

	(A)	(B)	(C)	(D)	(E)
	All targets and controls	All targets and controls	All targets and controls	Only targets	Only targets
	Logit	Logit	Logit	Logit	Logit
	Bankruptcy	Bankruptcy	Bankruptcy	Bankruptcy	Bankruptcy
Ln(SIZE)	-0.12	-0.12	-0.12	2.71**	1.62***
	(0.19)	(0.19)	(0.19)	(0.1.17)	(0.62)
LEV	-2.52*	-2.56*	-2.46**	-5.05***	-7.82***
	(1.39)	(1.38)	(1.41)	(1.54)	(1.53)
AGE	-0.0074	-0.0066	-0.0074	0.14**	0.086*
	(0.014)	(0.013)	(0.014)	(0.063)	(0.048)
HHI	-0.0040***	-0.0038***	-0.0041***	-0.00057	-0.0027
	(0.0015)	(0.0015)	(0.0014)	(0.0044)	(0.0037)
POST*LBO	2.40***				
	(0.71)				
POST*MBO		2.09**		4.75***	
		(0.84)		(1.52)	
POST*BO		3.04**			
		(1.19)			
POST*FUND			2.11**		1.59**
			(1.05)		(0.76)
POST*IND			2.72***		
			(0.92)		
Industry FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	679	679	679	92	92
Chi^2/F	87.21	88.46	127.51	4159.73	978.82

*Significant to the 10% level, **Significant to the 5% level, ***Significant to the 1% level.

6. Discussion

The results in this thesis suggest that private equity firms increase target size in terms of employees, fixed assets and sales, but decrease profitability, as measured by ROA, and neither increase nor decrease overall net income and EBITDA relative to the control group. Private equity firms neither decrease long-term investments overall nor increase long-term investments in financially dependent firms. Target companies post-buyout have a higher probability of going bankrupt, which is consistent across transaction types and PE types. MBO's have a significant increase in the likelihood of bankruptcy in comparison to regular transactions and private equity funds similarly exhibit a significant increase in the probability of bankruptcy in comparison to independent private equity firms. In terms of long-term investment, private equity firms have neither a longer- nor a shorter-term orientation on portfolio companies. However, when regarding the probability of bankruptcy, private equity firms do seem to have a shorter-term orientation on portfolio companies, although the effect is larger for MBO's and for portfolio companies of PE funds.

When looking at long-term investment in portfolio companies, the findings are in line with a larger body of research in that there is no evidence in favor of the short-termism hypothesis (e.g. Lerner et al., 2011; Harford & Kolasinski, 2013). However, the view of Boucly et al. (2011) and Amess et al. (2016) in that private equity increases long-term investment in financially constrained portfolio companies is not supported. There does seems to be a significant increase in size such as sales, employees and fixed assets, but this is not attributed to the alleviation of financing constraints. A possible explanation could be that target firms in my sample are simply not significantly financially constrained due to their relatively large size. Prior to the buyout, mean sales for Boucly et al. (2011) is around 33 million, while 280[7] million in my sample. The positive effect of an LBO on capital expenditures in Boucly et al. (2011) is mainly exhibited in private-to-private transactions, which consists of relatively small family-owned businesses. No significant increase in capital expenditures is shown for public-to-private LBOs and divisional LBOs, which are usually larger firms or previously had access to internal capital markets and are therefore less financially constrained (Amess et al., 2016). Another explanation Boucly et al. (2011) give for the alleviation of financing constraints by private equity is that capital and credit markets are not functioning as well in France as in the UK or the US. Wurgler (2000) reports a lower financial development measure[8] for France than for the

[7] A t-test confirms that mean sales of target firms between the sample of Boucly et al. (2011) and my sample is significantly different to the 1% level.

[8] The financial dependence measure in Wurgler (2000) is calculated as the natural logarithm of 1 plus the sum of stock market capitalization to GDP and private and nonfinancial public domestic credit to GDP.

Netherlands, which is also larger than the US and UK. When looking at more recent data, market capitalization of listed domestic companies as a percentage of GDP is higher for the Netherlands than for France, but lower when comparing to the US (World Bank, 2016). This suggests that financial development is lower in France compared to the Netherlands, and therefore firms operating in France are more financially constrained. This could help explain an absence of increased capital expenditures for firms operating in more financially dependent industries, since private equity would not alleviate these constraints as much as in France. Following this rationale, one would expect similar results in Amess et al. (2016) as they study a sample of LBOs in the UK, which is considered to be a highly financially developed country (Boucly et al., 2011). However, Amess et al. (2016) study the effect of an LBO on the number of granted patents, which are concentrated among certain industries (Ughetto, 2010). Unfortunately, Amess et al. (2016) do not provide a detailed breakdown of LBOs by industry nor provide detailed descriptive statistics. Therefore, it is more difficult to compare the industries targets operate in between my sample and the sample of Amess et al. (2016). Still, looking at the most prevalent industries in my sample (see appendix A), which are wholesale trade, retail trade and food production, one does not suspect these industries to produce many patents. Therefore, the LBOs in the sample of Amess et al. (2016) could concentrate in other, more financially dependent industries, which could explain the different results.

When looking at the probability of bankruptcy in target companies, the results contrast with Tykvová and Borell (2011) who did not find an increase in the probability of bankruptcy for portfolio companies and are more in line with earlier research such as Kaplan and Stein (1993), who found an increase in the probability of bankruptcy. However, I do not regard the factors driving the results in Kaplan and Stein (1993) to be similar to my sample. Their sample period coincided with the onset of the US junk bond market in the middle of the 1980s. During this period, deals shifted towards riskier industries, included debt to equity ratios in excess of 90 percent and prices for transactions rose dramatically (Chancellor, 1999; Cotter & Peck, 2001). Tykvová and Borell (2011) examined a European sample of LBOs between 2000 and 2010, which is similar to mine. The main difference is their use of a cross-country sample and controlling for different private equity characteristics such as PE experience and syndication of deals. The sampling period of Tykvová and Borell (2011) also includes the GFC, but found that the favorable debt market conditions before the crisis did not result in an increase in the probability of bankruptcy. Still, most of the bankruptcies in my sample occurred between 2012 and 2015, which is after the sampling period of Tykvová and Borell (2011). Perhaps

the crisis materialized for those companies only after 2010 or were subject to the creative destruction of for example internet technology in retailing and film.

When distinguishing between transaction types, there seems to be a significant increase in the probability of bankruptcy for MBOs, which is for example not supported by the research of Wilson and Wright (2013). They found lower probability of bankruptcy for MBO's in comparison to regular buyouts before 2003, when changes to the UK bankruptcy process were introduced, and no statistically significant difference after 2003. Other institutional differences such as the Anglo-Saxon environment in the UK and the Germanic type of environment of the Netherlands could help explain the differences in results for MBO's and regular buyouts.

There are some limitations in my research design that have to be taken into account when assessing the results. One, I checked and added data from individual financial statements for target companies but forego this largely in the sample of target companies. This does incorporate some additional mistakes or missing values in the data of control companies, but is in my opinion of less significance than in the data on target companies. The reason is mainly the selection procedure and the manner in which AMADEUS treats data. AMADEUS handles fairly well in representing balance sheet data, but is inconsistent in showing profit and loss items. However, I noticed that if AMADEUS had some information on profit and loss items, it mostly had information on these items for multiple years. Since the matching procedure required input in terms of employees and ROA, it meant for most control companies that it had information on for example depreciation in multiple years as well, although not as consistent in the data I manually collected.

Two, the t-tests in table 2 (section 3.3) show that for mean ROA, the control group is significantly different one year before the LBO. This has as an important implication that the difference-in-difference estimator does not consider 'equal' groups, which influences the observed LBO effect. In this case, the mean ROA of the control group is significantly lower than the mean ROA of the target group. If for example a mean reversing effect takes place, one would expect the effect of the LBO on ROA to be lower, which can be seen in the results (table 3, section 4.1). However, this is not to say that there definitely is such a mean reversing effect, only that the probability of such an effect is probably higher when the two groups are distinct from each other.

Third, the econometric design of using difference-in-difference regression to establish the impact between target and control firm post-buyout has the inherent flaw that the 'treatment' group is not independently chosen. In an ideal setting, you would want to randomly assign the treatment (i.e. LBO) and the control (i.e. no LBO) to a set of firms. Of course, this is not going to happen for obvious reasons.

In the current setting, private equity firms could gravitate towards certain industries or firms that exhibit certain properties, which have an impact in the post-buyout period without having something to do with the LBO. For example, private equity firms could prefer firms that recently did major capital investment, in order to have more free cash flow available in the future to pay off principal and interest payments. This would then show up in the results as a decline in long-term investment post-buyout without having to do much with the actual LBO itself.

Fourth, the sampling size in respect to the amount of bankruptcies is somewhat low. Although I consider a sampling size of 107 deals for a single European country fairly decent, especially in regard to earlier research (e.g. Opler 1993; Kaplan & Stein, 1993). Still, a 5.61% bankruptcy rate for the sample of targets only translates to bankruptcy in 6 cases. If for example I dropped firms due to data availability that went bankrupt in the period under consideration, this could influence the results in a major way due to the relatively low number of bankruptcies under consideration now. Subsequently, since the distribution in bankruptcies was only three for independent PE firms, three for PE funds, four for regular buyouts and two for MBOs, this could influence the current result for their differences even more.

Fifth, the AMADEUS database perhaps also has a significant survivorship bias. In three of the six bankruptcy cases in my sample of control companies, I was not able to look up the unique BvD identifier in AMADEUS, let alone get data on these companies. Furthermore, when collecting data on target companies from AMADEUS, it only reported a bankruptcy in one case while Company.info reported six. The solution for target companies was to look up the data in the individual financial statements on company.info. However, in the case that a control company does not show up in the AMADEUS universe, you would simply not select this company as a control company. The number of bankruptcy cases in the control companies could therefore be severely understated, which would explain further why only 2.43% of the control companies went bankrupt versus 5.61% of the target companies during 1996-2015. The survivorship bias is probably due to the rules AMADEUS follows. If a company does not report anything for five years, WRDS will delete the company from the database while ORBIS will keep the company as long as it is active in the business register (Kalemli-Ozcan, Sorensen, Villegas-Sanchez, Volosovych & Yesiltas, 2015). If the company does not report anything for five years or if the company is not active in the business register, the companies are simply deleted.

Finally, there is of course the possibility that the models are biased due to for example omitted variables or that the observed statistically significant relationships are simply due to randomness. A model is an inherent simplification of the truth and always subject to biases. Even if there is no real

significant effect of a certain 'treatment' you would still expect to find statistically significant results in roughly 5 percent of the cases (Bertrand et al., 2004). Especially since you are reliant on past data and have no ability to perform 'real' experiments, you are subject to the current amount of past data, which introduces the possibility of for example data mining. However, as a researcher, you try to be objective in both evaluating and interpreting the results in such a way that represent reality the most.

Interesting future research would be to explore the difference between independent private equity firms and private equity funds if there is of course such a persisting effect among other countries and time. One would have to look at the incentive structures into more detail and the differences between their selection of possible target companies a priori. Another research possibility is the effect of leverage and covenants in an LBO on the short-termism hypothesis. This research treats LBOs as a general group without taking into account the different leverage ratios used to finance the transaction. Perhaps, the short-termism hypothesis is only true for a certain threshold of leverage. More research possibilities lie in examining to what extent wealth transfers are possible to actually enhance short-term profits. For example, debt issuers are sometimes successful in transferring wealth from creditors on a large scale[9], but this does not necessarily mean it is a persisting feature of private equity. Furthermore, if you would assume that investments in positive NPV projects increase enterprise value in the present, foregoing these investments would rather decrease value in the short-term rather than increasing it. Analyzing the incentives of PE sponsors or the general partners would give a deeper insight to what extent and in what way wealth transfers are actually possible.

7. Conclusion

There is an ongoing debate in research, politics and the financial press whether high returns in private equity (PE) are due to value creation or mere transfers of wealth. Especially the leveraged buyout (LBO) is controversial, where PE firms use high amounts of debt secured against the target firm's assets and future cash flows to facilitate a transaction (Amess et al., 2016). Private equity is said to be focusing only on the short-term while sacrificing long-term value by decreasing investments and taking more risk in general (Rappaport, 1990; Long and Ravenscraft, 1993). Conversely, a recent and growing body of research (e.g. Boucly et al., 2011; Amess et al., 2016) argues that private equity actually increases growth due to relaxation of financing constraints in target companies post-buyout.

[9] See for example the research of Krishnamurthy (2010) into the malfunctioning of debt markets during the GFC.

By examining a sample of 107 LBO's in the Netherlands between 1999 and 2012, no support for either the short-term or long-term hypothesis in terms of long-term investment could be found. Capital expenditures neither decreased nor increased in comparison with a control group post-buyout and the effect is consistent across transaction types and PE firm types. However, there does seems to be some support for the short-termism hypothesis in terms of the probability of bankruptcy, which increases in target companies post-buyout overall, but also for transaction types and PE firm types. When assessing the difference between the likelihood of bankruptcy in these different transactions and PE firms, Management buyouts (MBO's) seem to have a higher likelihood of bankruptcy than regular buyouts and a similar effect arises in PE funds in comparison to independent PE firms. There does seem to be some concerns with survivorship bias, which possibly downplay the effects of an LBO on the probability of bankruptcy. Additional research in the Netherlands is needed to confirm if private equity transactions actually increase the probability of bankruptcy on portfolio companies.

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Appendix A

Industry descriptions[10] and statistics for the sample of target firms between 1999 and 2012. FD is the financial dependence measure. HHI is the average of the Herfindahl-Hirschman index between 1996 and 2015. A detailed description on the FD and HHI can be found in section 3.4 and 4.3 respectively.

Industry	Description	Number of deals	FD	HHI
10	Manufacture of food products	10	0,71	217,9
11	Manufacture of beverages	1	1,26	155,9
13	Manufacture of textiles	2	1,35	202,8
17	Manufacture of paper and paper products	2	1,41	383,4
18	Printing and reproduction of recorded media	1	0,48	231,2
20	Manufacture of chemicals and chemical products	2	1,05	207,7
21	Manufacture of basic pharmaceutical products and pharmaceutical preparations	1	1,17	331,1
22	Manufacture of plastics products	5	1,10	189,6
23	Manufacture of other non-metallic mineral products	1	0,16	145,5
24	Manufacture of basic metals	1	0,22	297,6
25	Manufacture of fabricated metal products, except machinery and equipment	1	1,20	125,7
26	Manufacture of computers, electronic and optical products	1	0,64	102,8
27	Manufacture of electrical equipment	3	0,22	345,8
28	Manufacture of machinery and equipment	4	1,01	175,3
31	Manufacture of furniture	1	1,50	318,1
32	Manufacture of other products	1	1,24	220,4
35	Electricity, gas, steam and air conditioning supply	1	0,54	171,1
38	Waste collection, treatment and disposal activities; materials recovery	1	0,27	205,4
41	Construction of buildings and development of building projects	2	0,37	177,6
42	Civil engineering	2	0,70	248,3
45	Sale and repair of motor vehicles, motorcycles and trailers	2	0,22	117,4
46	Wholesale trade (no motor vehicles and motorcycles)	19	1,14	174,0
47	Retail trade (not in motor vehicles)	8	0,59	229,7
52	Warehousing and support activities for transportation	2	0,65	178,5
55	Accommodation and food service activities	1	0,33	179,9
58	Publishing	2	1,06	405,7
59	Media production and distribution	1	-0,98	286,8
61	Motion picture and television program production and distribution; sound recording and music publishing	2	0,15	262,6
62	Support activities in the field of information technology	6	0,89	334,0
64	Financial institutions, except insurance and pension funding	1	0,77	344,3
66	Other financial services	2	0,24	120,9
69	Legal services, accounting, tax consultancy, administration	1	0,58	163,8

[10] The industry description for every two-digit SBI code is taken from an issue of the 'Kamer van Koophandel' (Chamber of Commerce) which can be downloaded here: https://www.kvk.nl/download/SBI_code_ENG_DEC2015_tcm109-412802.pdf

70	Management and business consultancy	2	0,48	95,2
71	Architects, engineers and technical design and consultancy; testing and analysis	5	1,06	182,4
77	Renting and leasing of tangible goods and other business support services	1	-0,05	111,1
78	Employment placement, provision of temporary employment and pay rolling	3	0,73	204,3
79	Travel agencies, tour operators, tourist information and reservation services	2	0,85	249,2
85	Education	2	1,01	132,6
86	Human health activities	2	0,33	167,9

Appendix B

Is there a significant difference between the mean descriptive statistics of the target group and the control group one year before the buyout?

Test:

$$H_0: \mu_1 - \mu_2 = 0$$

$$H_1: \ \mu_1 - \mu_2 \neq 0$$

T-statistic:

$$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Degrees of freedom:

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)}{\frac{1}{n_1 - 1}\left(\frac{s_1^2}{n_1}\right) + \frac{1}{n_2 - 1}\left(\frac{s_2^2}{n_2}\right)}$$

P-value:

$$2P(T \geq t) = \alpha$$

Example: t-test between mean capital expenditures of the control group and target group one year prior to the buyout in order to determine if the two significantly differ from each other.

Test:

$$H_0: \mu_1 - \mu_2 = 0$$

$$H_1: \ \mu_1 - \mu_2 \neq 0$$

T-statistic:

$$t = \frac{21506346 - 10085028}{\sqrt{\frac{97730445^2}{189} + \frac{29889569^2}{89}}} = 1.076$$

Degrees of freedom:

$$df = \frac{\left(\frac{97730445^2}{189} + \frac{29889569^2}{89}\right)}{\frac{\left(\frac{97730445^2}{189}\right)}{189 - 1} + \frac{\left(\frac{29889569^2}{89}\right)}{89 - 1}} \approx 276$$

P-value:

$$2P(T \geq 1.076) = 0.28$$

The P-value is 0.28, which is even above the 10% level. The null hypothesis is therefore not rejected. This means that the mean capital expenditures for control firms is not significantly different from the mean capital expenditures in target firms.