



Default determinants of PE-backed firms in Europe

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Abstract

This study examines a sample of European private equity transactions undertaken between 2000 and 2015. The factors that have an impact on the likelihood of the target's default are identified and evaluated through a logistic regression. Three groups of variables are included in the analysis: (1) economic variables which capture the trend of the overall economy; (2) deal features, defined as variables on which the PE has a decisional power; (3) specific characteristics of the target firm before the transaction. The findings suggest that leverage employed in the transaction, cross border deals, targets ROA previous to the transaction, and the fact of being a company from UK has an impact of the likelihood of default.

Keywords: Private equity, leveraged buyouts, default likelihood.

Determinantes da falência de empresas adquiridas por PE na Europa

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Resumo

Este estudo analisa uma amostra de transações europeias de private equity (PE) realizadas entre 2000 e 2015. Os fatores que influenciam a probabilidade de falência da empresa alvo são identificados e avaliados através de uma regressão logística. Três grupos de variáveis são incluídos na análise: (1) variáveis económicas, que captam a tendência da economia global; (2) características do negócio, definidas como variáveis sobre as quais o PE tem poder de decisão; (3) características específicas da empresa alvo antes da transação. Os resultados sugerem que a alavancagem empregada na transação, transações transnacionais, metas de rentabilidade ROA anterior à transação, e o facto de ser uma empresa do Reino Unido tem um impacto da probabilidade de falência.

Palavras-chave: Private equity, leveraged buyouts, probabilidade de falência

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List of Abbreviations

BvD	Bureau Van Dijk
EBIT	Earnings before interest and taxes
EBITDA	Earnings before interest taxes depreciation and amortization
IBO	Institutional buyout
IPO	Initial public offering
LBO	Leveraged buyout
MBO	Management buyout
MBI	Management buy-in
MV	Market value
M&A	Mergers and acquisitions
OLS	Ordinary least squares
PE	Private equity
PTP	Public to private
RE	Retained earnings
ROA	Return on assets
ROE	Return on equity
SBO	Secondary buyout
SPV	Special purpose vehicle
TA	Total assets
TL	Total liabilities
VIF	Variance inflation factor
WC	Working capital

1 Introduction

Private equity firms, together with their LBO activity, have become increasingly important in the world's financial markets, both as a financing alternative in the corporate lifecycle and as an asset class for investors¹. Indeed, Private Equity is seen as a relatively recent asset class that has been particularly satisfying for investors in the last years since it has, on average, outperformed the stock market². For the sake of clarity, even if the term private equity is generally used to encompass both buyouts and venture capital, this paper focuses on the buyout market and will refer to private equity transaction as a typical LBO³.

PE activity is known for recurring boom and boost periods that characterized its history since the first LBOs. The phenomenon emerged in the 1980s as a consequence of the venture capital activity, benefitting primarily from rising stock prices and the development of the junk bond market, and experienced a first decline in the 1990s⁴. After that, the activity started to rise again until a minor decline caused by the 2007 financial crisis. The difference was that this second boom (2001-2006) was driven mainly by the availability of syndicated bank debt in turn traded in the secondary market or packaged into structured products (CLO)⁵. Subsequently, from 2010, the sector has started to grow once again and we are now approaching a new boom cycle. Among the favorable factors contributing to this boom have been: an increase in investor's interest in the sector, ebullient equity markets, low interest rates, abundant liquidity and steady GDP growth in US and Europe.

PE firms always have more money available, as investors have allocated more capital to these firms over the past five years than in any time in history. To give an idea of the size of the funds, in 2018, a total of \$582 billion was raised globally (+10% from 2017). At the same time, as shown in Figure 1, PE dry powder (defined as uncalled capital) has been rising since 2012 across all fund types. Figure 2 shows how deal values are steadily increasing as of 2014, while

¹ Groh, A. P., Baule R. and Gottschalg O. 2008. "Measuring Idiosyncratic Risks in Leveraged Buyout Transactions." *IESE Business School Working No. D682*.

² PricewaterhouseCoopers Aktiengesellschaft Wirtschaftsprüfungsgesellschaft (Pwc), "Private Equity Trend Report 2015, Upward momentum inspiring confidence", 2015.

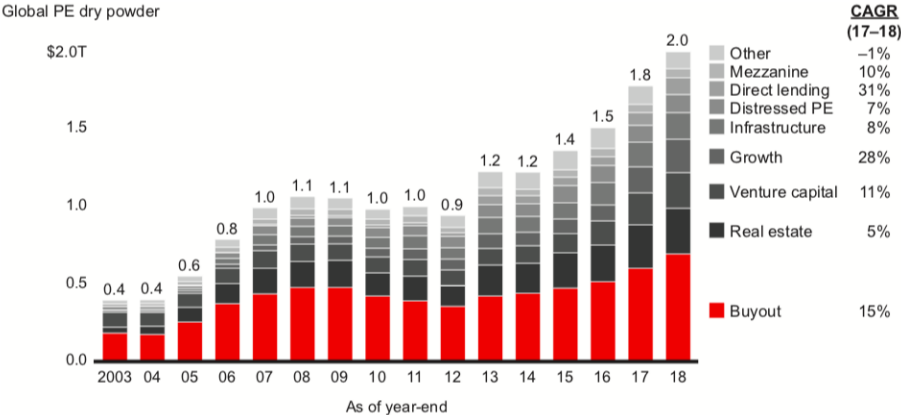
³ Ernst, S. Koziol, C. and Schweizer, D. 2013. "Are private equity investors boon or bane for an economy? A theoretical analysis" *European Financial Management*, 19 (1), 180-207.

⁴ Fenn, W. George, Liang N. and Prowse S. 2011. "The Private Equity Market: An Overview" *Financial Markets, Institutions and Instruments* 6 (4), 1-106.

⁵ Acharya, V., Franks J. and Sarvaes H. 2007. "Private Equity: Boom and Bust?" *Journal of Applied Corporate Finance* 19 (4), 44-53.

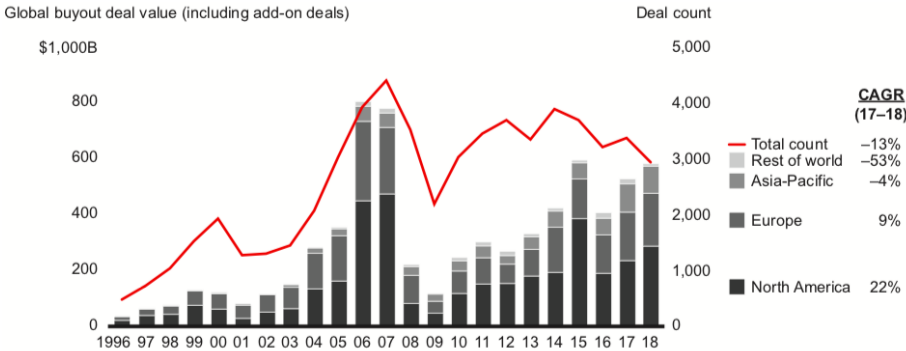
the number of LBO deals does not seem to increase at the same rhythm (-13% from 2017). This means that the average deal value is remarkably increasing due to the high amount of capital available, indeed the size of the average disclosed buyout has been climbing for six years and hit a record in 2018 with the \$17 billion buyout of Thomson Reuters’ Financial & Risk unit, operated by Blackstone and the Canada Pension Plan investment fund⁶.

Figure 1. Dry powder per PE activity between 2003 and 2018.



Source: Bain & Company, 2019. “Global Private Equity Report 2019”.

Figure 2. Deal value and number of LBOs between 1996 and 2018.



Source: Bain & Company, 2019. “Global Private Equity Report 2019”.

Private equity activity can also be seen as a controversial topic of discussion, mainly because of the high levels of debt that characterize the acquisitions. Indeed, in a leveraged buyout a firm is acquired by a specialized investment firm using a small portion of equity and a relatively large portion of outside debt financing, thus meaning that the ownership is highly concentrated after the transaction and the PE firm owns a majority control. This characteristic of PE transactions ties the acquired company in strict debt obligations, lowering the cash flows

⁶ Bain & Company, 2019. “Global Private Equity Report 2019”.

available for alternative investments. Critics argue that LBOs increase the probability of bankruptcy, as fixed schedule repayment resulting from leverage are likely to increase the likelihood of default. This could consequently lead to job losses and destruction of the value of corporations, impacting the overall economy negatively⁷. Moreover, PE firms aim to sell the target company after a certain period and are therefore accused of striving for high short-term returns at the cost of long-term firm's prospects⁸.

On the other side, supporters of PE activity claim that PE funds represent an opportunity for additional funding for firms and provide a new management model, which is superior to any other form of ownership⁹. Jensen (1989)¹⁰ was the first to affirm the superiority of the PE ownership model. Firstly, it aims to solve agency problems, as it is characterized by concentrated ownership, incentives to the management, and close monitoring of it¹¹. Indeed, because of the majority interest owned by PE firms in the target company, they are highly motivated in pursuing the best performance and, more importantly, powerful enough to decide the direction the company should take¹². Firm executives most of the time own an insignificant percentage of the outstanding equity in the firms they run, and this weakens their drive to create shareholder value¹³. On the contrary, one of the main strengths of PE activity is that managers are usually bestowed with significant shares, which represent an essential incentive to focus on the company's performance¹⁴. Secondly, the high level of leverage forces managers to deal with operational problems earlier and more forcefully than they would have done in the absence of debt¹⁵. Finally, management turnaround after the acquisition is usually very high, and the new directors appointed by PE firms are aware of the mechanism of a private equity transaction, knowing how to best prepare the company for an advantageous selling¹⁶. Following these

⁷ Palepu, K. G., 1990. "Consequences of leveraged buyouts." *Journal of Financial Economics* 27 (1), 247-262.

⁸ Ernst, S. Koziol, C. and Schweizer, D. 2013. "Are private equity investors boon or bane for an economy? A theoretical analysis" *European Financial Management*, 19 (1), 180-207.

⁹ Ernst, S. Koziol, C. and Schweizer, D. 2013.

¹⁰ Jensen, M. C. 1989. "The eclipse of the public corporation" *Harvard Business Review*, 89, 61-74.

¹¹ Murphy, K. J. 2012. "Executive Compensation: Where We Are and how We Got There" in George M. C. Milton H. and Stulz R. *Handbook of Economics of Finance*, vol. 2, 211, 233-35.

¹² Cheffins, B. R. and Armour, J. 2007. "The Eclipse of Private Equity", *Dalware Journal of Corporate Law*, 33 (1).

¹³ M Murphy, K. J. 2012.

¹⁴ Cheffins, B. R. and Armour, J. 2007.

¹⁵ Jensen, M. C. 1989.

¹⁶ Ronald W. M. and Randall S. T. 2009. "Does Private Equity Create Wealth? The Effects of Private Equity and Derivatives on Corporate Governance", *University of Chicago Law Review*, 76, 219-258.

theories, several studies support the notion that leveraged transactions create value, showing significant gains in operating performance after the deal¹⁷.

Even if it is not clear how long this positive atmosphere can last until the next downturn materializes, it is evident that PE activity plays an important role in almost all developed capital market. For this reason, since the 1980s, there has been considerable research on the topic. The results observable in the literature are often conflicting, and this can be partially attributed to the quality of data. Indeed, the research conducted on private equity usually focuses on specific geographic markets or segments (especially PTPs or MBOs) due to the scarcity of data and limited samples to conduct proper research¹⁸. In most instances, data for private firms are not fully and easily accessible, which is why many studies examine transactions that involve public debt, companies that subsequently went public or LBO of public companies. For this reason, more frequently than not, the results obtained are potentially biased and not generalizable to a broader population of PE transactions. For example, firms with public debt financing are usually bigger and the sample would, therefore, be characterized by larger companies.

Most of the research on this topic, focuses on PE funds drivers' returns or investigate the post-investment impact on the target company, highlighting the effects of PE management to find out if this particular type of ownership creates value improving firm's performance¹⁹. Fewer papers address the issue of PE-backed companies' default and those which did, mainly focused on public companies. Indeed, research into corporate failure, more broadly not only considering PE-backed companies, has focused mainly on listed companies due to data availability²⁰.

This research provides insights into the most relevant criteria that PE firms should take into account when investing in a company to reduce the likelihood of default. The purpose of this paper is to investigate which factors have an impact on the probability of default of the target company focusing on Europe, highlighting that the research was initially intended to be more extensive including the US market. However, it was not possible to gather enough accounting

¹⁷ Shourun, G. Hotchkiss E. S. and Weihong S. 2011. "Do Buyouts (Still) Create Value?", *The Journal of Finance*, 66 (2), 479-517.

¹⁸ Puche, B. Braun R. and Achleitner A. 2015. "International evidence on value creation in private equity transactions", *Journal of Applied Finance*, 27 (4), 105-122.

¹⁹ Burth, B. and Solveig R. 2019. "Private equity deal success and pre-acquisition determinants – empirical evidence from Germany", *Applied Economics*, 51 (2), 141-154.

²⁰ Wilson, N. and Wright M. 2013. "Private Equity, Buyouts and Insolvency Risk", *Journal of business Finance and Accounting*, 40 (7/8), 949-990.

data for the target companies in that region in order to obtain reasonable regression results, and hence, the US sample has not been considered in the end.

As suggested by Palepu (1990)²¹, there are three main reasons why a buyout could fail. Firstly, the structure of the buyout could be flawed; for example, the leverage is not sustainable compared with post-buyout cash flows or a too high premium was paid. Secondly, post-buyout management could be weak. Third, the general economic condition could have a decisive impact. As data related to the management of such a large sample is not easily collected, the second category has been substituted with pre-acquisition target characteristics²², linked either to the business activity or to its history. Summarizing, the analysis takes into account a sample of 7318 private equity acquisitions undertaken in Europe between 2000 and 2015, considering three dimensions of factors that influence default: (1) economic variables which capture the trend of the overall economy; (2) deal factors, defined as variables on which the PE has a decisional impact; (3) specific characteristics of the target firm before the transaction.

The paper is structured as follows. In the next section, a review of literature regarding the PE deals outcome is presented and this is used to create the research hypothesis. Successively, the sample collection is described, and the variables used are defined. In section IV results are shown and the relative impact of each factor on default is discussed. Section V concludes and suggestions for further research are presented.

This research provides insight on where to invest in the European landscape, analyzing a potential relation between the success or failure of a deal and a set of defined factors. Based on the analyzed criteria, the aim is to draw a conclusion on whether PE decision making can be optimized taking into account the significant factors.

²¹ Palepu, K. G., 1990.

²² These factors have recently been investigated by Burth and Solveig for a sample of acquisitions carried out in Germany. Reference: Burth, B. and Solveig R. 2019. "Private equity deal success and pre-acquisition determinants – empirical evidence from Germany", *Applied Economics*, 51 (2), 141-154.

2 Literature review

The percentage of deals in which the target company defaults, is usually found to be very low despite the differences in sample and period analyzed. Andrade and Kaplan (1998)²³ identify that 29% of the larger public-to-private transactions of the 1980s defaulted at some point. Kaplan and Stein (1993)²⁴ analyzed the collapse of the LBO market in the late 1980s, arguing that 26 of the 83 large LBOs completed between 1985 and 1989 defaulted and 18 entered Chapter 11 bankruptcy proceedings. Lopez-De-Silanes et al. (2010)²⁵ reported from a sample of 7453 LBOs that 12.9% of PE deals went bankrupt between 1971 and 2005 worldwide. On average, it was found to have lower default rate from studying the second wave of LBOs. Thomas (2010)²⁶ analyzing a sample of 3269 private equity transactions occurred in US between 2000 and 2009, finds that between 2008 and 2009, 183 targets defaulted. It can be translated to a 5.6% cumulative default rate (2.84% annually), which is lower than the overall speculative-grade default (6.17% per year for the same period found by Moody's). Similarly, Kaplan and Stromberg (2009)²⁷, analyzing a sample of 17171 private equity acquisitions carried out worldwide between 1970 and 2007, found that only 6% ended in bankruptcy (on average 1.2% annually), underlying that the bankruptcy incidence was lower than the Moody's average default rate for the same period (1.6% annually²⁸). Achleitner, Braun and Engel (2011)²⁹ analyzing a sample of 1090 deals undertaken in Europe between 1986 and 2010, found that 99 of the transactions did not generate any positive cash flow for the PE firm or went bankrupt, which represent 9.1% of the sample.

An element that is claimed to greatly impact the PE industry is the credit market condition. Both in the 80' and mid'00 booms, the credit market experienced an explosion in liquidity which led to an unprecedented supply of leverage throughout the global financial system and,

²³ Andrade, G. and Kaplan S. N. 1998. "How costly is financial (not economic distress)? Evidenced from Highly Leveraged Transactions that became distressed", *Journal of Finance*, 53 (5), 1443-1494.

²⁴ Kaplan, S. N. and Stein. 1993. "The evolution of buyout pricing and Financial Structure in the 1980s", *Quarterly Journal of Economics*, 108 (2), 313-357.

²⁵ Lopez-De-Silanes, F. Phalippou L. and Gottschalg O. 2015. "Giants at the Gate: Investment Returns and Diseconomies of Scale in Private Equity", *Journal of Financial and Quantitative Analysis*, 50 (3), 377-411.

²⁶ Thomas, M. J. 2010. "The Credit Performance of Private Equity-Backed Companies in the Great Recession of 2008-2009", *Private Equity Council*.

²⁷ Kaplan, S. N. and Stromberg P. 2009. "Leveraged Buyout and Private Equity", *Journal of Economic Perspectives*, 23 (1), 121-248.

²⁸ Default rate of bond issuers between 1980 to 2002 by Moody's.

²⁹ Achleitner, A. Braun R. and Engel N. 2011. "Value creation and pricing in buyouts: Empirical evidence from Europe and North America", *Review of Financial Economics*, 20 (4), 146-161.

in particular, to a growth of investments in private equity and hedge funds³⁰. Kaplan and Stromberg (2009) argue that private equity investments are related to economic conditions, affirming that investors seem to take advantage of market timing when the cost of debt is particularly low. They also observe that in specific periods of the boom-and-bust cycle, when the debt is particularly cheap, private equity firms **overpay** their targets, and this seems to be one of the reasons that lead to losses. Alexston et al. (2013)³¹ confirm this hypothesis finding that leverage is associated to higher transaction prices and lower funds final returns, advocating that PE firms overpay their targets in periods of easy access to credit, due to easy access to debt. Consistent with this finding, Guo, Hotchkiss and Song (2010)³² analyze a sample of 192 public to private transactions undertaken between 1990 and 2006, of which 23 defaulted (12%), finding that these deals generated an only a modest increase in firm operating performance still generating high returns. They consider the impact of transaction pricing on the deal outcome, providing evidence that private equity firms benefit from acquiring targets at a lower price than other bidders, therefore buying at a particularly low price and selling high. Similar results were obtained by Acharya and Kehoe (2007)³³, Bargeron, Schlingemann, Stulz and Zutter (2007)³⁴ and Wright et al. (1995)³⁵. Linked with these finding, Achleitner, Braun and Engel (2011)³⁶, analyze buyouts carried out between 1986 and 2010 in Europe and North America and argue that besides leverage and operational improvements, the EBITDA multiple expansion (defined as the difference between the entry and exit price) is particularly important to determine PE returns. This finding would suggest that the price paid at entrance has an important role in the deal outcome, advocating that the lower the **premium paid** at entrance the lower the probability of default.

An interesting point of discussion is whether the level of leverage influences the probability of bankruptcy. Kaplan and Stain (1993)³⁷ argue that the high incidence of default registered in the 1980s leveraged buyout is due to the excessive amount of **leverage** undertaken by PE firms, which increased to 90% of the total capital, together with an increase in the price paid in the

³⁰ Morgan Stanley, 2006. "Morgan Stanley Roundtable on Private Equity and Its Import for Public Companies", *Journal of Applied Corporate Finance*, 18 (3), 8-37.

³¹ Alexston et al, 2013

³² Shourun, G. Hotchkiss E. S. and Weihong S. 2011.

³³ Acharya, V., Franks J. and Sarvaes H. 2007.

³⁴ Bargeron, L. Schlingemann F. P. Stulz S. and Zutter C. 2007. "Why Do Private Acquirers Pay So Little Compared to Public Acquirers?", Fisher College of Business Working Paper 2007-03-011.

³⁵ Wright, M.Thomson S Robbie K. and Pauline W. 1995. "Management Buy-Outs in the short and long term", *Journal of Business Finance Accounting*, 22 (4), 461-482.

³⁶ Achleitner, A. Braun R. and Engel N. 2011.

³⁷ Kaplan, S. N. and Stein J. 1993.

transactions. Alexstone, Jenkinson, Stromberg and Weisbach (2012)³⁸ analyze a sample of 153 buyouts carried out by top PE firms between 1980 and 2006 in Europe and US, including mainly public to private transactions. For the period 2004-2007 they find very high leverage of about 73%, similar to the 77% that characterized the 1980s LBO boom which subsequently collapsed, therefore suggesting that the level of leverage plays a role in the default probability. Findings in line with this hypothesis are also shown by Hotchkiss et al. (2011)³⁹ for US and Wilson and Wright (2013)⁴⁰ analyzing a sample of UK acquisitions.

On the contrary, Thomas (2010)⁴¹ found that a large number of the defaulted companies had little or no leverage indicating that leverage did not play a role in the probability of default. Instead, stating that default seems correlated with the **financial health of the target company** at the time of the acquisition, as most of the defaulted companies were acquired by previous bankruptcies. Moreover, the default seems to be correlated to the overall economic activity, as companies belonging to **sectors** affected by a downturn in the period were overrepresented.

An important issue is that the premium paid at entrance and the level of leverage seem to be correlated. Indeed, Axelston et al. (2012)⁴² provide empirical evidence of a negative correlation between deal leverage and interest rates, showing that the leverage used in the deal is unrelated to firm and industry characteristics whilst appearing to be driven by economic credit condition. The conclusions suggest that deals tend to be priced higher if cheap debt is available, as more leverage is used in the transaction. The correlation between deal pricing and leverage is also found by Ilg (2015)⁴³ and Achleitner, Braun and Engel (2011)⁴⁴, who spot a positive correlation between leverage and buyout pricing. In line with this finding, Alexstone, Jenkinson, Stromberg and Weisbach (2008)⁴⁵, regressing the level of leverage to firm-specific characteristics, aggregate market conditions and the characteristic of the buyout fund, find that the main determinant of leverage is the real interest cost of the loans (measured as the local real interest rate plus the spread for leveraged debt).

³⁸ Axelson, U. Jenkinson T. Strömberg, P. and Weisbach, M. S. 2012. "Borrow cheap, buy high? The determinants of leverage and pricing in buyouts", Discussion paper, Centre for Economic Policy Research, London School of Economics and Political Science, London.

³⁹ Hotchkiss, E. D. Smith D. C, and Stromberg P. 2011. "Private Equity and the Resolution of Financial Distress", paper presented at the Coller Private Equity Institute Conference, London Business School.

⁴⁰ Wilson, N. and Wright M. 2013.

⁴¹ Thomas, M. J. 2010.

⁴² Axelson, U. Jenkinson T. Strömberg, P. and Weisbach, M. S. 2012.

⁴³ Ilg, D. 2015. "Value creation drivers in large leveraged buyouts".

⁴⁴ Achleitner, A. Braun R. and Engel N. 2011.

⁴⁵ Axelson, U. Jenkinson T. Strömberg, P. and Weisbach, M. S. 2012.

Hypothesis 1. Hence, from what the literature establishes, the following hypothesis can be outlined: the higher the leverage used in a transaction the higher the probability of default.

Several studies support the idea that private activity returns are linked to economic conditions. Alexson et al. (2012)⁴⁶ argue that when the economy is particularly prosperous, there is evidence of greater private equity fundraising, higher deals value and more leverage. However, it is not clear if the economic trend has an impact in terms of deal returns and default probability. It could be expected that economic downturns could increase the probability of default as the target company's performance could be impacted negatively. In line with this view, Kaplan and Stein (2007)⁴⁷ find that in the 1980s LBO collapse, as a reaction to the economic crisis, banks accelerated their principal repayments resulting in an unsustainable schedule for many firms. On the opposite, Guo, Hotchkiss and Song (2010)⁴⁸ find evidence that **year** dummies, either for the year of the buyout or the exit, do not help in explaining the performance, suggesting that the deal outcome does not depend on the overall economic trend. An explanation for the fact that downturns do not play a role is given by the findings of Bernstein et al. (2017)⁴⁹. They analyze a sample of PE backed companies in UK and find that PE-backed firms invest more aggressively than peer companies during downturns. This ability to maintain a high level of investment appears related to the superior access of PE-backed companies to financing, and the lower cost of debt (measured as interest expenses over total debt compared with a control sample of non PE-backed companies). In line with these findings, Ivashina and Kovner (2011)⁵⁰ found that PE groups represent a valuable source of funding during downturns, due to the strong bonds with the banking industry which allow them to access credit for their firms during periods of crisis. Moreover, PE firms raise money to their funds which is then invested over multiple years, leaving them with high undrawn capital. It turns out to be particularly useful in periods in which the accessibility to credit, for example to refinance a distressed company, is more complicated. For these reasons, it seems that PE-backed companies are not affected by economic downturns as their peers.

Hypothesis 2. Due to the high leverage employed by PE firms, it is fundamental that the target firm is generating the forecasted cash flow after the acquisition, in order to pay back the debt

⁴⁶ Axelson, U. Jenkinson T. Strömberg, P. and Weisbach, M. S. 2012.

⁴⁷ Kaplan, S. N. and Stein. 1993.

⁴⁸ Shourun, G. Hotchkiss E. S. and Weihong S. 2011.

⁴⁹ Bernstein, S. Lerner J and Mezzanotti F. 2017. "Private equity and financial fragility during the crisis", NBER Working Paper No. w23626.

⁵⁰ Ivashina, V and Kovner, A. 2011. "The Private Equity Advantage: Leveraged Buyout Firms and Relationship Banking", Review of Financial Studies, 24 (7), 2462-2498.

on a fixed schedule. It is expected that if the country experiences a contraction in the GDP, the firm's revenue could be impacted negatively leading to fewer cash flows available and increasing the probability of insolvency.

Smith and Stromberg (2014)⁵¹ focus on the characteristics of the PE acquirer. They argue that the likelihood of default is lower when the LBO acquisition is relatively recent in the lifetime of the particular fund, due to the ability to provide capital support thanks to undrawn commitments. In addition, the likelihood of default decreases when the PE firm has been more successful, measured by the ability to raise new funds.

Hypothesis 3. Following what highlighted in the literature, it is expected that companies backed by more successful PE firms are less likely to default.

Limited research has been conducted on the potential relationship between pre-buyout target characteristics and the probability of default. Berthold and Solveig (2019)⁵² confront this issue analyzing the deal outcome (measured via the equity multiple) of 125 transactions that took place in Germany. They argue that pre-buyout revenue has a negative influence on the outcome of the transaction, as targets with lower revenue are more likely to outperform than bigger targets. A positive influence has also been found for one of the seven industries (healthcare), meaning that operating in a specific industry can be advantageous. Contrasting to this, pre-buyout EBITDA, industry and firm's age does not seem to be good predictors of the success of PE transactions in Germany.

They do not investigate specific pre-acquisition profitability ratios, however, Wilson et al. (2013)⁵³, analyzing a sample of UK buyouts between 1995 and 2010, argue that PE firms tend to choose companies with higher profitability (ROA) and cash generation, expecting that they will continue to be particularly profitable after the acquisition.

Hypothesis 4. In line with previous studies, it is expected that the age of the target does not influence the probability of default.

Hypothesis 5. In accordance with the literature, companies which are more profitable before the acquisition, measured by ROA, are less likely to experience default.

⁵¹ Hotchkiss, E. D. Smith D. C, and Stromberg P. 2011.

⁵² Burth, B. and Solveig R. 2019.

⁵³ Wilson, N. and Wright M. 2013.

An additional factor to consider is whether the target company is characterized by a particular condition at the moment of the acquisition. Special circumstances are a secondary buyout, defined as a deal in which both acquirer and seller are financial sponsors⁵⁴ and a distressed acquisition. There is much skepticism about SBOs in the research community. Bonini (2010)⁵⁵ claims that in SBOs the operating performance is not improved as much as in first buyouts. Cumming and MacIntosh (2003)⁵⁶ argue that the increase in SBO activity coincided with greater liquidity and higher deal price and leverage than first buyouts. This would suggest that in SBO the returns are mainly due to the leverage effect than an actual operational improvement. Prequin (2011)⁵⁷ prompts that in periods of high undrawn capital, PE firms have higher pressure to invest and they may end up not acting in the best interest of investors, carrying out SBOs despite being aware of limited possible operational improvement. An opposite view is given by Achleitner and Figge (2012)⁵⁸, who study a sample of 2456 European buyouts between 1990 and 2010 and find no evidence that secondary buyouts generate lower returns for the PE fund.

Hypothesis 6. Considering the finding of previous studies, which claim lower operational improvement and higher leverage in secondary buyouts, the following hypothesis is stated: SBOs are more likely to default than primary buyouts.

The second particular condition discussed is the case of the target company being financially distressed before the acquisition. Sudarsanam et al. (2011)⁵⁹ studying a sample of P2P UK transactions, argue that, even if distressed companies could represent a significant turnaround opportunity, the high bankruptcy risk at the time of acquisition increases the chances that the target will end up in default later. A similar thesis is supported by Opler and Titman (1993)⁶⁰ who claim that an high bankruptcy risk when associated with the typical high leverage used in PE deals, may increase the chances of default.

⁵⁴ Achleitner, A. and Figge C. 2012. "Private Equity Lemons? Evidence on Value Creation in Secondary Buyouts", *European Financial Management*, 20 (2), 406-433.

⁵⁵ Bonini, S. 2010. "Secondary Buyouts: Operating Performance and Investment Determinants", *Financial Management*, 44 (2), 431-470.

⁵⁶ Cumming, D. and MacIntosh J. 2003. "Venture capital exits in Canada and the United States", *University of Toronto Journal*, 53 (2), 101-200.

⁵⁷ Prequin, 2011. "Secondary buyouts as a proportion of deal activity".

⁵⁸ Achleitner, A. and Figge C. 2012.

⁵⁹ Sudarsanam, S. Wright M. and Huang J. 2011, "Target Bankruptcy Risk and Its Impact on Going Private Buyout Performance and Exit", *Corporate Governance: An International Overview*, 19 (3), 240-258.

⁶⁰ Opler, T. and Titman, S. 1993. "The determinants of leveraged buyout activity: Free cash flow vs. financial distress costs", *Journal of Finance*, XLVIII, 1985-1999.

Hypothesis 7. In line with the presented literature, it is predicted that acquisitions of distressed companies are more likely to end up in default.

Scellato et al. (2013)⁶¹ investigate 241 private to private buyouts involving European companies and find out that target companies backed by PE firms in the same country exhibit higher post-buyout performance. They argue that this is due to a comparative advantage in dealing with asymmetric information and agency problems, and in offering privileged access to expert advice.

Hypothesis 8. Following the mentioned findings, companies backed by PE firms in the same nation are expected to be less likely to default.

The UK has always been the largest LBO player in Europe⁶² and, back in 2007, it showed the biggest PE market as percentage of country GDP. Moreover, it is the first European country in terms of deals number⁶³.

Hypothesis 9. As the PE market is more developed in UK, it is expected that PE firms in this region are more experienced and knowledgeable of how to manage the acquired firms. Hence, targets operating in the UK are expected to be less likely to default.

Table 1 presents a summary of the discussed hypothesis.

Table 1. Summary of the hypothesis.

	Definition
Hypothesis 1	The higher the leverage used in a transaction the higher the probability of default.
Hypothesis 2	A decrease in the target's country GDP increases the probability of default.
Hypothesis 3	Companies backed by more successful PE firms are less likely to default.
Hypothesis 4	The age of the target does not influence the probability of default.
Hypothesis 5	Companies which are more profitable before the acquisition are less likely to default.
Hypothesis 6	SBOs are more likely to default than primary buyouts.
Hypothesis 7	Acquisitions of distressed companies are more likely to end up in default.
Hypothesis 8	Companies backed by PE firms in the same nation are less likely to default.
Hypothesis 9	Targets operating in the UK are less likely to default.

⁶¹ Scellato, G. and Ughetto, E. 2013. "Real effects of private equity investments: Evidence from European buyouts", *Journal of Business Research*, 66, 2642-2649.

⁶² Blundell-Wignall, A. 2007, "Private Equity Boom: Causes and Policy Issues", *Financial Markets Trends*, 1, 59.86.

⁶³ Statista, "Total number of PE backed buyout deals in Europe in 2017".

3 Data Sample and Variables

3.1 Sample Selection

The data collection for this paper requires a two-steps approach: (1) deal data collection and (2) target characteristics collection. The first part focuses on gathering data about the PE deals that took place in Europe between 2000 and 2015; collected data includes information on the deal's features (i.e. value, date), on the target firm and the acquiring PE firm. The initial sample is drawn by data held by Zephyr, owned by Bureau Van Dijk, the most comprehensive database regarding deal information. In particular, it contains a specific sub-database with detailed information regarding private equity deals. The initial screening identifies **10972** transactions that took place between 2000 and 2015 in Europe, classified as “institutional buyout”, for which the deal is defined as “completed - confirmed”⁶⁴ and report as transaction financing the caption “private equity”⁶⁵ and as sub-deal type “leveraged buyout”⁶⁶. Thereafter, only deals in which the BvD ID number of the target company were present are kept in the sample. This is a code which identifies the companies in an unequivocal way among all Bureau Van Dijk databases, and it is later needed to match the target companies in Amadeus. Moreover, only acquisitions of a majority interest (between 50% plus one and 100% stakes) are considered, excluding the cases in which the acquirer was already owning more than 50%⁶⁷.

The second part focuses on collecting data about the target company with a matching procedure in Amadeus from Bureau Van Dijk. Through this database, it is possible to obtain the status of the company, which is fundamental to differentiate between the companies that defaulted and the ones that did not. Moreover, it provides accounting data needed to investigate whether specific characteristics of the target firm before the acquisition play a role in the target's default probability and to calculate specific post-deal ratios. The matching procedure highlights that

⁶⁴ According to Zephyr, the deal is described as “completed – confirmed” when a formal confirmation of the deal was located. Otherwise, the deal is described as “completed – assumed”.

⁶⁵ This caption is added to the deal as financing method when the deal contains an element of Private Equity activity on the Acquirer's side of the deal, whether this is through funding or through an MBO, a MBI or an IBO.

⁶⁶ This sub-deal type would be added whenever a significant amount of borrowed funds/debt are used to acquire the Target.

⁶⁷ Owning a control interest would give the PE firm the power to lever the balance sheet of the target. Hence, the target accounting data before the transaction could be biased by previous PE firm decisions.

about 70% of the codes are found in Amadeus. As some companies appear two times in the sample (being SBOs), in the end a final sample of **7318** deals was analyzed.

However, the fact of being present in the database does not imply that all data for the variables needed is actually provided; indeed, many missing observations are present. Moreover, Amadeus provides the ten most recent years for the same company starting from a certain “last year available” and going backwards. This last year is sometimes previous to the acquisition date and many times the reason for not updating the company’s data is unclear. For this reason, when including accounting information in the model, the considered sample ends up being significantly smaller.

3.2 Dependent variable: the Default variable

An important matter is to differentiate between the companies that defaulted and the ones that did not. In order to discriminate between the two categories, three main methods have been utilized. Hence, several regression models are developed, one for each defined dependent variable.

Amadeus Status, dependent variable (1) is defined

The first measure relies on the “Status” reported in Amadeus for the target company. A list of “statuses” is disclosed for every company together with the relative dates, yet it is fundamental to determine whether the default occurred while the company was still under the PE firm control. In other words, it is important to control for the fact that the deal has not been already exited at the time of default, as in this case the influence of a subsequent owner could have had an impact. To solve this issue, the BvD ID code of each target company was matched with a list of acquisitions provided by Zephyr and carried out between 2000 and 2019, highlighting if the company was involved in any subsequent deal and to determine its date. As not all M&A deals are present in the database, for the target companies identified as defaulted a further control is carried out looking for online news mentioning that they were involved in subsequent deals. For the purpose of this paper, a company is considered as “defaulted” if it missed a payment or filed for bankruptcy, as this is the definition of default for a credit default swap contract, according to the International Swaps and Derivatives Association (ISDA). Therefore, are considered as defaulted companies reporting as “Status” the following captions:

“Bankruptcy”, “Defaulted (Bankruptcy)”, “Active: insolvency proceedings”, “Active (rescue plan)” and “Active: default of payment”. On the contrary, companies reporting “Active” are considered as still alive. Table 2 in Appendix reports detailed description of each Status variable.

This procedure identifies the defaulted companies with high certainty, but few shortfalls are still present. Firstly, for some firms the status is “Unknown” or not reported, hence they are excluded from the analysis, decreasing the sample size. Secondly, it is possible that firms classified as active actually defaulted, both if the status has not been updated anymore or due to errors in the database. For this reason, two other methods to discriminate between the two categories are employed.

Assets analysis, dependent variable (2) is defined

To partially remedy the first shortfall, the approach of Bernstein, Lerner and Mezzanotti (2019)⁶⁸ is applied. It is based on observing whether assets are not reported any more in the database, while they were reported in the year of the acquisition. In this case, a firm is considered “out of business” and these observations are added to the list of defaulted companies found with the first method. Similarly, companies that still report assets are considered as active (26 defaulted and 21 active companies could be added to the sample with this method). However, the interpretation of this variable is unclear as the company can disappear from the database for many reasons, such as an acquisition, a liquidation, a merger or a bankruptcy.

Ratio Approach, dependent variables (3) (4) (5) and (6) are defined

To deal with both the first and second shortfall described, a third method is implemented. The use of financial ratios to predict bankruptcy was pioneered by Beaver (1966)⁶⁹ and Altman (1968)⁷⁰. ROA (defined as net income over total assets) is chosen as discriminant ratio, being found the second-best ratio to predict bankruptcy according to Beaver⁷¹. A decision had to be taken regarding the ratio cut-off point and the year to observe the ROA. It is important to choose a number of years after the transaction in which it is fairly sure that the deal has not been exited yet and, at the same time, enough time is left to the target company to actually default. In this

⁶⁸ Bernstein, S. Lerner, J. and Mezzanotti, F. 2017.

⁶⁹ Beaver, W. 1966. “Financial Ratios as predictors of failure”, *Journal of Accounting Research*, 4, 71-111.

⁷⁰ Altman, E. I. 1968. “Financial ratios, discriminant analysis and the prediction of corporate bankruptcy”, *The Journal of Finance*, 23 (4),589-609.

⁷¹ Beaver (1966) individuates cash flows over total debt as best ratio to predict bankruptcy, however not enough data on cash flows are reported in the database.

paper, the ratios are calculated three and five years after the acquisition as the average holding period is found to be between 4.5 and 5.8 years⁷². Even if five years is probably a better time period, three years is taken into account as more observations are present. Indeed, as only ten years of data are kept in Amadeus, considering a subsequent year decreases the number of observations available. Following the mentioned paper, the cut-off points are set both at 0.02 and 0.00. Concluding, variables (3) and (4) are based on the ROA three years after the transaction with cut-off points of 0.02 and 0.00 respectively. Variables (5) and (6) are defined observing the ROA five years after the transaction with a cut-off point of 0.02 and 0.00 respectively. Table 3 presents an overview of the discussed dependent variables.

Table 3. Description of the dependent variables.

	Definition
Dependent variable (1)	Based on the “status” reported in Amadeus.
Dependent variable (2)	Adding to the defaulted firms found in Dependent variable (1), the firms of which the assets disappeared from the database.
Dependent variable (3)	Based on ROA 3 years after the acquisition with cutoff point 0.02.
Dependent variable (4)	Based on ROA 3 years after the acquisition with cutoff point 0.00.
Dependent variable (5)	Based on ROA 5 years after the acquisition with cutoff point 0.02.
Dependent variable (6)	Based on ROA 5 years after the acquisition with cutoff point 0.00.

3.2 Explanatory variables

Leverage

This variable is measured by the ratio of debt to capital⁷³ in the year of the acquisition. Outliers are winsorized at the 99th and 1st percentile to obtain more robust results.

Top 5

This variable is a binary variable which points out whether the transaction is carried out by a particularly active PE firm. The five PE firms are individuated relying on the number of transactions carried out within the sample, as this is assumed to be an indicator of a firm’s size. They are Blackstone, the Carlyle Group, Sun Capital Partners, 3 I Group and Riverside.

⁷² Bain & Company, 2019. “Global Private Equity Report 2019”.

⁷³ This approach is utilized by Scellato et al. (2013), Shourun et al. (2011).

Cross Border

A variable that is expected to capture the experience of the PE firm is the dummy variable “Cross Border”, denoting when the PE firm and the target do not belong to the same country. Indeed, it is reasonable to assume that smaller PE firms focus their investments in their own region due to a better knowledge of the market, while bigger firms take on more risk investing abroad, maybe cooperating with smaller local PE firms.

GDP growth

This variable accounts for the economic conditions of the target country. It is calculated by the GDP growth mean of the three years following the acquisition, in the target country. Data was obtained from OECD statistics database.

Deal Type

This is a categorical variable that distinguishes among distressed acquisitions, secondary buyouts and the rest of the transactions. Secondary buyouts are identified according to the “deal rationale” description reported in Amadeus, which indicates whether the deal is an exit from a previous PE owner. Moreover, all deals in which the target company is appearing for the second time in the sample were added. Likewise, distressed firms are identified through the “deal rationale” reported in Amadeus, whenever a distressed acquisition caption is reported. In addition, when all needed accounting data relative to the year before the transaction are available, the z-score for non-manufacturing companies (Altman, 2000⁷⁴) is used to define whether the acquired company was in financial distress before the acquisition.

The z-score is defined as:

$$Z - score = 6.72 \frac{EBIT}{TA} + 1.05 \frac{MV Equity}{TL} + 6.5 \frac{WC}{TA} + 3.26 \frac{RE}{TA}$$

with Equity being market value of equity; WC working capital; RE retained earnings; TL total liabilities and TA total assets. As some data to calculate the ratios is missing, “shareholder funds” are used instead of retained earnings and book value of equity is employed instead of the market value (the same approximations are used by Tykvová and Borell, calculating the z-

⁷⁴ Altman, E. I. 2000. “Predicting Financial Distress of Companies: revisiting the z-score and zeta models”, Working paper, Stern School of Business, New York University.

score using Amadeus database⁷⁵). According to the model, companies that score more than 2.9 are considered healthy, companies with a lower score than 1.23 are in high financial distress and the ones with a score in-between stand in a grey area. In this paper, only companies with a score lower than 1.23 are categorized as in financial distress.

ROA

The variable “ROA” is defined as net income over total assets in the last full year prior to the buyout. Outliers are winsorized at the 99th and 1st percentile.

Common Law

This is a binary variable which takes into account whether the target company operates in a common law country (UK) or not.

Target age

This variable captures the age of the target company and is calculated as the difference between the incorporation year, reported in Amadeus, and the deal year reported in Zephyr. The variable is transformed into natural logarithms to avoid spurious results⁷⁶.

3.3 Instrumental variables

Revenue and EBIT

These variables are observed in the year before the transaction. Outliers are winsorized at the 99th and 1st percentile.

ROE

This variable is calculated as net income over equity in the year previous to the acquisition. Outliers are winsorized at the 99th and 1st percentile.

⁷⁵ Tykvová, T. and Borell, M. 2012. “Do Private Equity Owners Increase Risk of Financial Distress and Bankruptcy“, *Journal of Corporate Finance*, 18 (1), 138-150.

⁷⁶ The logarithmic transformation is suggested by several studies in order to minimize outliers (Keene, 1995).

Initial stake

This is a dummy variable which indicates whether the PE firm was already owning a minor stake in the target company before the acquisition. The information is taken by the “deal description” reported in Amadeus which indicates whether the acquisition is 100% and the previously owned stake.

Crisis

This is a dummy variable that controls whether the financial crisis has an impact on the probability of default. It identifies the acquisitions carried out between 2006 and 2009.

TA

This variable is an approximation of the target’s size and refers to the total assets one year previous to the acquisition. Outliers are winsorized at the 99th and 1st percentile.

Leverage -1

This variable is calculated as debt over capital in the year previous to the acquisition. Outliers are winsorized at the 99th and 1st percentile.

Long term interest rates

The variable “LT” aims to capture the importance of the cost of debt at the time of the transaction. Long term interest rates were collected in relation to the target company for the year in which the acquisition took place.

Premium

This variable is employed as a measure of deal pricing. The premium paid over the target is calculated as the percentage difference between the price paid for the firm (deal value), as reported in Zephyr, and the total book value of the target company in the year before the transaction, calculated as the sum of total liabilities and equity⁷⁷. Outliers are winsorized at the 99th and 1st percentile.

⁷⁷ A similar approach is employed by Shourun et al. (2011).

Industry

In order to control whether targets operating in specific industries behave differently, industry dummies were added into the regression. The industry for every target company is defined starting from the four-digit SIC code reported in Amadeus for each company. The industries considered are construction, finance, manufacturing, mining, retailing, services, transports, wholesale, public administration, and agriculture.

Table 4 (in Appendix) reports a detailed description of each variable and the sources.

3.4 Summary statistics

Table 5 reports summary statistics for all the variables included in the regressions. The discrepancy in the number of observations is due to data availability. Indeed, the variables reflecting accounting data include considerably fewer observations than the others.

Moreover, a deal outcome could be determined only for a partial number of deals, ranging between 4793 in model II and 1092 in Models V and VI. Thus, six different subsamples are analyzed, one for each model.

Average leverage is 65%, which is lower than the 90% found for the 1980s deals, and the 70% for the second LBOs wave of 70%⁷⁸, but still high enough to greatly impact the default risk of the target firms. In addition, it is quite stable throughout the sample (66% for 2000-2009 buyouts and 64% for 2010-2015 buyouts).

The variable Age, indicates that an ample variety of companies is included in the sample. The age range between 0 and 157 shows that some firms are sold within the first year of inception. The mean of 20 years suggests that the majority are relatively older firms than start-ups. The same is underlined by the revenue which ranges between 1 and \$2.4 Million.

The low average ROA of 3.8% can be explained by the fact that PE firms usually target companies that have margins for operational improvements as one of the main focus points of

⁷⁸ Shourun (2011).

PE activity is the efficiency improvement throughout the holding period. The average ROA 5 years after the transaction is, in fact, found to be 18%.

Cross border acquisitions account for 39% of the full sample, while 23% of the sample are acquisitions of UK companies.

Looking at the control variables, the mean premium is 10% which is relatively low. Remarkable is that without winsorizing the variable, the average premium is 121% showing that few bigger deals are present in the sample.

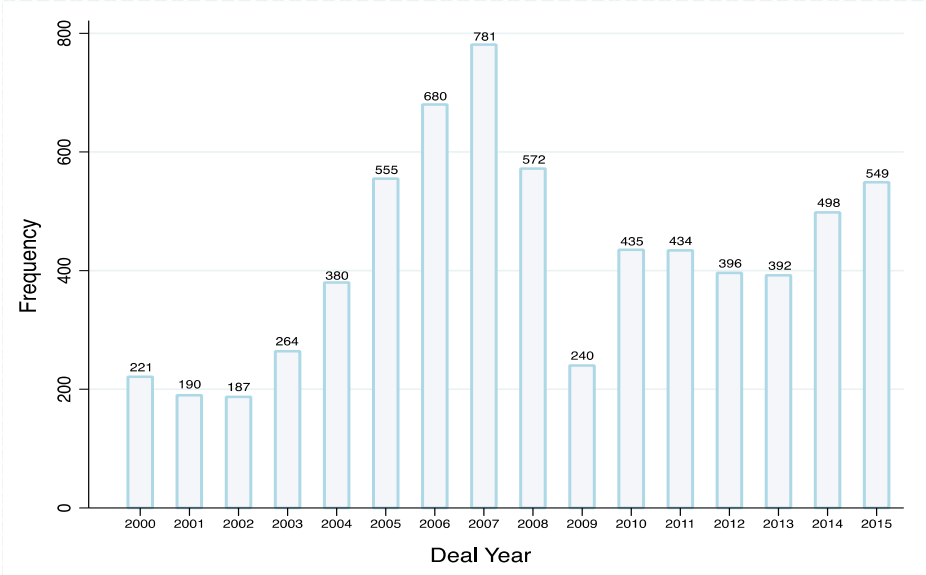
Table 5. Descriptive statistics for all the variables.

Variable	Variable type	Nr Obs	Mean	St dev	Min	Max	Nr. 0	Nr. 1
Dependent variable (1)	Binary	4791	-	-	-	-	4653	138
Dependent variable (2)	Binary	4793	-	-	-	-	4629	164
Dependent variable (3)	Binary	1699	-	-	-	-	902	797
Dependent variable (4)	Binary	1699	-	-	-	-	1138	561
Dependent variable (5)	Binary	1092	-	-	-	-	620	472
Dependent variable (6)	Binary	1092	-	-	-	-	736	356
Leverage	Continuous	1824	0,647	0,399	0	2,772	-	-
Top5	Binary	7318	-	-	-	-	7144	174
Cross border	Continuous	7318	-	-	-	-	4472	2846
GDP	Continuous	6756	1,823	1,739	-7,297	11,752	-	-
Distressed	Binary	7318	-	-	-	-	6949	369
SBOs	Binary	7318	-	-	-	-	5231	2087
ROA	Continuous	4179	0,038	0,201	-0,827	0,558	-	-
Common law	Binary	7318	-	-	-	-	5633	1685
Age	Continuous	4430	19,591	20,578	0	157	-	-
Revenue	Continuous	1072	93498,410	240976,500	1	2407510	-	-
EBIT	Continuous	4214	4775,723	82258,32	-1757819	4470000	-	-
Initial stake	Binary	7318	-	-	-	-	6881	437
ROE	Continuous	4173	0,169	1,476	-7,740	8,070	-	-
Crisis	Binary	7318	-	-	-	-	4730	2588
Leverage -1	Continuous	1587	0,630	0,335	0,000	1,96	-	-
TA	Continuous	4716	118049,500	358527,800	2,859882	3662453	-	-
LTI	Continuous	6602	3,644	1,427	-0,069	15,824	-	-
Premium	Continuous	635	10,028	63,707	-0,968	544,51	-	-

Figure 3 presents the number of deals in regard to the year, while Table 6 (in Appendix) shows the number of deals by country. Even if the database is not complete and fails to report many deals, it is still found to reflect the real situation as the United Kingdom is the country which

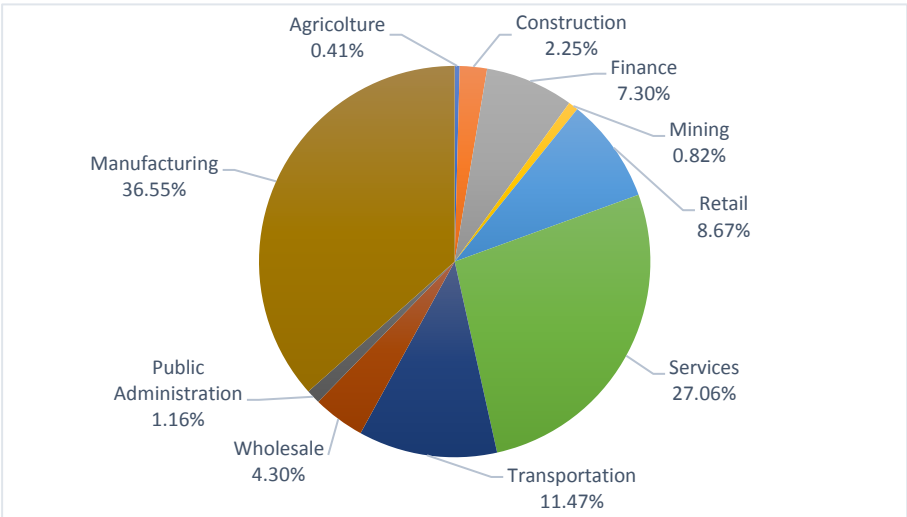
presents more observations, followed by France and Germany⁷⁹. Moreover, looking at observations throughout the years it is easily identifiable the boom followed by the 2008 financial crisis.

Figure 3. Deals partition among years.



The industry of the target could be determined in 2930 deals. Figure 4 shows the industry’s frequency in the various industries, pointing out that almost 65% of the targets involved in the transaction are from either the manufacturing or services sector.

Figure 4. Targets partition among industries.



⁷⁹ According to Thomson Reuters, between 2005 and 2015 the UK accounted for one third of PE deals worldwide and one quarter of deal value across Europe.

4 Empirical Analysis

4.1 Methodology

The aim of the paper is to individuate the main factors that influence the probability of a firm's default after the acquisition from a PE firm. In particular, the objective is to differentiate among three categories of factors: pre-buyout determinants of the target company, economic factors and the ones that capture specific characteristics of the PE deal. The analysis uses cross-sectional data with continuous and categorical predictors, while the dependent variable admits a binary outcome. In previous literature, logit and probit models are usually used to predict bankruptcy (Hauser and Booth, 2011⁸⁰; Ohlson, 1980⁸¹; Burth et al. 2019⁸²). For the purpose of this paper, a maximum likelihood logistic regression is employed, and the analysis of the odds is performed. Stata is employed to analyze the data.

The proposed regression, including all explanatory variables, is the following:

$$Default = \alpha + \beta_1Leverage + \beta_2Top5 + \beta_3CommonLaw + \beta_4CrossBorder + \beta_5GDP + \beta_6ROA + \beta_7DealType + \beta_1TargetAge$$

4.2 Results

Table 7 presents six different models with the respective results. Each model includes one of the dependent variables previously defined. Multicollinearity among explanatory variables is tested through the variance inflation factor (VIF) reported in Table 8 in the Appendix, which shows how much the variance of the coefficient estimate is being inflated by multicollinearity, the correlation matrix between predictors and the condition indexes⁸³. All the variables show VIF values of less than 2.5 which is considered to be the maximum acceptable to claim absence of multicollinearity in the model⁸⁴. The correlation matrix (showed in Table 9 in Appendix) among predictors reports a correlation of 30% between the two deal categories “distressed” and “SBOs” and a correlation of 23% between leverage and the deal type “distressed”. However,

⁸⁰ Hauser, R. P. and Booth, D., 2011. “Predicting Bankruptcy with Robust Logistic Regression”, *Journal of Data Science*, 9, 565-584.

⁸¹ Ohlson, J. A. 1980. “Financial ratios and the probabilistic prediction of bankruptcy”, *Journal of Accounting Research*, 18, 109-131.

⁸² Burth, B. and Solveig R. 2019.

⁸³ The approach is taken by Habshah, M. et al. (2013).

⁸⁴ Allison, P. D. 1999. “Logistic Regression Using the SAS system: Theory and Applications”, Cary, NC: SAS Institute Inc.

none of the correlation coefficients is higher than 0.8, which is considered the critical value to recognize multicollinearity⁸⁵. Finally, the condition indexes (Table 10 in Appendix) are all lower than 15⁸⁶. OLS regressions are employed as robustness tests, confirming that the direction and the significance of the variables are in line with the logistic regression ones (results for OLS are reported in Table 11 in Appendix).

Table 7. Regressions results, using all explanatory variables. Logit regression results reported as odds ratios.

Model	Dependent variable					
	1	2	3	4	5	6
Leverage	2,136*** (0,62)	2,304*** (0,63)	1,166 (0,22)	1,574** (0,31)	1,880*** (0,49)	2,171*** (0,58)
Top 5	2,711 (2,94)	2,332 (2,53)	0,453 (0,24)	0,543 (0,32)	0,610 (0,44)	0,234 (0,18)
Cross flag	0,296*** (0,11)	0,290*** (0,10)	1,213 (0,15)	1,099 (0,14)	1,087 (0,17)	1,110 (0,19)
GDP	0,863 (0,11)	0,810* (0,09)	0,896** (0,04)	0,939 (0,04)	1,002** (0,05)	0,955 (0,06)
Distressed	0,842 (0,30)	0,866 (0,29)	1,551*** (0,25)	1,269 (0,20)	1,363 (0,27)	1,054 (0,22)
SBOs	0,411** (0,18)	0,414** (0,18)	0,787* (0,12)	0,759* (0,12)	0,869 (0,17)	0,913 (0,19)
ROA	0,085*** (0,05)	0,100*** (0,06)	0,070*** (0,03)	0,135*** (0,05)	0,213*** (0,09)	0,177*** (0,35)
CL	2,860** (0,93)	3,952*** (1,22)	0,793* (0,12)	0,8943 (0,15)	0,694* (0,14)	0,691* (0,15)
Log Age	1,632 (0,65)	1,400 (0,53)	0,494*** (0,08)	0,541*** (0,09)	0,524*** (0,11)	0,457*** (0,10)
Constant	0,010*** (0,01)	0,013*** (0,01)	1,96*** (0,49)	0,722 (0,18)	1,18 (0,36)	0,740 (0,24)
Pseudo R ²	0,121	0,136	0,091	0,066	0,076	0,073
Observations	1462	1509	1316	1316	784	784

notes:

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level.

As expected, most of the deals have a positive outcome and the default rate is very low. Considering models I and II, which rely on larger samples, the default rate ranges between

⁸⁵ Habshah, M. Sarkar, S. K. and Rana, S. 2013.

⁸⁶ Considered as rule of thumb by Habshah, M. Sarkar, S. K. and Rana, S. 2013.

2,88% and 3.42% for the analyzed period (on average 0.2% annually). This is lower than the global speculative-grade default rate, of 4.20% on average, between 2000 and 2015. Taking into account the crisis period only, the average default rate between 2007 and 2010 increases to 0.8% annually, which is still lower than the average default rate of 1.88% for the same period⁸⁷.

The first two models are believed to better capture the reality as the other four are possibly biased. Firstly, if a PE firm exited the investment before the set periods of three and five years considered, there would be the influence of a subsequent owner. Secondly, the target could take longer periods to default, as sometimes the acquisitions are kept in the portfolio even for 10 years. For example, Blackstone, one of the biggest PE firm in the world, acquired the famous Hilton Hotel chain in 2007 and sold it through an IPO in 2018 gaining \$14 billion after 11 years. Hence, the default rates for the analyzed samples could be biased both downward and upward. For this reason, the models that rely on the ROA cut-off points are mainly utilized to confirm the findings of models I and II.

The results of the statistical significance show that some of the independent variables are not statistically significant. Furthermore, some variables change the significance according to the model.

4.2 Adding extra explanatory variables

The introduction of more explanatory variables in the model is a recurring strategy used in literature to verify the robustness of the estimations. The aim is to control for other factors suspected to affect the dependent variable.

In Table 12, 13, 14, 15, 16 and 17 (in Appendix) the models are tested adding several instrumental variables. Every table refers to one of the six different models showed in Table 5. Regression I reports the results obtained including only the explanatory variables. Control variables that reflect accounting data are included one by one due to the strong correlation among them. Regression II includes Revenue while regression III includes EBIT. Regression

⁸⁷ Data for default's rates are taken from Moody's, 2016. "Annual Global Corporate Default Study And Rating Transitions".

IV substitutes ROA with ROE to test whether a different efficiency ratio has the same impact. Regression V includes the variable TA. In Regression VI the binary variables Crisis and Initial stake are included. In regression VII leverage level before the transaction is included while the deal type “Distressed” is excluded as they would capture the same information. Since the literature finds correlation among leverage, interest rates and premium paid for the target, these two variables were not included in the original models as to not influence the variable Leverage, and are added as control variables in regressions VIII and IX. Finally, regressions X and XI control for years and countries fixed effects.

The continuous variable Leverage is highly statistically significant in five of the studied models. The odds ratios indicate that, holding all the other variables at a fixed value, for a unit increase in leverage the odds of default increase by between 57% and 117%. The results hold in all the models in which leverage is found significant, and also when adding most of the control variables. Exceptions are observed when including Revenue or industry fixed effect, but this can be explained by the considerable reduction in sample size in these two regressions. Hence, hypothesis 1 is confirmed. This means that the debt taken on for the purpose of the acquisition has a great impact on the probability of default and that PE firms are occasionally leveraging their targets with an unsustainable level of debt. At the same time, several studies⁸⁸ argue that firms with greater increases in leverage have, in the end, higher cash flows, operating gains and hence better returns. This means that the amount of debt should be carefully chosen, as it increases returns up to a certain level, while it could lead to the target’s default beyond that point.

A relation between interest rates, leverage and premium paid is pointed out by many studies. Therefore, when adding the variable LTI in regression VIII, it was expected that lower interest rates would increase the probability of default, being drivers of higher leverage and hence higher default probability. However, the results suggest a different conclusion. Interest rates are found to be significant only when including them in the first model (Table 12, regression VIII): for one unit increase in interest rates, the odds of default increase by 18%. Since interest rates are observed in the acquisition year, they are a proxy of the cost of debt employed in the acquisition. Hence, this finding suggests that the higher the interests paid on the debt the higher the probability of default. However, in the other five models the interest rates are not significant, and this could also be caused by a possible correlation between this variable and leverage.

⁸⁸ Shourun (2011).

Similarly, when including the premium (Regression IX), it is found to be significant only in Model I and II. At the same time, the variables LTI and Leverage lose their significance. This difference can be explained by the fact that the three variables are very likely to be correlated and that the regression relies on one fourth of the observations than the other models (as the premium could be only calculated for deals reporting the deal price). Hence, conclusions for the actual impact of interest rates and the premium paid cannot be determined with certainty.

The analysis shows that the variable Top5 is not statistically significant in the models, hence hypothesis 3 is rejected. In Model I and II, in Regressions II, IX and XI the variable had to be omitted due to perfect collinearity with the dependent variable. This means that target companies backed by the five most active PE firms in the sample never defaulted. Still, it is important to consider that the sample is considerably reduced in these regressions and this is likely to be the reason that drives the perfect collinearity: for example, in regression II (Model I) only 20 deals out of 985 are backed by top firms and none of these is found to default. A weakness of this variable is also that many deals carried out by big PE firms are made in cooperation with other sponsors, creating SPVs with different names. As the variable is constructed on the names reported in the database, it is likely that it does not capture all the deals backed by the top 5 PE firms.

The variable Cross Flag is significant in two of the models, showing, on the contrary to hypothesis 8, that firms backed by PE from a different country are less likely to default (in the other four models the direction of the odds ratio is the opposite, however it is not statistically significant). The significance found in Model I and II holds when including the control variables. The negative impact on the default probability can be due to the fact that only the most active and experienced PE firms undertake deals in other countries. Moreover, they probably employ the best experts in the sector and are able to cooperate with smaller local sponsors, which can provide closer insights to the specific market.

The variable GDP while being significant at 0.10 in the second model, it is not in the other models. In addition, the OLS for the second model does not confirm the significance and, when including control variables, it loses its significance (Table 13). Hence, the results suggest that hypothesis 2 is rejected as GDP does not influence the default probability. A possible explanation is that the performance improvement implemented after the acquisition (broadly confirmed in the literature) more than counterbalances the possible losses in revenue due to economic downturns (captured by lower GDP growths). Hence, in the end, the cash flows

available to pay back the debt are not negatively impacted by downturns and the probability of default is unvaried.

The test shows that, among the two deal types defined, only secondary buyouts seem to have an impact on the deal outcome. The variable SBO is significant in four models, showing that in secondary buyouts the likelihood of default decreases by 60% on average. Hence, hypothesis 6 is rejected. On the other hand, secondary buyouts are found to default less than primary buyouts. The odds ratios are slightly different in magnitude throughout the models, but as they are all lower than zero it is possible to claim the positive impact of acquiring the target from another financial sponsor. A possible explanation is that firms that have already been under PE ownership for a certain number of years, are better organized and managed, hence performing better than targets of primary buyouts.

An interesting finding is that companies which are in financial distress when acquired, do not seem to default more than healthy companies. The significance of the variable DIS in Model III can be explained by the fact that three years are not enough to exit a situation of financial distress and the group of companies that report ROA below the cut off points still include some of the companies acquired in financial distress. Indeed, when looking at models which observe the ROA after 5 years, the deal type “distressed” is not significant. To confirm the results the control variable leverage before the transaction is included in regression the Regression VII and it does not seem to influence the deal outcome in any of the models.

The results show that the ROA one year prior to the transaction is significant in all the models. The odds ratios suggest that one unit increase in ROA decreases the odds of default by 13% on average, hence hypothesis 5 is verified. This suggests that firms that are more profitable when acquired, start with an advantage and are probably easier to be operationally improved. When ROE is substituted to ROA in Regressions IV, it is significant only in Model 3 and 4. Therefore, ROA seem to be a better predictor of the probability of default.

The variable common law accounts for targets which operate in the UK, as this is the only state in the European region characterized by this kind of law. The results found for this factor are mixed and controversial. Indeed, despite being significant in five out of six models, the direction of the odds ratios is different showing a positive impact on default in the first two regressions and negative impact in the other three models. The results generally hold also when adding control variables. Following the approach of relying more on the first two models, they suggest that firms default between 2 and 3 times more in UK than in the rest of Europe. A

possible explanation is that the market is particularly developed in the UK, and more generally in common law countries, as the PE activity was born in these regions. As the market is more developed, there is more money invested in the sector from investors. This could lead PE firms to have less choice among possible investments and to more pressure to invest. As a result, PE firms could end up pursuing risky investments due to the usual fee structure of private equity funds. Typically, the PE firms receive an initial fee regardless of future returns, while the second source of income is the carried interests. These ones are distributed only after a minimum return, together with the initial investment, has been returned to the investors (hurdle rate). Moreover, PE firms can borrow money with the only aim to pay dividends, and due to the close link with the banking industry, are likely to obtain credit more easily.

For instance, Phones 4U is one of the target company present in the sample which defaulted. It was the second-biggest mobile phone retailer in UK in the 2000s. In 2008 it was acquired by the private equity firm BC Partners, and ended up bankrupt in 2014. However, few months before the default the company borrowed £200 million to pay BC a special dividend, generating a 30% return on the initial investment in the target. According to the Financial Times this move left the company with debt four times the EBIT and this led soon to the default of the firm.

Summarizing, PE firms in the UK could be less risk adverse than their European colleagues due to the high amount of capital available and the higher difficulty in finding “right” targets, due to competition. Moreover, due to the more developed PE market they could have a closer bond with the banking industry and being able to obtain refinancing, even when the target company is in financial distress.

Finally, in line with hypothesis 4, the results suggest that the age of the target does not have any impact on the deal outcome as the variable is not significant in any of the models. This means that acquiring a startup or a more mature company does not increase the probability of default. To carry out an additional control, the variable age was categorized in three groups: small companies with age lower than 3 (637 observations), medium companies with age between 3 and 9 (1034 observations), and mature companies with age higher than 9 (2759 observations). This division points out that in the full initial sample mature companies were acquired more than four times higher than startups. As expected, substituting this categorical variable with the continuous variable age in the regression, the results do not change and none of the category is significant. An explanation for this finding is that PE firms focus their investment in their area of expertise. For example, it is expected that PE investing in start-ups

are particularly knowledgeable of both the sector and the market. Indeed, there are PE firms specialized in various stages of the corporate cycle (i.e. seed stage, growth capital, turnaround) hence are best able to manage these particular kinds of company.

Generally, including the control variables in the models does not change the main findings highlighted for the explanatory variables. Small differences across the regressions in significance are likely to be explained by the variation in sample size.

Furthermore, revenue, EBIT and total assets before the acquisition seem not to influence the default probability. The dummy variable that captures the crisis period is significant in Model I and II while the variable Initial Stake is significant in Models III and IV. However, as the results are not consistent, it is not possible to claim whether these variables have an impact on the default probability with certainty.

Finally, in regressions XI some industries are actually dropped from the model as they predict failure or success perfectly, due to the few observations available in some groups. Hence, it is not a reliable analysis because the samples are greatly reduced in size.

Table 18 presents a summary of the hypothesis initially stated in this paper and the main findings.

Table 18. Summary of hypothesis and findings.

	Definition	Finding
Hypothesis 1	The higher the leverage used in a transaction the higher the probability of default.	Confirmed
Hypothesis 2	A decrease in the target's country GDP increases the probability of default.	Rejected
Hypothesis 3	Companies backed by more successful PE firms are less likely to default.	Rejected
Hypothesis 4	The age of the target does not influence the probability of default.	Confirmed
Hypothesis 5	Companies which are more profitable before the acquisition are less likely to default.	Confirmed
Hypothesis 6	SBOs are more likely to default than primary buyouts.	Rejected
Hypothesis 7	Acquisitions of distressed companies are more likely to end up in default.	Rejected
Hypothesis 8	Companies backed by PE firms in the same nation are less likely to default.	Rejected
Hypothesis 9	Targets operating in the UK are less likely to default.	Rejected

5. Conclusions

This paper examines whether, and how, several factors influenced the default of the targets in leveraged buyouts between 2000 and 2015. While earlier literature focuses mainly on fund returns analysis and on specific countries or types of deals (MBOs, PTP), this research tries to analyze a broader sample which includes several countries and types of deals.

A sample of 7318 deals was analyzed, but a defined outcome could only be found for a maximum of 4791 (Model II has the higher amount) transactions. Deal leverage, cross border deals, pre-acquisition target ROA, and being from UK or a secondary buyout acquisition seem the variables that mostly impact the likelihood of default. Being a UK target and having high levels of leverage result in an increase of this probability, while the other factors have an opposite influence. On the contrary, the age and the healthiness of the target before the acquisition and the post-buyout GDP do not seem to play a role.

This paper takes into account several factors to determine what influences the default. However, the only factor that captures specific characteristics after the transaction is the variable GDP, which aims to reflect the economic trend after the deal. In the literature, returns are widely found to be driven by changes that the PE management is performing following the investment: mainly improvements in the operating performance (improving profitability, eliminating unproductive assets, usage of assets more effectively, asset purchases or sales). For this reason, it would be interesting to study whether adding these after-deal factors (i.e. management ownership or participation, change in management, subsidiaries selling, capital injections) change the results observed in this paper. A shortfall is represented by the fact that this analysis would need a close cooperation with PE funds, which again could bias the quality of data.

Furthermore, variables related to the PE firms would also be important to study (i.e. age, size, undrawn capital in the transaction year). They were not included in this study because for many deals a SPV is reported instead of the real PE firm, therefore a matching procedure of the BvD codes in Amadeus would miss many observations.

Characteristics of the target market are also likely to influence the deal outcome and it would be interesting to create a matching sample of non-PE-backed firms to obtain industry adjusted results. In this paper when including the industry variable, the sample size is greatly reduced, hence these industry adjusted results could not be observed.

Finally, this paper focuses on deals in Europe and a comparative study for US would be interesting to control whether results are consistent. Indeed, a similar study to the one presented in this paper was attempted for the US, using Orbis which is the equivalent of Amadeus for US companies, but without success due to the lack of accounting data reported in Orbis for the target companies individuated with Zephyr.

A. Appendix

Table 2. Description of Status captions as reported in Amadeus.

Variable	Caption	Description
Company is considered as not defaulted	Active	The company is active.
	Active (rescue plan)	The company remains active; it is not involved in insolvency proceedings, but is in a period of protection. One of the conditions is that the company hasn't been incurred into default of payment (this means that there aren't credits unpaid). The target is to prevent financial difficulties which endanger survival of the company.
	Active (reorganization)	We make a distinction between plain active and active but being reorganized. A priori reason for reorganization is not having financial problems.
	Active (default of payment)	The term "default" should be distinguished from the terms "insolvency" and "bankruptcy". "Default" essentially means a debtor has not paid a debt.
Company is considered as defaulted	Active (insolvency proceedings)	Here the company is declared insolvent. The company remains active, though is in administration or receivership or under a scheme of arrangement (US - Chapter 11). During this period, the company is usually placed under the protection of a law and continues operating and repaying creditors and tries to reorganize and return to normal operating. At the end, the company will either return to normal operating, will be reorganized or will be liquidated.
	Bankruptcy	Bankruptcy is a legally declared inability of a company to pay its creditors. The company is in the process of bankruptcy. The assets are being sold in order to repay the creditors. At the end the company will be dissolved and will no longer exist.
	Dissolved (bankruptcy)	The company has been dissolved at the end of a bankruptcy process or there was a bankruptcy declared into an insolvency or liquidation proceeding.
Observations are not considered	Dissolved	The company no longer exists as a legal entity, but the reason for this is not specified. This means that the company is dead, has no more activity or is no longer included in the companies register.
	In liquidation	All assets of the company are being sold and the next step will be that the company will be dissolved and will no longer exist. We reserve the term "in liquidation" mainly to friendly or voluntary liquidation.
	Dissolved (demerger)	The company no longer exists as a legal entity and the reason for this is a demerger as the company has been "split".
	Dissolved (merger or take-over)	The company no longer exists as a legal entity because the company has been included in a merger or was subject of a take-over.
	Dissolved (liquidation)	The company has been dissolved after (friendly) liquidation of its assets.
	Inactive (no precision) and Unknown	No information regarding the status.

Table 4. Explanatory and control variables description.

NAME	Notation	Type	Definition	Source
Leverage	LEV	Quantitative	Total debt over capital in the year of the transaction.	AMADEUS
Top 5	TOP5	Categorical	Dummy = 1 if PE firm is one of the five most active firm in the sample; 0 otherwise.	ZEPHYR
Cross flag	CF	Categorical	Dummy =1 if target and PE firm are from different countries; 0 otherwise.	ZEPHYR
GDP	GDP	Quantitative	Average GDP growth rate in the target country for the three years after the transaction.	OECD
Distressed acquisition	DISS	Categorical	Dummy =1 if company in financial when acquired; 0 otherwise.	ZEPHYR, AMADEUS
Secondary buyout	SBO	Categorical	Dummy =1 if secondary buyout; 0 otherwise.	ZEPHYR
ROA	ROA	Quantitative	Net income over total assets in the year before the transaction.	AMADEUS
Common law	CL	Categorical	Dummy =1 if the target is from UK ;0 otherwise.	ZEPHYR
Log Age	AGE	Quantitative	Age of the target since establishment. Number of years calculated backwards from the entry year.	AMADEUS AND ZEPHYR
Revenue	REV	Quantitative	Revenue of the firm in the year before the transaction.	AMADEUS
EBIT	EBIT	Quantitative	EBIT of the firm in the year before the transaction.	AMADEUS
ROE	ROE	Quantitative	Net income over equity in the year before the transaction.	AMADEUS
Total assets	TA	Quantitative	Total assets in the year before the transaction.	AMADEUS
Crisis Period	CRIS	Categorical	Dummy =1 if the transaction took place between 2006 and 2009.	ZEPHYR
Initial stake	IS	Categorical	Dummy variable = 1 if PE firm was owing a percentage in n-1; 0 otherwise.	ZEPHYR
Leverage -1	LEV-1	Quantitative	Total debt over capital in the year before the transaction.	AMADEUS
Long term interest rates	LTI	Quantitative	Long term interest rate in the target country in the transaction's year.	OECD
Premium	PRM	Quantitative	Percentage difference between price paid in the deal the sum of total debt and equity the year before the transaction.	ZEPHYR, AMADEUS
Year	YEAR	Categorical	Year of the deal.	ZEPHYR
Industry	IND	Categorical	Industry of the target.	AMADEUS

Table 6. Partition of deals among countries.

Country	Nr. Deals
Austria	93
Belgium	164
Bosnia	2
Bulgaria	20
Croatia	10
Cyprus	5
Czech Republic	102
Denmark	217
Estonia	31
Finland	238
France	1132
Germany	988
Greece	12
Hungary	25
Ireland	51
Italy	442
Latvia	11
Lithuania	34
Luxembourg	32
Macedonia	1
Malta	3
Moldova	1
Netherlands	481
Norway	194
Poland	146
Portugal	74
Romania	45
Russia	74
Serbia	7
Slovakia	34
Slovenia	6
Spain	435
Sweden	395
Switzerland	126
Turkey	42
Ukraine	11
UK	1634

Table 8. Variance inflation factor for explanatory variables.

Variable	VIF	1/VIF
Leverage	1.14	0.8795
Top 5	1.03	0.9683
Cross flag	1.04	0.9595
GDP	1.07	0.9385
Distressed acquisition	1.23	0.8151
Secondary buyout	1.13	0.8869
ROA	1.16	0.8607
Common law	1.06	0.9432
Log Age	1.03	0.9742
Mean VIF	1.10	

Table 9. Correlation matrix among predictors.

Variable	Leverage	Top 5	Cross flag	GDP	Distressed acquisition	Secondary buyout	ROA	Common law	Log age
Leverage	1.0000								
Top 5	0.0155	1.0000							
Cross flag	-0.0441	-0.1275	1.0000						
GDP	0.0728	0.0050	-0.1042	1.0000					
Distressed acquisition	-0.1748	-0.0180	-0.0518	0.0209	1.0000				
Secondary buyout	-0.0312	-0.1109	-0.0568	0.0240	0.2930	1.0000			
ROA	0.2370	0.0158	0.0198	0.0363	0.1935	-0.0133	1.0000		
Common law	-0.0062	-0.0223	-0.0623	-0.2134	-0.0048	-0.0789	-0.0485	1.0000	
Log Age	0.0129	0.0023	0.0419	-0.0491	0.0579	0.0022	-0.1018	0.0054	1.0000
cons	-0.4660	0.0054	-0.1914	-0.2466	-0.1593	-0.1593	-0.1260	-0.0698	-0.7436

Table 10. Conditional indexes for explanatory variables (factor variables not allowed).

Variable	Conditional Index
Leverage	1.00
GDP	1.87
ROA	3.00
Common law	4.61
Log Age	8.97

Table 11. OLS results, using all explanatory variables.

Model	Dependent variable					
	1	2	3	4	5	6
Leverage	0,045*** (0,01)	0,053*** (0,01)	0,038 (0,04)	0,092*** (,04)	0,135*** (0,05)	0,157*** (0,05)
Top 5	0,023 (0,04)	0,019 (0,04)	-0,159 (0,10)	-0,107 (0,09)	-0,100 (0,15)	- 0,196 (0,13)
Cross flag	-0,033*** (0,01)	-0,036*** (0,01)	0,042* (0,02)	0,019 (0,02)	0,018 (0,03)	0,021 (0,01)
GDP	-0,003 (0,00)	-0,005 (0,00)	-0,024*** (0,01)	-0,0125 (0,01)	-0,026** (0,12)	-0,009 (0,01)
Distressed	-0,012 (0,01)	-0,012 (0,03)	0,109*** (0,04)	0,054* (0,03)	0,077* (0,05)	0,012 (0,04)
SBOs	-0,022* (0,01)	-0,023** (0,01)	-0,049* (0,03)	-0,048* (0,03)	-0,028 (0,04)	-0,013 (0,03)
ROA	-0,107*** (0,03)	-0,103*** (0,03)	-0,534*** (0,07)	-0,406*** (0,07)	-0,338*** (0,09)	-0,347*** (0,08)
CL	0,037*** (0,01)	0,054*** (0,01)	-0,051* (0,03)	-0,008 (0,03)	-0,076* (0,04)	-0,062* (0,03)
Log Age	0,013 (0,01)	0,008 (0,01)	-0,157*** (0,03)	-0,127*** (0,03)	-0,148*** (0,04)	-0,163*** (0,04)
Constant	0,015 (0,02)	0,008 (0,01)	0,638*** (0,05)	0,417*** (0,05)	0,538*** (0,06)	0,426 (0,06)
R ²	0,041	0,049	0,117	0,080	0,081	0,089
Observations	1462	1509	1316	1316	784	784

notes:

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level.

Table 12. Regressions results with dependent variable (1), adding control variables. Logit regression results reported as odds ratios.

Variables	Model										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
LEV	2,136*** (0,62)	2,357** (0,98)	2,150*** (0,63)	3,193*** (0,88)	2,146*** (0,62)	2,206*** (0,64)	3,311*** (1,24)	2,093*** (0,61)	1,077 (0,75)	2,211*** (0,66)	0,879 (0,78)
Top5	2,711 (2,94)	(a)	2,656 (2,88)	2,702 (2,93)	2,693 (2,92)	2,759 (2,99)	2,480 (2,68)	2,659 (2,89)	(a)	3,210 (3,53)	(a)
CB	0,296*** (0,11)	0,383** (0,18)	0,301*** (0,11)	0,311*** (0,11)	0,290*** (0,11)	0,291*** (0,11)	0,343*** (0,13)	0,305*** (0,11)	0,394 (0,25)	0,312*** (0,11)	0,199** (0,28)
GDP	0,863 (0,11)	0,922 (0,14)	0,862 (0,11)	0,973 (0,11)	0,870 (0,11)	0,898 (0,12)	0,929 (0,12)	1,04 (0,14)	1,142 (0,24)	0,811 (0,13)	1,048 (0,28)
DIS	0,842 (0,30)	1,206 (0,55)	0,837 (0,29)	0,972 (0,35)	0,834 (0,29)	0,857 (0,30)	-	0,886 (0,31)	0,874 (0,62)	0,943 (0,34)	0,645 (0,57)
SBO	0,411** (0,18)	0,579 (0,39)	0,403** (0,18)	0,428** (0,19)	0,410** (0,18)	0,408** (0,18)	0,534 (0,23)	0,446* (0,20)	0,532 (0,37)	0,401** (0,18)	0,724 (0,57)
ROA	0,085*** (0,05)	0,118*** (0,10)	0,087*** (0,05)	-	0,085*** (0,05)	0,090*** (0,06)	0,105*** (0,07)	0,088*** (0,05)	0,124* (0,14)	0,082*** (0,05)	0,019** (0,03)
CL	2,860** (0,93)	21,702** (30,23)	2,936*** (0,95)	2,505*** (0,81)	2,811*** (0,92)	3,249*** (1,09)	2,793*** (0,94)	2,733*** (0,89)	8,947*** (6,19)	3,419*** (1,23)	7,624*** (5,51)
AGE	1,632 (0,65)	1,127 (0,60)	1,630 (0,65)	1,401 (0,57)	1,583 (0,63)	1,671 (0,66)	1,823 (0,77)	1,643 (0,66)	1,452 (1,19)	1,753 (0,72)	1,173 (1,03)
REV	-	1,000 (6,42)	-	-	-	-	-	-	-	-	-
EBIT	-	-	1,000 (0,01)	-	-	-	-	-	-	-	-
ROE	-	-	-	0,955 (0,09)	-	-	-	-	-	-	-
TA	-	-	-	-	1,00 (2,97)	-	-	-	-	-	-
CRI	-	-	-	-	-	3,065** (1,42)	-	-	-	-	-
IS	-	-	-	-	-	1,391 (0,71)	-	-	-	-	-
LEV-1	-	-	-	-	-	-	0,546 (0,29)	-	-	-	-
LTI	-	-	-	-	-	-	-	1,175* (0,10)	1,291 (0,25)	-	-
Premium	-	-	-	-	-	-	-	-	1,005* (0,00)	-	-
Year dummies	No	No	No	No	No	No	No	No	No	Yes	No
Industry dummies	No	No	No	No	No	No	No	no	No	No	Yes
Constant	0,010*** (0,01)	0,019*** (0,01)	0,018*** (0,01)	0,016*** (0,01)	0,001*** (0,01)	0,014*** (0,009)	0,01*** (0,01)	0,009*** (0,01)	0,01*** (0,00)	0,102*** (0,00)	0,035** (0,06)
Pseudo R ²	0,111	0,102	0,117	0,089	0,122	0,133	0,114	0,124	0,158	0,168	0,280
Nr Obs	1462	985	1425	1461	1462	1462	1394	1426	535	1423	470

notes:

(a) variable omitted due to perfect collinearity

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level.

Table 13. Regressions results with dependent variable (2), adding control variables. Logit regression results reported as odds ratios.

Variables	Model										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
LEV	2,304*** (0,63)	2,109* (0,88)	2,059*** (0,59)	3,356*** (0,89)	2,311*** (0,64)	3,394*** (0,67)	3,773*** (1,38)	2,258*** (0,63)	2,007 (1,09)	2,423*** (0,69)	2,186 (1,39)
Top5	2,332 (2,53)	(a)	2,428 (2,63)	2,263 (2,45)	2,327 (2,52)	2,424 (2,62)	2,283 (2,47)	2,293 (2,48)	(a)	2,496 (2,74)	(a)
CB	0,290*** (0,10)	0,390** (0,18)	0,278*** (0,10)	0,305*** (0,11)	0,285*** (0,09)	0,295*** (0,11)	0,350*** (0,12)	0,301*** (0,11)	0,438 (0,25)	0,296*** (0,10)	0,218** (0,16)
GDP	0,810* (0,09)	0,882 (0,13)	0,803* (0,09)	0,853 (0,09)	0,817 (0,09)	0,824 (0,09)	0,893 (0,11)	0,943 (0,12)	1,047 (0,23)	0,871 (0,13)	0,864 (0,21)
DIS	0,866 (0,29)	1,122 (0,51)	0,837 (0,28)	0,979 (0,34)	0,857 (0,29)	0,874 (0,29)	-	0,899 (0,30)	1,106 (0,68)	0,924 (0,32)	0,816 (0,59)
SBO	0,414** (0,18)	0,541 (0,35)	0,435** (0,19)	0,431** (0,18)	0,412** (0,17)	0,410** (0,17)	0,479** (0,21)	0,441* (0,19)	0,450 (0,31)	0,434** (0,19)	0,792 (0,56)
ROA	0,100*** (0,06)	0,117*** (0,10)	0,092*** (0,06)	-	0,099*** (0,06)	0,117*** (0,07)	0,117*** (0,08)	0,104*** (0,06)	0,159* (1,78)	0,094*** (0,05)	0,024** (0,04)
CL	3,952*** (1,22)	21,638** (29,86)	3,673*** (1,15)	3,482*** (1,06)	3,884*** (1,19)	4,649*** (1,48)	3,493*** (1,21)	3,846*** (0,06)	14,367*** (9,93)	4,428*** (1,48)	14,719*** (10,18)
AGE	1,400 (0,53)	1,095 (0,57)	1,351 (0,52)	1,21)	1,358 (0,52)	1,425 (0,54)	1,787 (0,73)	3,846*** (1,19)	1,626 (1,26)	1,493 (0,58)	0,969 (0,74)
REV	-	1,00 (6,38)	-	-	-	-	-	-	-	-	-
EBIT	-	-	0,999* (1,96)	-	-	-	-	-	-	-	-
ROE	-	-	-	0,9554 (0,08)	-	-	-	-	-	-	-
TA	-	-	-	-	1,00 (2,88)	-	-	-	-	-	-
CRI	-	-	-	-	-	2,709** (1,18)	-	-	-	-	-
IS	-	-	-	-	-	1,917 (0,86)	-	-	-	-	-
LEV-1	-	-	-	-	-	-	0,487 (0,26)	-	-	-	-
LTI	-	-	-	-	-	-	-	1,143 (0,10)	1,392 (0,25)	-	-
Premium	-	-	-	-	-	-	-	-	1,006* (0,00)	-	-
Year dummies	No	No	No	No	No	No	No	No	No	Yes	No
Industry dummies	No	No	No	No	No	No	No	no	No	No	Yes
Constant	0,013*** (0,01)	0,022*** (0,02)	0,026*** (0,02)	0,019*** (0,01)	0,022*** (0,01)	0,014*** (0,009)	0,015*** (0,01)	0,012*** (0,01)	0,01*** (0,00)	0,074*** (0,10)	0,025** (0,04)
Pseudo R ²	0,135	0,095	0,129	0,109	0,137	0,133	0,127	0,135	0,190	0,168	0,285
Nr Obs	1509	1024	1494	1508	1509	1462	1440	1472	556	1443	489

notes:

(a) variable omitted due to perfect collinearity

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level.

Table 14. Regressions results with dependent variable (3), adding control variables. Logit regression results reported as odds ratios.

Variables	Model										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
LEV	1,166 (0,22)	0,877 (0,21)	1,196 (0,24)	1,577*** (0,29)	1,162 (0,22)	1,198 (0,24)	1,183 (0,32)	1,101 (0,22)	2,099** (0,77)	1,167 (0,23)	1,422 (0,50)
Top5	0,453 (0,24)	0,375 (0,24)	0,449 (0,23)	0,518 (0,26)	0,432 (0,22)	0,457 (0,24)	0,496 (0,26)	0,456 (0,23)	0,313 (0,24)	0,422 (0,22)	0,326 (0,24)
CB	1,213 (0,15)	1,114 (0,16)	1,226* (0,15)	1,230* (0,14)	1,178 (0,14)	1,232* (0,15)	1,251* (0,15)	1,196 (0,14)	1,602** (0,33)	1,202 (0,15)	1,285 (0,27)
GDP	0,896** (0,04)	0,838*** (0,04)	0,896** (0,04)	0,913** (0,04)	0,899** (0,04)	0,894 (0,04)	0,902** (0,04)	0,869*** (0,04)	0,845* (0,07)	0,876** (0,05)	0,895 (0,06)
DIS	1,551*** (0,25)	1,852*** (0,35)	1,530*** (0,25)	1,737*** (0,27)	1,532*** (0,24)	1,517*** (0,24)	-	1,543*** (0,25)	0,948 (0,25)	1,564*** (0,25)	1,047 (0,29)
SBO	0,787* (0,12)	0,954 (0,17)	0,812 (0,12)	0,787* (0,11)	0,769* (0,11)	0,768* (0,11)	0,719** (0,10)	0,814 (0,12)	0,762 (0,18)	0,797 (0,12)	0,727 (0,18)
ROA	0,070*** (0,03)	0,053*** (0,03)	0,078*** (0,02)	-	0,076*** (0,02)	0,075*** (0,02)	0,056*** (0,02)	0,061*** (0,02)	0,018*** (0,01)	0,069*** (0,03)	0,037*** (0,02)
CL	0,793* (0,12)	(a)	0,775* (0,12)	0,769* (0,11)	0,763* (0,11)	0,807 (0,12)	0,813 (0,12)	0,832 (0,12)	0,683* (0,15)	0,807 (0,12)	0,659* (0,15)
AGE	0,494*** (0,08)	0,443*** (0,08)	0,505*** (0,08)	0,438*** (0,04)	0,477*** (0,08)	0,489*** (0,07)	0,479 (0,07)	0,508*** (0,)	0,628 (0,17)	0,504*** (0,08)	0,555** (0,16)
REV	-	1,00** (3,39)	-	-	-	-	-	-	-	-	-
EBIT	-	-	0,999* (1,53)	-	-	-	-	-	-	-	-
ROE	-	-	-	0,858*** (0,39)	-	-	-	-	-	-	-
TA	-	-	-	-	1,00 (1,82)	-	-	-	-	-	-
CRI	-	-	-	-	-	1,014 (0,27)	-	-	-	-	-
IS	-	-	-	-	-	1,666** (0,38)	-	-	-	-	-
LEV-1	-	-	-	-	-	-	1,010 (0,04)	-	-	-	-
LTI	-	-	-	-	-	-	-	1,143 (0,10)	0,965 (0,06)	-	-
Premium	-	-	-	-	-	-	-	-	1,00 (0,00)	-	-
Year dummies	No	No	No	No	No	No	No	No	No	Yes	No
Industry dummies	No	No	No	No	No	No	No	no	No	No	Yes
Constant	1,960*** (0,49)	02,71*** (0,83)	1,882*** (0,472)	1,6319** (0,39)	1,949*** (1,48)	1,884*** (0,47)	1,852** (0,49)	1,984** (0,04)	1,440 (0,79)	1,845 (1,47)	1,456** (0,96)
Pseudo R ²	0,091	0,099	0,092	0,066	0,097	0,094	0,086	0,094	0,125	0,096	0,111
Nr Obs	1316	907	1309	1316	1316	1316	1253	1282	499	1315	459

notes:

(a) variable omitted due to perfect collinearity

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level.

Table 15. Regressions results with dependent variable (4), adding control variables. Logit regression results reported as odds ratios.

Variables	Model										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
LEV	1,574** (0,31)	1,259 (0,31)	1,579** (0,30)	1,947*** (0,37)	1,569** (0,31)	1,624*** (0,32)	1,663** (0,44)	1,511** (0,31)	2,579*** (0,97)	1,598*** (0,32)	1,598 (0,56)
Top5	0,543 (0,32)	0,614 (0,43)	0,543 (0,31)	0,697 (0,35)	0,523 (0,30)	0,544 (0,31)	0,567 (0,33)	0,558 (0,32)	0,389 (0,33)	0,528 (0,32)	0,426 (0,35)
CB	1,099 (0,14)	0,984 (0,15)	1,088 (0,14)	1,112 (0,14)	1,072 (0,14)	1,118 (0,14)	1,134 (0,14)	1,061 (0,14)	1,642** (0,35)	1,086 (0,14)	1,279 (0,29)
GDP	0,939 (0,04)	0,867** (0,04)	0,941 (0,04)	0,951 (0,04)	0,943 (0,04)	0,941 (0,04)	0,943 (0,04)	0,919 (0,05)	0,904 (0,08)	0,934 (0,05)	0,922 (0,07)
DIS	1,269 (0,20)	1,666*** (0,31)	1,266 (0,20)	1,298* (0,21)	1,256 (0,20)	1,241 (0,20)	-	1,274 (0,21)	0,865 (24)	1,265 (0,20)	1,089 (0,31)
SBO	0,759* (0,12)	0,887 (0,17)	0,774 (0,13)	0,755* (0,12)	0,748* (0,12)	0,737** (0,12)	0,719** (0,11)	0,799 (0,13)	0,681 (0,18)	0,761* (0,13)	0,713 (0,20)
ROA	0,135*** (0,05)	0,119*** (0,31)	0,144*** (0,05)	-	0,141*** (0,04)	0,146*** (0,05)	0,126*** (0,04)	0,120*** (0,04)	0,078*** (0,05)	0,140*** (0,04)	0,103*** (0,06)
CL	0,8943 (0,15)	(a)	0,939 (0,15)	0,937 (0,14)	0,915 (0,15)	0,976 (0,15)	0,939 (0,15)	1,005 (0,16)	0,757 (0,18)	0,957 (0,16)	0,828 (0,21)
AGE	0,541*** (0,09)	0,571*** (0,11)	0,541*** (0,08)	0,474*** (0,07)	0,521*** (0,08)	0,532*** (0,08)	0,532*** (0,08)	0,558*** (0,09)	0,506** (0,15)	0,542*** (0,09)	0,529** (0,16)
REV	-	1,00** (0)	-	-	-	-	-	-	-	-	-
EBIT	-	-	0,999* (1,13)	-	-	-	-	-	-	-	-
ROE	-	-	-	0,836*** (0,04)	-	-	-	-	-	-	-
TA	-	-	-	-	1,00*** (1,62)	-	-	-	-	-	-
CRI	-	-	-	-	-	1,284 (0,35)	-	-	-	-	-
IS	-	-	-	-	-	1,782*** (0,41)	-	-	-	-	-
LEV-1	-	-	-	-	-	-	1,107 (0,32)	-	-	-	-
LTI	-	-	-	-	-	-	-	1,058 (0,05)	1,012 (0,07)	-	-
Premium	-	-	-	-	-	-	-	-	0,998 (0,02)	-	-
Year dummies	No	No	No	No	No	No	No	No	No	Yes	No
Industry dummies	No	No	No	No	No	No	No	no	No	No	Yes
Constant	0,723*** (0,18)	0,271*** (0,83)	0,719 (0,18)	0,692 (0,17)	0,720*** (1,18)	0,673 (0,17)	1,852** (0,49)	0,604 (0,19)	0,615 (0,00)	1,229 (1,52)	1,286 (1,96)
Pseudo R ²	0,066	0,099	0,065	0,054	0,070	0,070	0,062	0,094	0,096	0,073	0,089
Nr Obs	1316	907	1309	1316	1316	1316	1253	1282	499	1315	461

notes:

(a) variable omitted due to perfect collinearity

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level

Table 16. Regressions results with dependent variable (5), adding control variables. Logit regression results reported as odds ratios.

Variables	Model										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
LEV	1,880*** (0,49)	1,441 (0,47)	1,876** (0,49)	2,262*** (0,57)	1,879*** (0,49)	1,909*** (0,49)	1,792* (0,64)	1,849** (0,50)	1,971 (0,93)	2,011*** (0,53)	1,492 (0,63)
Top5	0,610 (0,44)	0,457 (0,41)	0,598 (0,43)	0,589 (0,42)	0,578 (0,42)	0,625 (0,45)	0,386 (0,32)	0,579 (0,41)	(a)	0,468 (0,39)	0,314 (0,37)
CB	1,087 (0,17)	1,144 (0,22)	1,102 (0,17)	1,079 (0,17)	1,083 (0,17)	1,095 (0,17)	1,058 (0,17)	1,120 (0,18)	1,278 (0,32)	1,074 (0,17)	1,211 (0,31)
GDP	1,002** (0,05)	0,800*** (0,05)	0,889** (0,05)	0,904* (0,05)	0,892* (0,05)	0,887** (0,05)	0,894* (0,05)	0,893* (0,06)	0,989 (0,09)	0,904 (0,05)	0,995 (0,09)
DIS	1,363 (0,27)	1,399 (0,341)	1,365 (0,28)	1,517** (0,31)	1,333 (0,27)	1,349 (0,27)	-	1,359 (0,28)	1,007 (0,33)	1,338 (0,27)	1,439 (0,49)
SBO	0,869 (0,17)	0,993 (0,23)	0,905 (0,17)	0,885 (0,17)	0,859 (0,16)	0,856 (0,17)	0,778 (0,14)	0,913 (0,17)	1,050 (0,30)	0,871 (0,17)	1,041 (0,32)
ROA	0,213*** (0,09)	0,115*** (0,07)	0,226*** (0,10)	-	0,214*** (0,09)	0,226*** (0,10)	0,213*** (0,09)	0,202*** (0,09)	0,384 (0,31)	0,227*** (0,10)	0,391 (0,30)
CL	0,694* (0,14)	(a)	0,703* (0,14)	0,664** (0,13)	0,685* (0,13)	0,709* (0,14)	0,711* (0,14)	0,716* (0,14)	0,614* (0,18)	0,718* (0,14)	0,542** (0,16)
AGE	0,524*** (0,11)	0,596 (0,14)	0,525*** (0,11)	0,481*** (0,09)	0,518*** (0,11)	0,519*** (0,10)	0,502*** (0,10)	0,542*** (0,11)	0,420*** (0,11)	0,537*** (0,11)	0,594* (0,21)
REV	-	1,00 (3,79)	-	-	-	-	-	-	-	-	-
EBIT	-	-	0,999* (2,69)	-	-	-	-	-	-	-	-
ROE	-	-	-	0,958 (0,05)	-	-	-	-	-	-	-
TA	-	-	-	-	1,00 (2,26)	-	-	-	-	-	-
CRI	-	-	-	-	-	1,044 (0,30)	-	-	-	-	-
IS	-	-	-	-	-	1,341 (0,37)	-	-	-	-	-
LEV-1	-	-	-	-	-	-	1,597 (0,60)	-	-	-	-
LTI	-	-	-	-	-	-	-	1,048 (0,06)	1,151 (0,00)	-	-
Premium	-	-	-	-	-	-	-	-	0,997 (0,02)	-	-
Year dummies	No	No	No	No	No	No	No	No	No	Yes	No
Industry dummies	No	No	No	No	No	No	No	no	No	No	Yes
Constant	1,177*** (0,37)	1,231 (0,47)	1,183 (0,37)	1,049 (0,32)	1,163 (0,36)	1,144 (0,37)	1,085 (0,36)	0,941 (0,37)	0,873 (0,00)	1,144 (1,45)	0,239 (0,225)
Pseudo R ²	0,076	0,071	0,074	0,059	0,072	0,072	0,074	0,072	0,0654	0,081	0,085
Nr Obs	784	539	779	785	784	784	743	761	313	780	302

notes:

(a) variable omitted due to perfect collinearity

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level

Table 17. Regressions results with dependent variable (6), adding control variables. Logit regression results reported as odds ratios.

Variables	Model										
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
LEV	2,171*** (0,58)	1,749* (0,58)	2,164*** (0,58)	2,591*** (0,66)	2,172*** (0,58)	2,197*** (0,59)	1,675 (0,59)	2,011*** (0,55)	2,74** (1,34)	2,246*** (0,60)	2,113* (0,96)
Top5	0,234 (0,18)	(a)	0,231 (0,25)	0,229 (0,24)	0,236 (0,25)	0,239 (0,25)	(a)	0,222 (0,24)	(a)	(a)	0,449 (0,53)
CB	1,110 (0,19)	1,226 (0,24)	1,126 (0,19)	1,085 (0,18)	1,111 (0,18)	1,118 (0,18)	1,058 (0,18)	1,172 (0,20)	1,367 (0,36)	1,111 (0,18)	1,285 (0,36)
GDP	0,955 (0,06)	0,871* (0,06)	0,954 (0,05)	0,975 (0,05)	0,955 (0,05)	0,953 (0,05)	0,957 (0,06)	0,935 (0,06)	1,023 (0,10)	0,938 (0,06)	1,092 (0,11)
DIS	1,054 (0,22)	1,119 (0,28)	1,047 (0,22)	1,235 (0,25)	1,058 (0,22)	1,044 (0,21)	-	1,001 (0,21)	0,680 (0,24)	1,015 (0,21)	1,179 (0,43)
SBO	0,913 (0,19)	1,049 (0,27)	0,963 (0,20)	0,944 (0,19)	0,915 (0,19)	0,902 (0,19)	0,905 (0,18)	0,939 (0,19)	1,142 (0,35)	0,883 (0,19)	1,206 (0,20)
ROA	0,177*** (0,35)	0,114*** (0,07)	0,202*** (0,09)	-	0,177*** (0,08)	0,186*** (0,08)	0,217*** (0,10)	0,155*** (0,22)	0,161** (0,14)	0,176*** (0,08)	0,204* (0,40)
CL	0,691* (0,15)	1,862 (2,49)	0,692* (0,15)	0,654** (0,14)	0,693* (0,15)	0,702* (0,15)	0,717 (0,16)	0,717* (0,15)	0,607* (0,19)	0,715* (0,15)	0,517** (0,18)
AGE	0,457*** (0,10)	0,549** (0,13)	0,461*** (0,09)	0,429*** (0,09)	0,458*** (0,09)	0,453*** (0,09)	0,457*** (0,10)	0,471*** (0,10)	0,454** (0,16)	0,462*** (0,09)	0,567* (0,21)
REV	-	-	-	-	-	-	-	-	-	-	-
EBIT	-	-	0,999* (4,38)	-	-	-	-	-	-	-	-
ROE	-	-	-	0,974 (0,05)	-	-	-	-	-	-	-
TA	-	-	-	-	1,00 (2,53)	-	-	-	-	-	-
CRI	-	-	-	-	-	1,022 (0,32)	-	-	-	-	-
IS	-	-	-	-	-	1,256 (0,36)	-	-	-	-	-
LEVp	-	-	-	-	-	-	2,044* (0,79)	-	-	-	-
LTI	-	-	-	-	-	-	-	1,001 (0,06)	1,017 (0,09)	-	-
Premium	-	-	-	-	-	-	-	-	0,998 (0,43)	-	-
Year dummies	No	No	No	No	No	No	No	No	No	Yes	No
Industry dummies	No	No	No	No	No	No	No	no	No	No	Yes
Constant	0,740 (0,24)	0,999 (5,14)	0,744 (0,24)	0,632 (0,19)	0,741 (0,23)	0,726 (0,23)	0,574 (0,19)	0,731 (0,29)	0,873 (0,00)	1,218 (1,54)	0,349 (0,35)
Pseudo R ²	0,073	0,066	0,079	0,056	0,073	0,074	0,074	0,073	0,062	0,081	0,093
Nr Obs	784	535	779	785	784	784	733	761	313	770	292

notes:

(a) variable omitted due to perfect collinearity

*Statistically significant at the 10 per cent level.

**Statistically significant at the 5 per cent level.

***Statistically significant at the 1 per cent level

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