UNIVERSIDADE CATÓLICA PORTUGUESA

Performance of Spanish buyouts: evidence from a global recession

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May 2021

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Final Thesis Work
Presented to Universidade Católica Portuguesa
To obtain a master's degree in Business Economics

by

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May 2021

Acknowledgments

First, I would like to thank my colleagues, friends and family in helping and encouraging me in one the most interesting and ambitious challenges of my life. You have all encouraged and inspired me to always do better, motivating and believing in me every step of the way.

I would like to thank my advisor, Professor Ricardo Cunha, for his support and guidance during this process.

And to Triple A- Capital & Finance, in particular, Pedro Xavier, whose support and knowledge during my internship was essential to have the best possible working experience.

Resumo

Investigações anteriores relativamente ao tópico de *buyouts* focaram-se quase exclusivamente em grandes mercados, como *US* ou *UK*. As conclusões são variadas, com alguns autores a concordar na superior performance operacional, e outros destacando as mudanças dos princípios de gestão e financeiras como motes para o melhor desempenho. Este estudo tem como objetivo avaliar a performance de 21 processos de *buyout* ocorridos em Espanha durante 2006, um ano antes da crise financeira. As operações de *buyout* foram analisadas durante um período de cinco anos com o intuito de estudar anos de recessão e anos de recuperação, e a performance foi avaliada considerando 5 variáveis, organizadas em três categorias: lucro, estrutura de capital e eficiência/produtividade. O desempenho das empresas foi avaliado combinando o instrumento de *propensity score matching*, que minimizou erros na construção de um grupo de comparação, com o modelo de estimação diferença-nas-diferenças. Os nossos resultados mostram que, em média, a performance foi negativa um ano e três anos após a operação de *private equity*, mostrando sinais de recuperação cinco anos após. Os ganhos de eficiência poderão explicar e apoiar a teoria de maior performance por parte de *buyouts*. Estes resultados contrastam com o desempenho de outros tipos de investimento de *private equity*, cuja recuperação após a crise financeira foi bastante mais demorada.

Palavras-chave: *buyouts*, *private equity*, crise financeira, *propensity score matching*, diferenças-nas-diferenças

Abstract

Previous research on the topic of buyouts performance has focused almost entirely on major markets, as the US or the UK. The conclusions are mixed, with some authors agreeing on the buyouts' superior operating performance and with others focusing on governance and financial engineering changes as drivers of performance. This study aims at evaluating the performance of 21 different Spanish buyouts that occurred in 2006, a year before the financial crisis hit the world. Buyouts were evaluated during a five-year period, aiming at analyzing their performance during recession years and recovery years. Performance was examined considering five variables, organized in three categories: profitability, leverage and efficiency. Combining a propensity score matching instrument, that minimized biases in the construction of matched firms, with a difference-in-difference estimation model, performance was then assessed. Our regression results show that, on average, performance was negative one and three years after the buyout, with signs of positive recovery five years after the operation. Efficiency gains might explain and support the theory of greater performance of buyouts. These results contrast with the performance of other types of private equity investments, whose recuperation after the economic downturn was much longer.

Keywords: buyouts, private equity, global recession, propensity score matching, difference-in-difference.

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List of Abbreviations

ATE	AVERAGE TREATMENT EFFECT
ATT	AVERAGE TREATMENT EFFECT ON THE TREATED
BIMBO	BUY-IN MANAGEMENT BUYOUT
CEO	CHIEF EXECUTIVE OFFICER
DID	DIFFERENCE IN DIFFERENCES
GP	GENERAL PARTNER
IBO	INVESTOR-LED BUYOUTS
LBO	LEVERAGED BUYOUT
LP	LIMITED PARTNERS
MBO	MANAGEMENT BUYOUT
P2P	PUBLIC TO PRIVATE
PSM	PROPENSITY SCORE MATCHING
PTP	PUBLIC TO PRIVATE
SBO	SECONDARY BUYOUTS
TH	THOUSAND

1. Introduction

The world is becoming increasingly more competitive. Economies are in constant change and eager to keep up with innovations, globalization, success, profits and evolution. The private equity market is one example of such economic evolution. It has its roots in the US during the eighty's decade, which marked the first wave of the buyout booming. Due to this enormous growth, the market started to organize itself around types of investments, industry focus and acquisition strategy (Fenn, Liang, & Prowse, 1997). The second wave came around the same time that the dot-com bubble exploded, with big companies and multinationals pursuing bigger and more profitable investments. Credit conditions also played an important role, since low interest rates allowed investors to borrow money at low cost and invest it at great and competitive returns (Wilson, Wright, Siegel, & Scholes, 2012). Deal values reached all time peaks almost every day, with investments crossing oceans and moving to Europe. UK established itself as one of the biggest European private equity markets, competing almost directly with the US. Nonetheless, other European countries started developing and upgrading their economies.

Europe and North America are the biggest markets where private equity operates. In Europe, the UK and France lead the market. Much has been studied about these markets. However, when it comes to the Spanish private equity market, literature is somewhat scarce. Even so, it is interesting to investigate whether the Spanish market has the necessary roots to grow and compete with the biggest arenas.

Literature is often divided on whether private equity presence implies a superior performance on portfolio firms. Some authors provide evidence of improved operating and governance performance, such as S. Kaplan (1989) and Gaspar (2012), while others state underperformance or no significant improvements, such as Borell and Tykvová (2011) and Guo, Hotchkiss and Song (2011). Jensen (1989) presented the first remarks about this subject, applying the agency theory to buyouts. From his point of view, changes in ownership and governance policies regarding incentives compensation were an important solution to minimize and mitigate agency problems.

This way, due to the private equity influence, operating performance improved because of, and, at the same time, fueled by improved efficiency.

This research contributes to the current literature by studying the post-performance of Spanish buyouts during a period of economic crisis. Our sample was composed of three groups of companies: a buyout group, a control group and a matched group obtained through a propensity score matching instrument. This tool allowed us to compare buyout companies to very similar firms that were never involved in private equity transactions. We then employed a difference-in-difference estimation to evaluate performance of buyouts within three categories of performance variables: profitability (profit margin, return on assets and return on equity), leverage (debt-to-equity) and efficiency/productivity (net asset turnover). We analyzed around 20 different Spanish buyouts during a three time periods: short run (2005 and 2007), medium run (2005 and 2009) and long run (2005 and 2011). The results do not support the idea of buyouts' profitability superiority, but they do reflect an increase in leverage in the first three years and an improvement in efficiency in the long run. However, the results' interpretation must always be aligned with a Spanish context at the time, which was very negative due to the financial and economic crisis. Nonetheless, Spanish buyouts reflected some effects and consequences of the crisis, but also showed an impressive recovery compared to other types of private equity investments, namely in terms of efficiency.

The remainder of this study is structured as follows. In section 2, we provide a revision of the current literature regarding private equity, with a special focus in buyouts, value creation and operating performance, and finish with an overview of the Spanish private equity market. Section 3 presents information about the constructions of the datasets. Section 4 describes the methodology process, namely the choice of performance measures, the description of the matching procedure, the estimation model and summary statistics. In section 5, we present the results and discussion, followed by section 6, in which we conclude the study. Section 7 presents some limitations of our investigation, including some comments about future research.

2. Literature Review

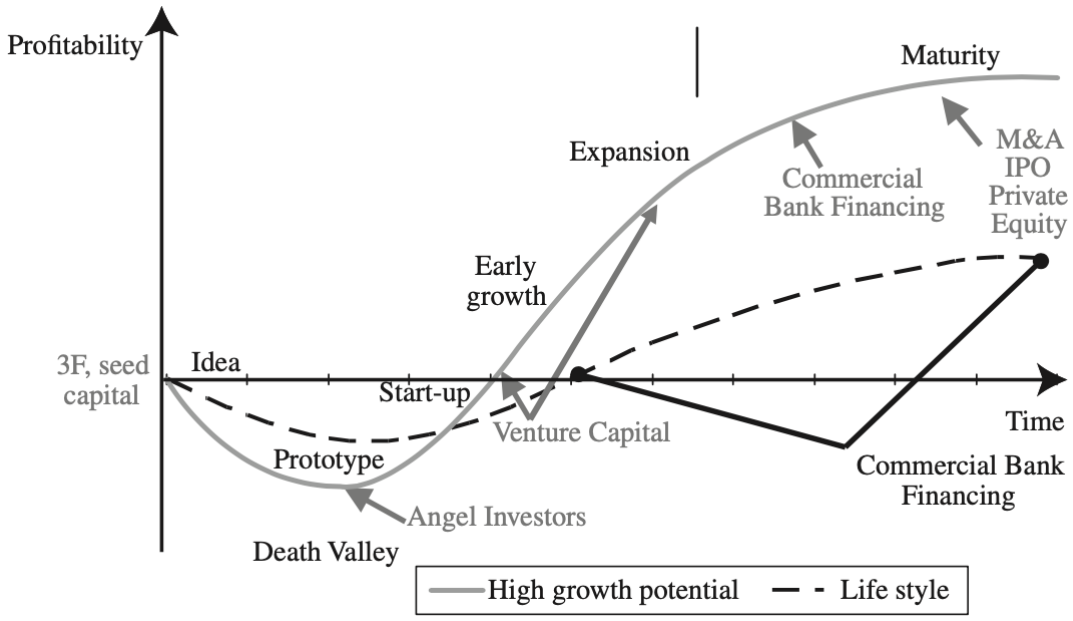
2.1. Private Equity

Every company needs financing to run its business properly, which can come in several ways. The type of financing is dependent on the size, age, and other economic and financial characteristics of the company. Moreover, the different sources of financing tend to vary according to the firm's life cycle, which is commonly designated as the financial growth cycle (Berger & Udell, 1998). In the start-up stage, capital aims at developing the business idea and concept, meaning that capital investment tends to be riskier. This capital is called the angel capital and is succeeded by the venture capital. In this situation, the company and its business idea have already been established, tested in the market and the potential for growth is promising. Venture capital is very often associated with business areas that are heavy on cost, in which new firms need considerable financial sustain in order to subsist. At this point, private debt tends to be scarce and rare considering the risk that is involved, which includes the shortage of collaterals from newly firms. However, when firms reach a considerable dimension and size, including the availability of financial information, more financing options become accessible. Namely, several types of debt, from long-term to mezzanine capital, and private equity. Mezzanine capital is a hybrid instrument involving debt with equity, including the possibility of converting debt into equity privileges (Fenn et al., 1997). Private equity, on the other hand, is a much broader concept. Figure 1 shows the relationship between financial alternatives at different stages of business development for two types of companies: a life-style firm and a high-growth potential firm. According to Amorós, Atienza and Romaní (2008), life-style companies are largely dependent on bank loans, whereas high-growth potential companies , due to their higher risk and higher returns, have access to more non-traditional financing methods, such as venture capital and private equity.

In its essence, private equity corresponds to equity capital that is invested in companies that are not present in the stock exchange. Nonetheless, private equity can have more than one interpretation. In the American notation, private equity is frequently associated to venture capital and early-stages investments. Whereas, in Europe, private equity tends to refer to buyouts and later-stage investments (Balboa &

Martí, 2001). Within the literature, several authors use the more general term private equity to refer to two specific concepts: venture capital and buyouts (Kaplan & Schoar, 2005; Metrick & Yasuda, 2010; Harris, Jenkinson, & Kaplan, 2014). These type of capital investments differ considering its targets. As said before, in venture capital, the target companies are, very often, start-ups that already had one or two rounds of financing, or early-stage companies that are entering the market and whose potential for growth is promising. For the second type of investment, buyouts are common in mature and established companies. This concept will be explored later on.

Figure 1 - Financial alternatives at different stages of business development



Source: Amorós, Atienza and Romaní (2008)

Private equity firms gather its capital through private equity funds, which have a specific structure. These funds are legally classified as limited partnerships. The majority of the capital in the fund is provided by limited partners (LPs), which is then managed by the general partners (GPs). The partnership agreements between LPs and GPs define clearly the life of the fund and the projected payments to the GPs. These include management fees and a certain share of profits of the fund. Moreover, some GPs may charge a fee in the companies they invest and manage. The fund usually has an expected life of about ten years and, if successful, private equity firms may create funds periodically. Several players are involved in the LPs, from institutional

investors, to pension funds and corporate funds, but also insurance companies, banks, among others. Typically, LPs have no influence in how the portion of capital they contributed to fund is used (Kaplan & Strömberg, 2009; Metrick & Yasuda, 2010; Fraser-Sampson, 2007).

Within this matter, is important to mention that these partnerships tend to be designed as close-end funds. Briefly, this means that, after the fund is constituted, the fund is not allowed to receive more capital contributions. Besides, the LPs commit themselves to provide a certain capital amount, which is called over time at the same time as opportunities are being discovered. The LPs' capital that is then pledged to the fund becomes illiquid. Hence, investors may face several penalties if they decide to retreat their capital from the fund, as they are in violation of the partnership agreement (Maurin, Robinson, & Stromberg, 2020). Because private equity investments are illiquid, investors expected to receive a premium if compared to investing in the public market (Harris et al., 2014). The reasoning for the existence of a premium may be justified when exploring the sources of value creation in these types of investments. However, upfront, the superior and advantageous skills and experience of GPs seems to be a widely acceptable justification in the literature in explaining the success of private equity.

2.2. Buyouts

As mentioned before, the literature splits the concept of private equity into two parts – venture capital and buyouts. The first notion was already approached above. The second one needs more clarification. Berg and Gottschalg (2005) define a buyout as the acquisition of a controlling stake in a company. This acquisition is temporary, and it typically involves a combination of debt with equity. However, this is not an exact concept. Thus, comparing buyout with venture capital simplifies the task. As Fraser-Sampson (2007) affirms, buyouts tend to happen in more mature, large and established companies. The type of financing is often a mixture of debt with equity, unlike venture capital that uses mainly equity. Another important feature about buyouts leans over the control that the investment is frequently associated to. When it comes to this type of experienced investments, the private equity firm is looking for a

combination of ownership and control in order to better exploit its interests. Therefore, the stake's dimension that buyouts are related tend to be big enough so that the private equity firms possess the majority of the company's shares, or the equivalent of the majority of the voting rights (Fraser-Sampson, 2007). Venture capital, on the other hand, acquires a minor stake, so the capital is often named as "expansion capital" or "development capital". So, it has become clear that the objectives of venture capital and buyouts are quite distinct. Nonetheless, as well as venture capital can involve very diverse operations, the same happens with buyouts. In fact, there are a lot of different transactions that can occur.

Generally, buyouts can be insider driven or outsider driven transactions (Wright, Gilligan, & Amess, 2009). Insider-driven buyouts are called management buyouts (MBOs). In this case, the management team buys the company, or a specific division/subsidiary from the parent company. This means that the management team has to put money of their own in order to buy the stake. When private equity emerged, the term buyout essentially meant MBOs. However, with the development of this market, which resulted in larger transactions, individuals that aimed at pursuing an MBO contributed with their own money (that could be borrowed), but also with the acquisition of debt. These are called leveraged buyouts (LBOs). Basically, this strategy comprehends a concoction of debt with equity, in which the proportion of debt is bigger. Hence, they are more linked with the acquisition of companies, rather than with single divisions (Fraser-Sampson, 2007). Kaplan (1991) specifies that LBO are generally associated with debt to total capital ratios of around 85% and with substantial equity ownership by management.

Examples of outsider-driven buyouts are management buy-ins (MBIs) and investor-led buyouts (IBOs). The former is similar to an MBO, except that the management team does not come from the company. Instead, a new team is assembled to buy another company, usually in the same sector. This strategy is not very common, considering that the "outsiders" lack the advantages of the insider knowledge, leading, possibly, to inefficiencies and more risk. This problem was overturned with operations such as BIMBOs, which are a combination of MBIs and MBOs, meaning that the management team benefits with the contribution of outsider executives, but also leverages from the insider executives (Meuleman, Amess, Wright, & Scholes, 2009).

The other type of outsider driven buyouts are called IBOs, investor-led buyouts. This operation differentiates itself from the above's because, in this case, it is a private equity firm that acquires the controlling stake (Meuleman et al., 2009). If this transaction involves a considerable volume of debt, then the expression LBO can also be used to describe it.

Another distinction that can be made in buyouts is related with the vendor source. In fact, buyouts can serve several purposes. Public to private deals (P2Ps or PTPs) are very common and often associated with LBOs' type of deals. LBOs allow for real wealth gains and operating performance improvements, mainly as a result of a more efficient ownership structure (Muscarella & Vetsuypens, 1990). However, some argue that LBOs lead to wealth transfers rather than wealth creation. Muscarella & Vetsuypens (1990) develop the concept of reverse LBOs. These relate to companies that had been taken private through a divisional buyout or an LBO but have gone public again. At the moment the company is going public, financial information is disclosure, allowing for the inference of the effects of the leveraged buyout. Divisional buyouts are also frequent. They comprehend the sale of a division/subsidiary/business unit to the members of the management team of the parent company or the unit that is being divested. In other words, divisional buyouts are similar to units' divestures. The new members have control of the assets in exchange for a consideration that is paid to the parent company (Hite & Vetsuypens, 1989).

Other categories of buyouts include buyouts of family firms, secondary buyouts, buyouts of public sector companies and buyouts of firms in receivership (Wright et al., 2009). From these, the firsts two are worth some attention. In the case of family firms, buyouts they tend to happen when problems of succession arise, allowing the firm to stay independent. In secondary buyouts (SBOs), the private equity firm sells the company that had been previously acquired through an LBO to another private equity firm or a financial sponsor, as an alternative of selling it to the public market. The rationale of SBOs has been a matter of study. The reason behind an SBO ought to be different from an LBO, considering than after an LBO, theoretically, the target has improved its leverage and governance structure. More than just efficiency gains, Wang (2012) suggests that the main motivation that explain SBOs is due to liquidity. In fact,

when the private equity company sells the target to another private equity firm, this means instant liquidity for the former.

2.3. Evolution of the private equity and buyouts markets

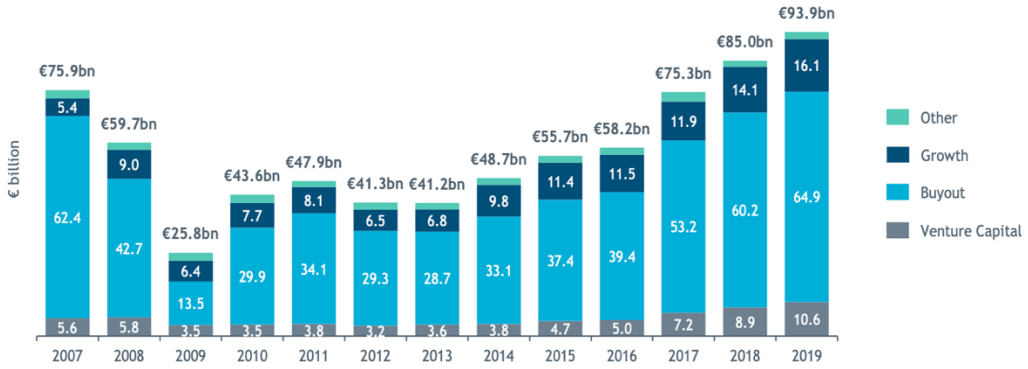
Private equity investment has its origins in the years post World War II. It was a period in which investment levels rose considerably given that the nations needed to rebuild themselves after the war. The public sector was thus focused in restoring normality, so the attention was on the services that allowed to do so. For that reason, small businesses and enterprises were left out of the main investment plans. That is when the private sector first started to be involved in the economy in order to close this gap. By establishing a private sector institution, politicians and bankers hoped that it would encourage institutional investors to do the same. Besides, the private sector had valuable management expertise that could be key for the investment in smaller businesses to be successful (Fenn et al., 1997).

After the consolidation of venture capital partnerships in the 60s, the next decade saw the rate of these investments slowing down. Weak economic and stock performances, a shortage of qualified entrepreneurs and a vulnerable IPOs market were some of the reasons behind this downfall. Hence, only organizations that had very promising growth perspectives and high returns received financing from experienced venture capitalists. This allowed the industry to develop and grow substantially from this moment on (Fenn et al., 1997).

The 80s are considered the landmark of the development of the private equity market. Venture capital partnerships increased, as well as the size of the investments and the size of the funds. However, the real growth came from the non-venture capital type of financing, mainly buyouts. The volume of these investments was a lot bigger and, due to the complexity of these operations, the industry started organizing itself according to specialized investment practices (such as leveraged buyouts of public companies and mezzanine financing), to industry focus and acquisition strategy (buy and build, firms in financial distress, acquisition of minority interests instead of controlling stakes). Public pension funds were an important player during this time,

having contributed with a lot of capital for those private equity partnerships (Fenn et al., 1997).

Figure 2 - Investments by stage in Europe



Source: Invest in Europe – Private Equity Activity 2019

The beginning of the last decade of the 19th century was marked by a slowdown in the buyouts market, due to the deterioration of the economics conditions, which was justified by the collapse of the junk bond market. But after some years of low activity in the leveraged buyout market during the late 90s, it re-emerged in the mid-2000s with a new wave oy buyouts, mainly in the US. This new wave was stimulated by low interest rates with positive and relaxed lending criteria that provide the necessary framework for private equity and, specially, buyouts to erupt (Wilson et al., 2012). The dimension of buyouts transactions exceeded the values of the 80s, reaching new peaks every year (S. N. Kaplan & Strömberg, 2009). Moreover, this trend expanded from the American market to Europe, including the UK. The North American and European market soon became the stage where the biggest operations occurred. However, the fairytale soon ended with the financial crisis that stroke the world in 2007. The financial market broke down, and credit conditions tightened, which resulted in a severe downfall in private equity investment. Buyout investment in Europe went from €62,5 bn in 2007 to €13,5 bn in 2009, representing a fall of 78%. Overall investment suffered heavily, as figure 2 shows. The recover took some time, and only recently, the amount of investment in buyouts reached similar levels of those in 2007.

The financial crisis confirmed some theories that supported the idea that low interest rates encourage a larger proportion of leverage in private equity deals, since

debt is cheaper (Axelson, Jenkinson, Strömberg, & Weisbach, 2013). However, it is also consensual that too much debt can be harmful.

2.4. Sources of value creation in buyouts

There seems to be a general idea that buyouts are capable of generating higher returns. As a result, very often, they appear to be associated to performance improvements.

Value generation in buyouts is a complex process. Laying out all possible factors that may affect value creation is a complicated task, since most of the times those factors are connected and related to each other. However, it is possible to divide value creation into two categories: value can either be created to the investors, namely, the private equity funds, or to the company itself through improved performance. Regarding the first level, for a certain level of financial performance, the business valuation can change, either by variations in market multiples, fluctuation in expectations, tax benefits, or even changes in the equity and enterprise values due to negotiations during the process of acquisition or divesture (Berg & Gottschalg, 2005).

Our main focus is on the other kind of value creation: the one that is a consequence of better financial performance. This improvement in performance can come from several sources. Jensen (1989) was one of the first authors in the literature exploring the potential power and capability of buyouts, specially, leveraged buyouts, in increasing and boosting productivity and efficiency, operational performance, governance structures and shareholder value. Comparing LBOs to public corporations, he argues that, while the latter is focused in maximizing earnings per share, the former is dedicated in maximizing *value*. It is this shift in goals that classifies LBOs as potential superior organizations. Using the words of Jensen (1989) referring to LBOs, "*these organizations' resolution of the owner-manager conflict explains how they can motivate the same people, managing the same resources, to perform so much more effectively under private ownership than in publicly held corporate form*". In practical terms, four characteristics define and distinguish LBOs from public companies: private and concentrated ownership, compensation and incentives systems pay for performance,

substantially leveraged financial structures and improved operational efficiency. Despite how clear these aspects may be, not all of them can explain the different buyouts waves. Some are better tailored for the first wave, while others are more explanatory for recent waves.

We followed a theoretical approach proposed by Kaplan and Strömberg (2009) that group three possible type of adjustments that private equity can provide to a company: financial, governance and operational engineering. Nonetheless, these categories are always, at some level, interconnected.

Financial engineering is linked to leverage, defined as the borrowing that is done in connection with the operation (S. N. Kaplan & Strömberg, 2009). Leverage helps creating pressure on managers not waste money and to spend it in a prudent and efficient way. Since interest and principal payments are compulsory, leverage compels managers to achieve the best results possible. Another side effect of leverage is related with the minimization of the free cash flow problem. The free cash flow problem was first introduced by Jensen (1986) and states that management teams may opt to invest the free cash flow below the cost of capital or misuse it in inefficiencies, rather than returning it to the investors. By creating more discipline within managers, leverage can help mitigate this problem. Besides, in some countries, with US as an example, given the tax deductibility of interests, leverage can even increase the firm valuation (S. N. Kaplan & Strömberg, 2009). To sum up, there are two possible gains arising from the use of leverage: either from increasing the cash flows due to better discipline in dealing with debt, or by advantages of cash flow in reducing taxes. Regarding the first, Guo, Hotchkiss and Song (2011) go even further by asserting that the higher increases in leverage, the greater are the gains in cash flow for this case.

Concerning governance engineering, three key terms arise: ownership, incentives and monitoring. Regarding ownership, in LBOs organizations, when compared with public companies, equity is much more concentrated. Instead of being dispersed, public equity is replaced with public and private debt (Jensen, 1986). Generally, this means that boards tend to be smaller, allowing for closer monitoring from the private equity firms, since investors play a more active role in the governance of the company. Monitoring is then a consequence strongly linked with the private equity industry.

Indeed, as an effect of increased leverage that forces management to be more discipline and clever, but also because management boards are smaller, monitoring arises as an important characteristic of private equity way of doing business and, more precisely, of buyouts. Another important aspect that is also a result of this shift in ownership structure is related with incentives. Management members are required to own a stake of the company, either through stocks or options, thus being forced to make an investment in it. This procedure was not common among public firms during the first wave. By giving managers a share in the company, they are encouraged to accomplish and deliver the best results possible, being contingent on the possibility of losing their investment (S. N. Kaplan & Strömberg, 2009). Besides, compensations in LBO's organizations are more focused in incentives that reward cash flow rather than accounting earnings (Jensen, 1989). According to Leslie and Oyer (2008), top executives' incentives in firms that were involved in private equity transactions are more considerable than its peers' executives in public companies. They add that the "highest paid executive at a private equity owned firm owns approximately twice as large a share of the firm", in which his base pay is smaller, but highly offset by cash compensation via his variable pay. The subject is deepened when the authors argue that the contrast in incentives disappears after the private equity backed firm goes public (through an IPO), suggesting that superior management incentives are, indeed, correlated with the PE ownership.

Financial and governance engineering are closely linked with the agency theory. Jensen (1986) claims that there is a conflict of interests between managers and shareholders, which is known as agency theory. Managers have incentives to grow the companies beyond their optimal point, hoping that will lead to an increase in power and in resources under their control, which means bigger compensations for them. On the other hand, shareholders have an interest in reducing the assets and resources under the managers' control, which means increasing their supervision, expecting that will lead to a bigger payout for them. The mechanisms mentioned above aim at minimizing agency costs that arise from this conflict and were very common during the first wave of buyouts in the eighties. Adjusting the ownership structure, while introducing enriched monitoring and control over operations and activities, such as debt, opens the door for higher levels of efficiency, developing a new, efficient and effective governance business model (Scellato & Ughetto, 2013).

Kaplan and Strömberg (2009) include yet another category of adjustments that started to emerge and become more frequent during the beginning of the 20th century: operational engineering. With the second wave, private equity firms begun establishing themselves around industries, investing in more specialized professionals that could bring valuable insights and whose backgrounds focused on those industries. Operational and industry know-how allowed private equity firms to explore and maximize their competitive advantages, enlarging the success in their transactions. Cressy, Munari, and Malipiero (2007) confirm, for a sample of 122 UK buyouts, that buyouts by PE firms with industry specialization performed better in terms of profitability.

Operational engineering comprehends changes in terms of productivity and effectiveness (Berg & Gottschalg, 2005). Empirical research has focused on possible drivers of advance performance by buyouts, which implies transformations at several points: at the assets and resources level, cost cutting strategies, margin improvements, reduction of capital constraints, outsourcing, strategical repositioning, better managerial decisions. It is deduced that buyouts' success improves the overall performance of the portfolio firms, but also the performance of the private equity firms. Indeed, Kaplan and Schoar (2005) suggest that the bigger the success in portfolio firms, the superior are the returns for private equity firms, which are positively related with the size and experience of the general partners and, therefore, positively correlated with the ability of the PE firm to attract new funds.

The issue that is still left answered is whether or not buyouts actually increase the operating performance of the companies involved. Literature does not provide a straight answer and conclusions are very dependent on the geographical markets and time periods chosen. Nonetheless, it is possible to distinguish authors that approve better operating performance, and authors that disagree. The next sub-section clarifies this point.

2.5. Evidence of buyouts' operating performance

While focusing solely on operating performance, it is interesting to separate the two waves of buyouts. During the first wave, research focused almost entirely on agency theory to explain structural adjustments and changes in performance after buyouts. The majority of those adjustments were associated to financial and governance engineering, which was explored above.

Studies from the first wave report buyouts from the US and the UK around the 1980s. There was a general consensus that portfolio companies' operating performance improved after the buyout's operation. S. Kaplan (1989) studied 48 US buyouts closed between 1980 and 1986 and concluded that, for a three-year period after the buyout, operating income before depreciation and net cash flow increased and capital expenditures decreased. These conclusions are very similar to those found by Smith (1990), who examined 58 American buyouts, inferring that operating returns, measured by operating cash flows before interest and taxes, increased after the buyout, as well as reductions in capital expenditures. He goes even further justifying the increase in operating returns as a result of changes in the incentives and ownership structure. Muscarella and Vetsuypens (1990) leaned over divisional reverse leveraged buyouts from a broad sample of industries that occurred between 1976 and 1987. From these LBOs, they concluded that incentives and compensation plans were a part of restructures, but also activities to improve the companies' efficiency were essential. Profitability improved mainly due to cost reductions, instead of higher revenues or better asset turnover. Leverage increased considerably, decreasing over time and rising up again after the companies return to capital markets. For that reason, they could not conclude that equity holders earned abnormal returns. (Holthausen and Larcker (1996) found analogous results.

Within the UK, Wright, Wilson and Robbie (1996) analyzed two samples of buyouts. For this matter, the second sample is of our interest, having the authors studied the financial performance of 251 buyouts between 1982 and 1984 and concluded that there was enough evidence to affirm that buyouts surpass industry peers for a five-year period after the transaction. In terms of efficiency, buyouts were superior in the post period, with ROA and profit per employee showing better results than the control

group. Regarding liquidity, it started to increase two years after the operation, possibly due to the influence of changes in working capital.

Concerning more recent periods, Guo, Hotchiss and Song (2011) explored 196 US buyouts completed between 1990 and 2006, reporting that operating performance was slightly higher for the buyout group and that cash flows were higher for companies with superior leverage, despite these buyouts using less leverage than those of the first wave. These authors also considered some governance restructures and found that cash flow performance was better whenever the PE firm replaced the CEO around the time of the operation. However, these results hardly compare to those achieved in the first wave. Jelic and Wright (2011), as well as Weir and Laing (1998), who all studied UK buyouts, support this speculation that buyouts improve overall performance, namely in terms of profitability, but that this improvement was not as significant as before.

On the other hand, Amess (2002, 2003) reported superior operating performance up to four years for a sample of 78 UK buyouts from 1986-1997. A shift in governance contributed greatly to a performance improvement, also having consequences at the efficiency level. A noteworthy reminder, Amess (2002, 2003) uses an augmented production function to better quantify marginal productivities of MBOs, concluding that productivity increases after the operation. Lichtenberg and Siegel (1990) present alike deductions regarding productivity.

Another valuable study is from Wilson, Wright, Siegel and Scholes (2012), who investigate performance during global recession's periods. They focused on UK buyouts that occurred between 1995 and 2010 and, therefore, analyzed several recessions and declines of economic activity, such as the upturn of the 1990s recession, a small slump during 2000 and 2003, the economic stability between 2003 and 2007 and the collapse of economic and financial activities of 2007-2008. Considering the purpose of this investigation, the findings from these authors are of upmost importance to us. The methodology used was similar to the one employed here. A propensity score matching instrument was performed to minimize possible comparison biases and performance measures used are similar to ours, which allows for a certain level of comparison when it comes to results and conclusions. Concerning

the sovereign crisis, the authors split the sample into two periods: a pre-recession period comprehending the years from 2003 to 2006 and a recession period that includes the years from 2007 to 2010. The overall performance was better during the recession period than before the economic downturn for PE buyouts. This applies for profitability ratios (profit margin, ROA), but also for interest coverage ratio and working capital analysis. Debt to total assets was lower during the recession period, which is another indicator of good performance. The authors suggest an explanation for these results. PE firms and investors tend to look for profitable companies whose potential for efficiency and profit improvements is greater. Since these companies tend to operate in fairly lower risk sectors, PE firms are capable of transforming companies that can scale their performance and, therefore, are more robust to economic downturns.

2.6. Overview of the Spanish private equity market

Very few studies focus solely on the Spanish private equity market. As a consequence, any conclusions must be framed and interpreted considering the Spanish economic and financial outlook. The timeframe of this investigation covers the period from 2005 to 2011. Hence, it is essential to understand the framework Spain was going through in those years.

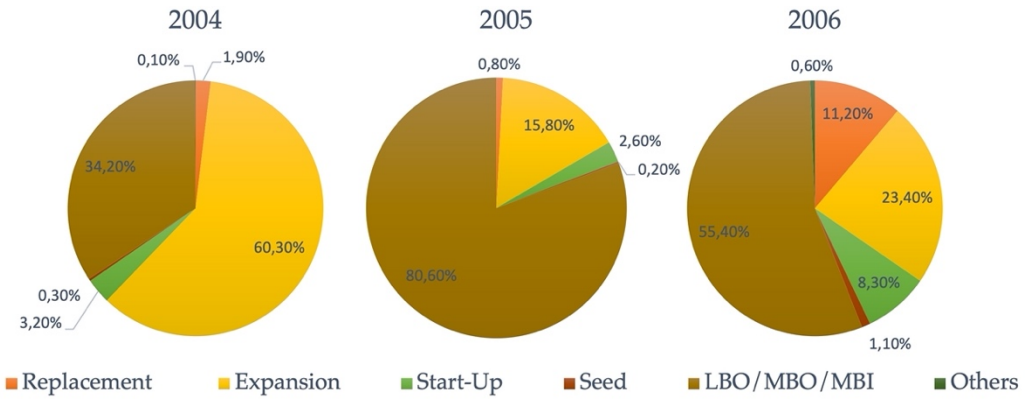
Understanding the structure and functioning of the Spanish private equity market is key in order to interpret any results that can be drawn from this investigation. The Spanish buyout market is substantially different from the American or the British one. In fact, this particular market is more recent than the others, having mostly developed during the ninety's decade. The beginning of the 21st century saw this market becoming more consolidated, more organized and growing in terms of deals and in terms of transaction values. Despite the considerable differences that still exist between the European private equity market and the American one, countries and institutions have been growing and developing their markets with the goal of minimizing and closing this competitive gap.

As said, the private equity business started to grow considerably in the beginning of the millennium. By 2005, the private equity investment volume in Spain as around 4 billion euros, getting closer to France, Germany and Italy. Regarding the years of 2005 and 2006, it is important to remember that economic activity was booming, and, for that reason, banks were full with liquidity, which can explain the expansion in this type of capital. Besides, not only the overall investment volume in private equity was growing each year, but also the portion related to buyouts grew. As seen in panel A from table 1, from 2004-2006, the volume in buyouts grew. For buyouts, 2005 seemed an outstanding year. Nevertheless, the enormous increase is justified by a series of 7 mega-transactions, which are not a normality within the Spanish market. The buyouts volume surpassed the expansion capital volume, which occupied the biggest share. However, in terms of transaction numbers, the expansion capital was always ahead from the buyout capital. The enigma is easily explained, considering that buyouts are associated to more mature companies, whose deal values tend to be bigger given the size and complexity of the company. As a result, the average buyout deal always surpasses other types of deals, as seen in panel B. Therefore, in terms of volume buyouts are leaders, but in terms of number of operations they lag behind.

The very positive perspectives for the next years started to fall during the years of 2007 and 2008, when the crisis in the US mortgage market exploded and soon expanded into a credit crisis in the US and Europe, culminating into a global recession. Every country, market and industry were affected by this crisis and, noticeably, the European and Spanish private equity markets were no different.

Table 1 - Investments by phase in Spain, including number of deals and average deal value between 2004 and 2006

Panel A: Investments by development phase during 2004-2006



Panel B: Number of deals and average deal values during 2004-2006

	Number of deals			Average deal value (€M)		
Variables	2004	2005	2006	2004	2005	2006
Start-Up	80	110	152	0,8	1,0	1,6
Expansion	279	268	329	4,3	2,6	2,6
Replacement	7	4	20	5,4	7,9	16,8
Buyout	16	50	48	42,0	66,8	33,7
Others	4	1	6	0,6	1,3	2,8
Total	402	500	683	5,0	8,4	4,6

Panel A describes the investments by development phase during the period of 2004 to 2006, while Panel B details number of deals and average deal values for each category of development phase for the same years as Panel A. The information was retrieved from ASCRI Informe reports between the period of 2005 and 2007 (Pellón, Hera, & Alférez, 2005, 2006, 2007).

The economic and financial consequences became serious as of 2009. Buyouts suffered a big hit, but also had the best recover in 2010. Table 2 is similar to table 1, but it presents the moment when the crisis burst and the following years. Alike Europe, buyouts transactions also decreased, leading to less volume, fewer deals and a decline in the average deal value. But, again, the same trend occurred in Spain, with buyout investment recovering very well in 2010 and maintaining this positive course in 2011.

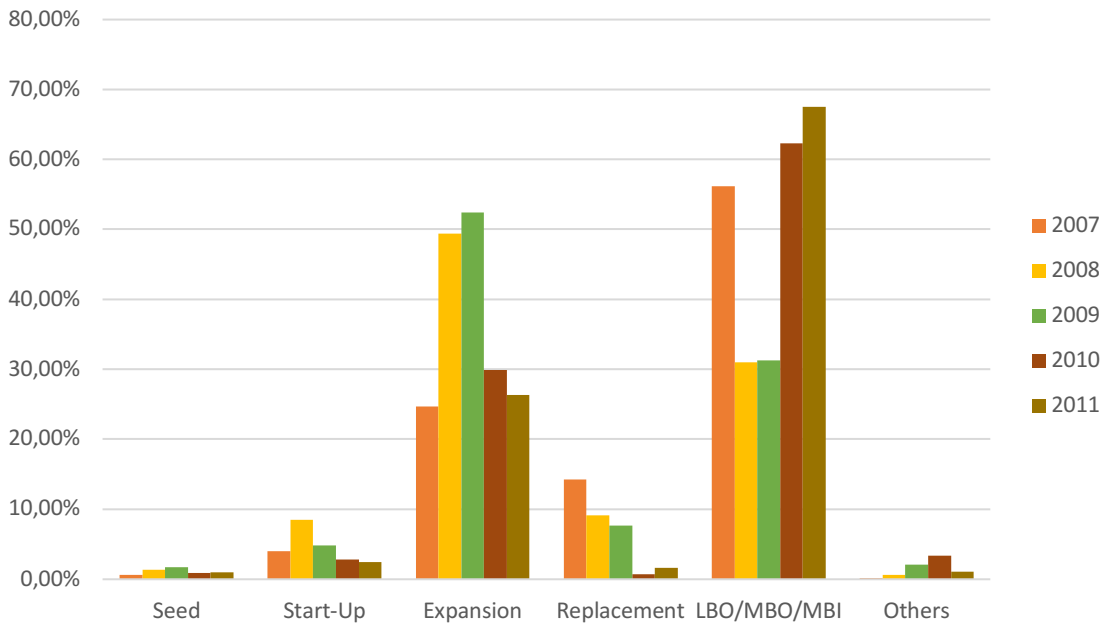
Moving to a more recent period, Spain has managed to overcome the impacts of the 2007 crisis. By 2018, it recorded more than 6 billion euros in investment in private equity, growing 21% more than 2017. Despite some political instability and uncertainty, international funds seem to be confident, dominating larger operations. Local managers control operations that are situated in the middle market. Another aspect that confirms the market growth is related with transactions with companies that, until 2018, had never been involved with private equity, accounting around 64% of the total investments in 2018 (Alférez, 2019).

Buyout's investments are, once again, leaders in terms of volume. In 2018, they represented 59% of the total investment, and, in 2019, this percentage went up to 80%. These values are easily explained given that this type of investments tend to surpass 100 million euros, meaning that almost all buyouts are classified as large operations managed by international funds (Alférez, 2020). Nevertheless, it is worthy to mention that this more international profile of the Spanish private equity market started to be developed over the years.

Despite of the positive performances during 2018 and 2019, the markets did not preview an economic fallout as the one following the moment the covid virus broke down. The next sections explain the data and methods used to explore the performance of Spanish buyouts in 2006.

Table 2 - Investments by phase in Spain, including number of deals and average deal value between 2007 and 2009

Panel A: Investments by development phase during 2007-2011



Panel B: Number of deals and average deal values during 2007-2011

	Number of deals			Average deal value (€M)		
Variables	2007	2009	2011	2007	2009	2011
Seed	136	141	190	0,2	0,2	0,2
Start-Up	139	104	142	1,3	0,8	0,6
Expansion	406	511	514	2,6	1,7	1,7
Replacement	19	10	4	32,7	12,8	12,8
Buyout	41	18	29	59,4	29,0	75,2
Others	2	10	7	2,2	3,5	5,7
Total	743	794	886	5,8	2,1	3,6

Panel A describes the investments by development phase during the period of 2007 to 2011, while Panel B details number of deals and average deal values for each category of development phase for the years of 2007, 2009 and 2011, which are the same years used in the econometric estimation. The information was retrieved from ASCRI Informe reports between the period of 2008 and 2012 (Pellón, Hera, & Alférez, 2008; Pellón, Hera, Alférez, & Barthel, 2009, 2010, 2012, 2008).

3. Data

3.1. Buyouts

Aiming at studying the behavior and performance of private equity transactions, namely buyouts, during distressful economic periods, the timeframe chosen comprehends the financial crisis that occurred in 2007-2008. For that reason, the chosen transaction year is 2006. This way, the performance study includes the years in which the financial recession reached its peak and the period afterwards. The sample is then constituted by public and private Spanish firms that were involved in private equity transactions during the year of 2006.

Data regarding the private equity deals was collected from Refinitiv Eikon. Since the purpose is to study the performance of a specific type of private equity deals, we filtered the results to only show buyout deals, which lead to 74 different companies. Additionally, to have more accurate data, we filtered this list even more by selecting only the investment security types classified as "Management Buyout" and "Leverage Buyout Financing", leading to a total of 50 firms.

Financial information on the companies involved in those deals was then collected from Sabi database, which contains financial information for companies located in Spain and Portugal. The timeframe of this analysis involves four years in total: 2005, 2007, 2009 and 2011. Therefore, companies that did not provide information for 2005 were automatically removed, since financial information for the year before the deal took place is compulsory for the econometric comparison to be made. A big number of companies did not provide sufficient information to be included, meaning that the final sample is composed of 21 different companies that were involved in private equity transactions during the year 2006.

Given that two different databases were used in this process, the search for each company on Sabi was done manually using the company name as the search criteria. Moreover, the economic sector and industry classifications are also distinct between the two databases. In order to standardize the industry classification, the NACE Rev. 2 was preferred, which is the industry classification used in the European Community.

Since companies can operate in several industries, only the NACE Rev. 2 primary code was included in the sample construction. This industry classification divides activities into sections, divisions, groups and classes, being the former the most wide-ranging classification and the latter the most specific. The code used in the sample is composed of four numbers that identifies the class at which a company belongs to. Thus, biases are reduced by using the most specific activity classification in the sample between the control and the treatment groups.

This sample of buyouts was subsequently divided into three subsamples given the time analysis: short-run analysis (comprises the years of 2005 and 2007), medium-run analysis (includes the years of 2005 and 2009), and long-run analysis (contains the years of 2005 and 2011). For each subsample, a comparable group was built. Since not all the 21 companies that were involved in private equity transactions have financial data available for the four years, each treatment sub-sample contains a number of companies that varies, though slightly. More specific information regarding the number of companies in each group for each subsample is provided on table 3.

The process of data collection was somewhat complex given that one database provided information about the private equity deals (Refinitiv Eikon), and the other the necessary financial information (Sabi). Considering that these two databases do not have a direct link, the same company can have a different name in both platforms, though very similar. For that reason, the process of collecting and matching the information between the two databases had to be done manually for most of the companies in order to ensure that the objective of constructing the most reliable sample as possible was achieved.

3.2. Control group

To properly analyze the impact a transaction such as a buyout has on a given company, that exact firm should be compare to another one that was not involved with private equity. For that reason, a control group had also to be constructed. The use of this control group in the difference-in-differences estimation allows for the control of

certain economic and industry effects that may affect both the treatment and control groups. However, that will be explored later on.

Data regarding the comparable group was then collected with a different approach than the buyouts group. Firstly, a list of companies with the same primary NACE Rev. 2 code as the treatment firms was retrieved from the Sabi database. Since it was necessary to assure that none of these companies had been backed by private equity, another list of companies was retrieved from Refinitiv Eikon. This list showed the companies, both private and public, that had been involved in private equity transactions. Afterwards, these companies were excluded from the first list. By following these steps, we assured that the companies that compose the comparable group operate in the same industries as the treatment group, but also that were not and are not involved with private equity firms.

Table 3 presents information about both groups.

Table 3 – Information regarding industry in each subsample

Panel A: Number of companies in each subsample

	Short Run	Medium Run	Long Run
Nr. of buyout firms	21	16	15
Nr. of control firms	10 623	7 214	5 466

Panel B: Industry distribution in each subsample

NACE Rev. 2	Divisions	Class	Short Run	Medium Run	Long Run
1051	Manufacturing	Operation of dairies and cheese making	x	x	x
1623	Manufacturing	Manufacture of other builders' carpentry and joinery	x	x	
1721	Manufacturing	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	x		
2011	Manufacturing	Manufacture of industrial gases	x		x
2369	Manufacturing	Manufacture of other articles of concrete, plaster and cement	x	x	x
2660	Manufacturing	Manufacture of irradiation, electromedical and electrotherapeutic equipment	x	x	x
2790	Manufacturing	Manufacture of other electrical equipment	x	x	
3011	Manufacturing	Building of ships and floating structures	x	x	x
3020	Manufacturing	Manufacture of railway locomotives and rolling stock	x		
3030	Manufacturing	Manufacture of air and spacecraft and related machinery	x	x	x
3109	Manufacturing	Manufacture of other furniture	x	x	x
4321	Construction	Electrical installation	x	x	x
4531	Wholesale and retail trade	Wholesale trade of motor vehicle parts and accessories	x	x	
4711	Wholesale and retail trade	Retail sale in non-specialized stores with food, beverages or tobacco predominating	x	x	x
4771	Wholesale and retail trade	Retail sale of clothing in specialized stores		x	x
5610	Accommodation and food service activities	Restaurants and mobile food services	x		
6202	Information and communication	Computer consulting activities	x		
6311	Information and communication	Data processing, hosting and related activities	x	x	x
6420	Financial and insurance activities	Activities of holding companies	x		
7120	Professional, scientific and technical activities	Technical testing and analysis		x	x
8020	Administrative and support service activities	Security systems service activities	x	x	x
8299	Administrative and support service activities	Other business support services activities	x		x

The NACE Rev. 2 industry classification divides industries in sections, divisions, groups and classes, being sections the most comprehensive classification and class the most specific one (Eurostat, 2008).

4. Methodology

The purpose of this research is to study the effects of buyouts and whether or not they create value, both in the short and long run. Barber and Lyon (1996) suggest a method when the research objective is to evaluate some sort of operating performance. From their point of view, three aspect must be taken into account: firstly, the choice of the operating performance measures; next, the benchmark at which those measures will be compared, which also comprises the choice of the expected operating performance model; and, finally, the selection of the test statistic.

The reasoning from Barber and Lyon (1996) was followed in this investigation. In this section, we start by identifying the chosen performance indicators. Next, we discuss how the control and treatment groups were matched, followed by the presentation of the econometric model. And, lastly, we conclude with summary statistics.

4.1. Performance measures

Measuring performance is a hard task considering the vast number of indicators. Besides, indicators can be organized in several categories depending on which financial area they are targeting. In this investigation, five measures were used, aiming at studying profitability, capital structure and productivity/efficiency.

Within profitability, we wanted to assess a company's competence in generating earnings and profits given its assets, equity, revenues, costs. To study profitability, we opted to combine three ratios: return on assets, return on equity and profit margin.

Concerning capital structure, we focused on the debt-to-equity ratio. This ratio belongs to the gearing category ratios, that reflect how a company was financed and, therefore, giving insights about the company's financial stability. When interpreting leverage ratios, one must pay attention to the industry profile. Some industries require larger amounts of debt, and others of equity. For that reason, a gearing ratio, alone,

has little meaning, but it gains more weight if compared to ratios from other companies or from industries averages.

In terms of productivity/efficiency, the net asset turnover ratio was used. Efficiency ratios can also be known as activity ratios. These gauge of how a company is combining and managing its assets and liabilities in order to maximize its income and, hopefully, its profitability. It is a measure of ability in transforming assets and liabilities into income and profit.

Table 4 presents the performance measures used as outcome variables in the estimation model. In the last column, some studies that used the same metric are mentioned.

Table 4 - Description of outcome variables

Variable	Definition	Measured as	Literature[1]
Profitmg	Profit margin	$\frac{\text{Profit/Loss before tax}}{\text{Operating revenue}}$	(Gaspar, 2012) (Scellato & Ughetto, 2013) (Ayash & Rastad, 2020)
ROA	Return on assets	$\frac{\text{Profit/Loss before tax}}{\text{Total assets}}$	(Gaspar, 2012) (Scellato & Ughetto, 2013) (Ayash & Rastad, 2020) (Desbrières & Schatt, 2002) (Borell & Tykvová, 2011) (Wang, 2012)
ROE	Return on equity	$\frac{\text{Profit/Loss before tax}}{\text{Shareholders funds}}$	(Gaspar, 2012) (Desbrières & Schatt, 2002)
DtE	Debt to equity ratio	$\frac{\text{Non current liabilities} + \text{Loans}}{\text{Shareholders funds}}$	(Fukao, Ito, Kwon, & Takizawa, 2007) (Desbrières & Schatt, 2002) (Borell & Tykvová, 2011) (Meuleman et al., 2009)
Netasset	Net asset turnover	$\frac{\text{Operating revenue}}{\text{Shareholders funds} + \text{Non current liabilities}}$	(Muscarella & Vetsuypens, 1990)

[1] We opted to follow similar measures as other authors. This column gives some examples of authors whose performance measure are the same or very similar to ours.

4.2. Propensity Score Matching

When conducting a research about the effect of a specific treatment, the approach can either be experimental or observational. If experimental, the study is associated with randomization. In these cases, the effect of the treatment is estimated by directly comparing the two groups, treatment and control, thus assuming the elements in both groups are probably similar and that the treatment itself will not be confounded with the group's characteristics, measured and unmeasured. The randomization term is then introduced because those factors that may influence the treatment are considered to be randomly distributed among the groups and among the elements of each group (Cochran & Rubin, 1973). This type of approach tends to be normal in medical research, more specifically, in clinical trials and epidemiologic research.

Randomization is then a key factor that distinguishes experimental studies from observational one's. In the latter, the direct comparison between the treatment and the control group will, most likely, be distorted because the baseline characteristics of the treated elements may be different from those in the untreated group (Austin, 2011). If those differences are not taken into consideration, then the results will lose validity since biases are almost certainly to be present.

One way of fixing this issue is to use a matching mechanism, as suggested by Rosenbaum and Rubin (1983). These authors proposed, in 1983, what is known as the propensity score, which they defined as "*the conditional probability of assignment to a particular treatment given a vector of observed covariates*". In other words, the score represents the probability of, in the case of this study, a company to belong to the treatment group according to a list of certain characteristics known as covariates. The propensity score matching mechanism allows for the reduction of endogeneity problems, such as the existence of confound factors, but also helps solving the problem of having too many observable characteristics. In reality, the propensity score matching allows for these observable covariates to be aggregated into a single index variable, which is the propensity score (Dehejia & Wahba, 2002; Fukao et al., 2007). The highest is this score, the likeliest is the company to belong to the treatment group.

The theory regarding the propensity score matching includes some important assumptions. Firstly, the assumption of unconfoundedness. This translates that all variables, and, therefore, all possible confound factors, must be observable. So, it is presumed that there are no unknown covariates/confounders that may affect the treatment. Another assumption is the overlap/common support. This states that units/companies that present the same values for covariates have a positive probability of belonging both to the treated or untreated group. Rosenbaum and Rubin (1983) defined these two assumptions as the "strong ignorability", where the average treatment effect and the average treatment effect on treated could be defined for all covariates values. However, this assumption is quite strong, which lead to lighter assumptions. For example, the unconfoundedness hypothesis applies only to the control group (Caliendo & Kopeinig, 2008).

Within the universe of propensity score matching estimators, there are four that deserve attention: Nearest-Neighbor matching, Radius matching, Stratification or Interval matching and Kernel matching. These distinguish themselves by the way they deal with the common support aspect, the question regarding the neighborhood of each unit and the weights appointed to each variable. These estimators also try to overcome the fact that the probability of observing two units, or in this case, two companies with exactly the same score is, in theory, zero considering that p(X) is a continuous variable (Newton et al., 2002). When choosing an estimator, one has to weight the pros and cons of each. In reality, the disadvantages of one tend to be the advantages of other, hence there is a trade-off between estimators. Table 5 presents a summary of these estimators.

In this study, the Nearest neighborhood estimator was used. As Caliendo and Kopeinig (2008) present, each unit from the treatment group is paired, at least, with one unit of the comparison group considering the propensity score. The option of matching with replacement was chosen, which means that one firm from the control group can be matched more than once. In this case, each treated unit was matched to three control units. Besides, we also guaranteed the common support condition, ensuring that any characteristic observed in the treatment groups is also observed in the matched group.

Table 5 - Description of possible PSM estimators

Estimation	Definition	Observations
Nearest Neighborhood	For each treated unit, the closest control is found, which is the unit with the highest propensity score. The estimation can be run with our without replacement, meaning that, in the case of the former, a control unit can be matched more than once.	Every treated units finds, at least, one match (there can be oversampling – more than one neighbor), which reduces biases. Some matches may be weak, since the nearest neighbor can have a very distinct score.
Radius	All estimations within a certain neighborhood are used as comparison, being that neighborhood called a radius, which is a predefined propensity score interval.	If the predefined radius is too small, that may leave some treated units unmatched. Nevertheless, the smaller the radius, the better are the matches.
Kernel	"(…) all treated are matched with a weighted average of all controls with weights that are inversely proportional to the distance between the propensity scores of treated and controls." (Stata PSM)	Variance is lower because more information is used (all controls). For that same reason, some controls may be bad matches.
Interval Stratification	The propensity score is divided into intervals such that, in each block, treated and untreated units have, on average, the same score.	It casts off observations where treated and/or control units are missing.

Concerning the choice of control variables, we opted to follow the strategy from Barber and Lyon (1996). They present four approaches to build a benchmark sample. In this study, the most complete was used by employing industry and pre-event indicators. Matrix X is then composed of two variables, that are described in Table 6. These variables were used to match samples and apply the propensity score matching. Besides, we also included industry dummies.

As was mentioned previously, the data is divided into three sub-samples. Hence, the matching procedure was performed for each sub-sample by executing a probit estimation with the following specification:

$$\Pr(Treat_i=1 \mid X_i) = F\{h(X_i)\}$$

where *i* is a firm index an X_i is the covariates vector.

Table 6 - Description of control variables used in the PSM

Variable	To control for	Definition	Literature[2]
Industry	Industry effects	Primary industry classification according to the NACE Rev. 2, which is a number composed of four digits.	(Wilson et al., 2012) (Gaspar, 2012)
Logsales	Firm size	Logarithm of sales in 2005.	(Gaspar, 2012) (Meuleman et al., 2009) (Wang, 2012)
Assetsempl	Firm specific characteristics, such as labor intensity	Asset per employee in thousands in 2005.	(Gaspar, 2012) (Muscarella & Vetsuypens, 1990)

An important aspect regarding the propensity score matching is related with the balancing property. Using the words by Rosenbaum and Rubin (1983), "*a balancing score,* $b(x)$*, is a function of the observed covariates* x *such that the conditional distribution of* x *given* $b(x)$ *is the same for treated* $(z = 1)$ *and control* $(z = 0)$ *units*", where z corresponds to an unit/company. So, in fact, the propensity score is, foremost, a balancing score. For that reason, the balancing property must be tested. The purpose is to check whether the distribution of the pretreatment characteristics is balanced in the treatment and control groups. The stratification test is one of the procedures that can be used to evaluate the balance. Here, observations are divided into sections, called strata, so that there is no statistical difference between the mean of the propensity score in the treated and control group. Next, *t*-tests are performed to assess if the distribution of covariates is the same for both groups. If it is not, then the specification must be modified by adding interaction or high-order terms until balance is achieved in every block/strata. Altering this specification does not affect the overall conclusions because the outcome variable of interest is not used in this step (Dehejia & Wahba, 2002). If

[2] We opted to follow similar measures as other authors. This column gives some examples of authors whose performance measure are the same or very similar as ours.

balance is not achieved, then any analysis or conclusions drawn are not reliable, given that there is not enough comparability between the two groups (Caliendo & Kopeinig, 2008; Garrido et al., 2014).

In our case, we need to estimate three equations, because we have three slightly different samples (short-run, medium-run and long-run analysis). Initially, the balancing property was not satisfied. Therefore, changes in the variables had to be made. We tried to introduce one interaction term ($\text{Assetsempl}_i * \text{Logsales}_i$), which solved the problem and balancing was then fulfilled in all three equations.

In summary, this was the equation estimated in the propensity score matching for the three subsamples:

$$Pr(Treat_i = 1|X_i) = F\{h(X_i)\}$$
$$= F\{\beta_0 + \beta_1 * Assetsempl_i + \beta_2 * Logsales_i + \beta_3 * Assetsempl_i * Logsales_i + \beta_4$$
$$* Industry_{1i} + \cdots + \beta_{25} * Industry_{22i} + \epsilon_i\}$$

Table 9 in the appendix shows the results of the propensity score matching.

4.3. Difference-in-Difference estimation

Having collected data on buyouts and control firms and having applied the propensity score matching to improve the comparison, we now move to the estimation itself. The purpose is to evaluate the effect of private equity, which, in our case, is considered the treatment. To do so, we need to compare the outcomes of firms that underwent the treatment with the potential outcomes of these firms if they had not experienced the treatment. The difference-in-difference estimation can be applied in this case. It compares the difference in the outcome before and after the treatment for the treated group to that outcome before and after the operation in the control group. It is a growing methodology that has been widely used in the literature (Bertrand & Zitouna, 2008; Borell & Tykvová, 2011; Davis et al., 2019; Fukao et al., 2007; Lehto & Böckerman, 2008).

This estimation is frequently associated with terms such as average treatment effect – ATE - and average treatment effect on the treated – ATT. While the former comprehends the average treatment effect regarding the entire population, the latter focuses only on the treated elements of the population. Within the literature, there is common understanding and acceptability that the DID gives the ATT, considering that, theoretically, the estimation was applied to a treated group, rather than to a certain group that could have been treated (Athey & Imbens, 2006; Ryan, Burgess, & Dimick, 2015).

The difference-in-difference estimation mitigates possible biases regarding, for example, external shocks. If we compared solely the before and after outcome of a company that was involved in the private equity transaction, the results could be influenced by, for example, an economic shock. Thus, the interpretation of a performance improvement or decline merely due to the private equity involvement would, most likely, be wrong. The DID estimation corrects this bias. Continuing with the example, by comparing the treated firms with their peers, the estimation considers that, in the event of an economic shock, all companies, both treated and control, are affected in an equally manner. Therefore, it assumes that possible time effects affect the two groups in the same way (Bertrand & Zitouna, 2008).

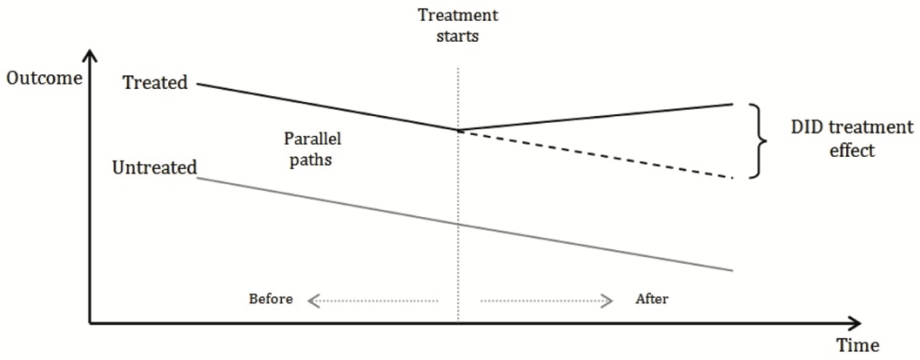
Three notions support this estimation. First, the availability of both treated and control groups. Second, and one of the most important, the assumption of parallel paths before the treatment. Essentially, this means that, without the treatment, the difference between the treated and the control group is constant over time. This is the same as saying that any deviation from the path is due to the treatment effect. Figure 3 shows a basic difference-in-differences setting. Thirdly, there must be a well-defined moment that outlines when the treatment started, so that there is a separation between the before and after periods (Villa, 2016).

The model can then be written as follow:

$$Y_i = \beta_0 + \beta_1 * Period_i + \beta_2 * Treat_i + \beta_3 * Period_i * Treat_i + \varepsilon_i$$

where i is a firm index. Y_i represents the outcome variable of interest (in this case: Profit margin, ROA, ROE, Debt-to-Equity and Net Asset Turnover), $Period_i$ is a dummy variable that takes the value of 1 if unit i belongs to the period after the transaction occurred and 0 otherwise and $Treat_i$ is a dummy variable that takes the value of 1 if unit *i* belongs to the treatment group and 0 otherwise. The year before the transaction is always the same (2005), but the period after the transaction can vary, so, alternatively, we take the years 2007, 2009 and 2011. The coefficient of interest, β_3, measures the interaction between $Period_i$ and $Treat_i$, which is the equivalent to a dummy variable that takes the value of 1 if the observation i is in the buyout group and in the post-buyout period. This coefficient evaluates the impact of using private equity. Therefore, the hypothesis we want to test is whether $\beta_3 = 0$.

Figure 3 - Basic DID setting



Source: Villa (2016)

With respect to possible serial correlation questions, we clustered the standard errors by industry. The underlying rationality is based on economics. Companies will probably behave similarly within industries. Besides, clustering the standard errors avoids potential heteroskedasticity issues.

4.4. Summary Statistics

Table 7 shows summary statistics for all variables used in this research, including variables used in the matching procedure.

The descriptive statistics refer to the year before the buyout took place. Since we have three subsamples (short run, medium run and long run), we opted to only show the summary statistics related to the short run group. This subsample is the one with the most industries included, with a total of 20 different industries, thus justifying this choice.

Concerning the control variables used in the propensity score, the median firm in the buyout group has sales and assets per employee bigger than the median firm in the control group. In terms of mean values, the average sales in the buyout group are considerably higher than in the control sample. On the other hand, the average assets per employee is almost the same in the two groups.

Looking at performance measures, the median buyout firm performs better in terms of profitability ratios, since the median profit margin, return on assets and return on equity are bigger. Its leverage is also bigger, with the same happening to net asset turnover.

If, on the other hand, we consider the matched sample, obtained after the propensity score matching, the median firm has a lower profit margin and return on assets, but the return on equity is very close. So, in terms of profitability, the two groups are on the same path. As for leverage, the debt-to-equity for the median buyout firm is considerably higher than for the matched firm. The net asset turnover is higher for the median buyout company, similarly as to what happens in the median control firm.

When it comes to control variables used in the propensity score matching, the median values of the matched sample are closer to the buyout group than the control group is. So, overall, the matching procedure was successful in approximating the values of the buyout group to a new sample, the matched one, that is more comparable than the control sample was. In fact, the median buyout firm and the median matched

firm have very close values for sales and assets per employee, which were the two main variables included in the propensity score matching. The interaction between $Logsales_i$ and $Assetsempl_i$ was only included to assure that the balancing property was satisfied.

Table 7 - Summary statistics for the sample group and the control group

	Buyout sample			Control sample			Matched sample		
Variables	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Profit margin (%)	4,41	7,57	20,30	30,45	2,00	1 835,68	7,33	5,20	13,08
ROA (%)	8,63	7,90	11,61	1,90	2,75	96,12	7,73	5,02	13,85
ROE (%)	4,74	23,01	100,60	25,74	12,97	1 433,45	64,66	23,59	234,97
Debt-to-Equity (%)	125,26	50,55	359,76	-18,56	20,25	10 331,97	106,98	21,93	281,80
Net Asset Turnover	2,85	3,40	1,53	4,25	2,84	89,77	10,53	2,54	49,47
Sales (th)	111 350,40	31 352,00	203 166,90	6 003,77	919,91	64 334,74	126 420,20	32 312,00	277 120,60
Asset per Employee (th)	782,38	165,00	2 250,49	790,18	58,28	15 030,24	654,24	173,93	1 119,58

This table presents the mean, median and standard deviation for control and outcome variables. Three groups are considered: the buyout group, the control group and the sample group. The first group is composed of 21 different companies, the control group includes 10 623 companies and the matched group considers 59 companies. The matched group was obtained through the propensity score matching estimator. Information regarding variables definitions is included in subsections 4.1 and 4.3. Sales and Assets per employee are measured in thousands. Financial information was retrieved from the database Sabi.

5. Empirical results & Discussion

Table 8 presents the results for the DID estimation of the five measures of performance: profit margin, return on assets, return on equity, debt-to-equity and net asset turnover. We clustered standard errors by industry in order to avoid possible serial correlations (Borell & Tykvová, 2011; Wang, 2012).

We opted to divide this section into three parts, considering the category of the performance measures.

5.1. Profitability

In the short run period, there seems to be a decline in the profit margin and in the return on assets. On average, profit margin declined around 2%, while return on assets declined less than one. Return on equity was the only profitability measure that did not decrease one year after the buyout. In fact, on average, it increased around 45%. So, interpretations regarding profitability are mixed in the short run. Within the literature, studies hardly focus merely on the year after the transaction took place. The justification is quite simple bearing in mind that buyouts are complicated operations, that, due to their nature, tend to happen in more mature and large companies. For that reason, these processes usually take some time to be fully implemented and, therefore, effects are plainer in longer periods of time.

The medium run outcome is very close to the short run one. Profit margin and return on assets continued to perform negatively, with the former decreasing more than 5% and the latter decreasing more than 2% on average. Return on equity rose, on average, around 14%. Since this comparison comprises the years of 2005 and 2009, this means that, for the profit margin and ROA, the negative operating effects of the buyout deepened three years after the operation. On the other hand, ROE increased less than in the short run, indicating that this growth was smoothed.

Table 8 - DID regression for buyouts and matched firms

Dependent Variable	Profit Margin			ROA			ROE		
Model	Short Run	Medium Run	Long Run	Short Run	Medium Run	Long Run	Short Run	Medium Run	Long Run
Period	0,0061	-0,0433***	-0,1372	-0,0149	-0,0616***	-0,1325	-0,3794	-0,3193**	-0,0303
	(0,0218)	(0,0141)	(0,1211)	(0,0130)	(0,0133)	(0,0755)	(0,3502)	(0,1159)	(0,0928)
Treat	-0,0409	-0,0049	-0,0124	-0,0020	-0,0021	-0,0097	-0,6140	-0,1255	-0,0639
	(0,0508)	(0,0255)	(0,0826)	(0,0325)	(0,0231)	(0,0385)	(0,3912)	(0,0959)	(0,1015)
Period*Treat	-0,0198	-0,0562	0,0068	-0,0092	-0,0272	-0,0238	0,4554	0,1413	0,2819
	(0,0647)	(0,0598)	(0,1292)	(0,0293)	(0,0427)	(0,0772)	(0,3492)	(0,1797)	(0,8110)
Constant	0,1193***	0,0582***	0,0882*	0,1819***	0,0751***	0,1046*	0,5502**	0,2790***	0,0524
	(0,0145)	(0,0176)	(0,0457)	(0,0103)	(0,0157)	(0,0372)	(0,2073)	(0,0475)	(0,2169)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	160	126	114	160	126	114	160	126	114
R-squared	0,2541	0,2253	0,1758	0,2896	0,2577	0,1860	0,1590	0,0808	0,1814

The table presents the difference in difference estimates for Profit margin, ROA, ROE, Debt-to-equity and Net asset turnover for the sample of firms involved in private equity transactions during the year of 2006. Variables' definition is described in subsections 4.1 and 4.4. Period is a dummy variable that takes the value of 1 in the short tun column for observations one year after the transaction; in the medium run column for observations three years after the transaction and in the long run column for observations five years after the transaction. Respectively, Period*Treat is an interaction term for buyouts 1, 3 and 5 years after the transaction. Estimation regarding industry dummies were omitted due to presentation purposes. The short run period includes 160 companies (21 buyouts and 59 matched companies); the medium run includes 126 companies (16 buyouts and 47 matched companies); the long run includes 114 companies (15 buyouts and 42 matched companies). Standard errors are in parenthesis and were clustered by industry. *** denotes p-values < 0,01, ** denotes p-vales < 0,05, * denotes p-values < 0,10

Table 8 - DID regression for buyouts and control firms (cont.)

Dependent Variable	Debt-to-Equity			Net Asset Turnover		
Model	**Short Run**	**Medium Run**	**Long Run**	**Short Run**	**Medium Run**	**Long Run**
Period	-0,2917	0,5809	0,0427	0,1002	-0,3572	-0,7046
	(0,3209)	(0,5258)	(0,2024)	(4,2711)	(0,5816)	(1,6510)
Treat	0,1101	0,6726	0,8345	-7,9896	-0,8419	-0,0680
	(0,9414)	(1,3439)	(1,0886)	(6,9865)	(0,7695)	(1,2725)
Period*Treat	0,3947	1,3779	-1,3976	-0,4755	-0,2175	1,0796
	(0,8517)	(1,9104)	(2,7902)	(4,3883)	(0,9427)	(1,9028)
Constant	0,9103***	-0,1141	0,8521*	4,4129	4,1197***	3,5669***
	(0,2299)	(0,7358)	(0,4454)	(2,9409)	(0,5026)	(0,9569)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	160	126	114	160	126	114
R-squared	0,2583	0,1367	0,1126	0,1745	0,2361	0,1269

Results in the long run are more aligned to those in the present literature. The long run period compares the years of 2005 and 2011. Profit margin showed a positive trend, though very slight, for the first time, accompanied by an average rise of ROE of 28% when compared to 2005. Return on assets continued the negative trend showed in the short and medium runs, indicating an average decrease of about 2%.

The interpretation of these results is comparable to those of several authors in the literature. In fact, Meuleman et al. (2009) measured profitability through the return on capital employed ratio and did not find enough evidence of significant superior profitability in buyouts. With similar conclusions, Scellato and Ughetto (2013) obtained signs of underperformance on firm-level operating profitability. Desbrières and Schatt (2002), who focused their analysis on the buyout French market, assessed profitability using ROE, return on investment and margin ratios. All these indicators showed a negative trend in the acquired firms relative to industry peers after the buyout. Therefore, conclusions on the topic of operating profitability are very mixed and diverse. S. Kaplan (1989) provided additional explanations that can justify this

lack of greater and expressive post buyout performance. He argued that post buyout assets divestures can underestimate operating income and, thus, affect profitability.

In general, our results are somewhat aligned with those presented by other authors (Leslie & Oyer, 2008; Guo et al., 2011; Scellato & Ughetto, 2013). Some profitability measures reflect an improvement, namely, ROE, but other, such as ROA and profit margin, reflect an underperformance in the short and medium runs, with a beginning of recovery in the long run in the case of the latter.

5.2. Leverage

As for capital structure, on average, gearing increased during the short and medium runs, growing more three years after the buyout. This result is not unexpected, considering that a big number of buyouts correspond to leverage buyouts, which means investors rely heavily on debt to secure their positions and stakes. On this subject, literature has a general consensus in agreeing that buyouts are associated to increased levels of leverage. Guo et al. (2011) found evidence that the greater the leverage, the greater were the cash flows. Axelson et al. (2013) supports this idea by stating that PE firms tend to use as much leverage as possible, with their data corroborating the statement. Besides, they argued that one of the biggest constraints of leverage can be the capital markets, which can limit the amount borrowed. Borell and Tykvová (2011) study the relation between financial performance and market credit conditions, concluding that the financial situation deteriorates for operations that were conducted during favorable market conditions. This inference is extremely helpful when interpreting our results. Credit market conditions were particularly accessible and relaxed before 2009, with regulation in the bank industry very loosened. That allowed many small and big investor to borrow at very low interest rates. Many economists argue that the main engine of the crisis was, precisely, the too relaxed credit conditions. Thus, the notable increase in leverage until 2009 is explained, mainly, due to the economic and financial landscape at the time. Explanations for the reduction estimated in the long run are also associated with the crisis, considering that the collapse of the banking industry and financial institutions prevented investors from borrowing money, but it also worsened their investment positions.

5.3. Productivity/Efficiency

Regarding net asset turnover, it decreased one year after the buyout. This means that the company lost efficiency right after the buyout took place, indicating that it generated less revenues from its assets. This negative tendency continued in the medium run. The average reduction was, however, smaller than the one obtained in the short run period. From here, one can suggest that the loss of efficiency detected one year after the buyout has been flattened during the three years after. This can hint, possibly, that the buyout company has managed to overcome the efficiency shortfall, by improving its assets operability. The long run results support this idea, with net asset turnover presenting, for the first time, a positive trend. On average, the buyout firm was able to generate one more dollar of revenues for each unit of assets, suggesting an improvement in efficiency due to the buyout. Gaspar (2012) also detected efficiency improvements in his study of French buyouts. Improvements were especially significant after four years, which backs up our results. Wilson et al. (2012) present similar results. They found that UK PE backed companies were less efficient before the buyout operation and productivity improvements reached more than 15% due to the buyout. These results seem to support the Jensen's hypothesis. Jensen (1989) places special attention into ownership as a central and transformative force that can affect a firm's performance. The role of the PE investors is particularly valuable because of their aptitudes and incentives in reducing agency problems and, consequently, in enhancing and upgrading firm's efficiency.

A crucial aspect of our study is framing our results within the Spanish context. Above all, it is important to consider the timeline of our analysis, which covers one year after the buyout took place, three years after and five years after. The medium run timeframe coincides with the same year when the crisis hit one of its worst moments, with economies and markets reaching low statistics every day. In spite of the crisis, the Spanish PE market managed to overcome those negative effects and still perform better than what was expected. The profitability measures dropped in the medium run, but soon started to recover in the long run, with special focus on return on equity. Leverage rose considerably, mainly in the three years after the buyout, but it decreased severely in a five-year timeline. The explanation is mainly due to credit

market conditions. Regarding productivity, the buyout sample revealed an increase in the long run, confirming propositions from previous research.

The statistics provided by ASCRI for the recession years support our results, which reflected a severe reduction in activity during 2008 and 2009, but a remarkable recovery form 2010. As in our analysis, the short and medium run presented the most negative results, but a positive and recovery trend could be recognized as of 2011. In fact, the performance of other types of private equity investments, such as expansion, venture capital or replacement, can hardly compare to those achieved by buyouts. Thus, an interesting key takeaway from this investigation is related with the endurance, persistence and survival capabilities of buyouts.

Our results vary from those that Wilson, Wright, Siegel and Scholes (2012) presented. In our case, performance was generally worse during the recession years than before. Even so, they highlight the greater potential of buyouts to improve efficiency and performance, which we can agree on. In fact, it might be the reason that explains the rapid recovery of buyouts.

6. Conclusion

Previous findings regarding improvements on buyouts' operating performance is mixed, with positive and negative results coexisting in the current literature. Moreover, studies tend to focus on the biggest markets, such as the American and English private equity markets. In this study we aimed at testing the operating performance of Spanish buyouts during a period of global recession. To do so, we collected data regarding buyouts deals from Refinitiv Eikon and companies' financial information from Sabi. The time period includes the years of 2005, 2007, 2009 and 2011. This timeframe comprehends the recession cycle that hit world after the outbreak of the mortgage bubble in the US. Therefore, we have included three-time analysis: short-run (2005-2007), medium run (2005-2009) and a long run (2005-2011). This division of timeframes also allowed us to study the performance of buyouts before and during the recession.

An advanced and widely used methodology was applied in this investigation. We wanted to include a comparison of a before and after period of the private equity transaction with a comparison of a buyout group versus a control group. This control group should be composed of the same companies as the buyout group if they had not been involved with private equity firms. Since that is not possible to test, a very similar control group had to be constructed. To do so, we employed a propensity score matching instrument to ensure that the buyout group and the new control group would be as similar as possible. To build the control group, information regarding Spanish companies was collected from Sabi and this group was then cleaned of companies that had been involved in private equity transactions. Since the purpose is to study the influence of the private equity in companies and whether or not this involvement affects their performance, the control group must be composed of companies that had never been engaged with this type of operations. The propensity score matching instrument matched companies from the buyout and control groups considering some variables, such as sales and assets per employee. Industry dummies were also included. From here, it emerged a new group of companies, the matched group, that was used in the estimation model.

The estimation model considers two differences: one regarding the time differences (before and after the treatment took place, which, in our case, the treatment corresponds to the private equity transaction), and another regarding the difference in outcomes between treated (buyouts) and untreated (control/matched) groups. The model is known as differences-in-differences and it allows, in this case, to assess the average effect of the involvement in private equity on the buyouts. To measure this effect, five performance variables were chosen within three categories of variables: profitability (profit margin, return on assets and return on equity), leverage (debt-to-equity) and productivity/efficiency (net asset turnover). As mentioned before, three time periods were analyzed here, so it was possible to examine the evolution of these five variables during the five years.

We did not find evidence of considerable superior performance of buyouts in this period. On the contrary, it is possible to assume that the Spanish buyout market was also affected by the economic crisis, with effects in the buyouts' performance during the short and medium run. Profitability went down, mainly, form the short to the medium run, which coincided with the same year the crisis hit one of its worst moments. Recuperation started to be observable as of the long run. Besides, it is possible to deduce companies took advantage of the relaxed credit conditions before the bubble burst, since leverage increased substantially until 2009. The reduction that came next can be easily explained considering the consequences of the crash of the banking system that came around 2009 and 2010, with investor experiencing vast losses. In terms of productivity, the buyout companies suffered a decrease in the first three years, but signs of recovery could be spotted as of 2011.

These results are aligned with the statistics from the Spanish's Venture Capital and Private Equity association, that reflected a severe reduction of activity during 2009 and 2010, and an impressive recovery during the following years. Comparing to other types of private equity capital, such as venture capital or seed capital, none achieved the same recovery levels as buyouts.

Our findings, together with these statistics, allow us to conclude that Spanish buyouts did not showed signs of solid superior profitability. However, there seems to be an interesting capability in improving efficiency, even during very negative

economic environments, which might explain the impressive recovery of buyouts. Just as Jensen (1989) placed an important role in the transformative capabilities that buyouts have on efficiency and productivity to reduce agency problems, this study provides evidence that may support this hypothesis.

7. Limitations and Future Research

Alike many studies that rely in accounting information as the base of their study object, accounting information always carries the risk of being manipulated. Wu (1997) focused specifically on earnings manipulation within buyouts and confirmed evidence that stock prices tend to fall before an MBO, with managers retaining a considerable portion of savings. He found that preannouncement income decline is a characteristic of buyouts, as opposed to target firms of other takeovers who reveal an income increase. Having in mind this risk, results interpretation must always be careful.

Nonetheless, the biggest limitation of this research is related with sample size. Obtaining a considerable group of companies that provided sufficient financial information for the chosen timeline was an enormous challenge. This task got even more difficult since the two databases are not directly linked. For that reason, matching deals and companies between Refinitiv Eikon and Sabi was a very long and exhausting process since information had to be examined manually for each company and deal. Thus, there was a tradeoff concerning having more reliable and trustworthy information, which translated into a smaller sample size, or having a bigger sample, but whose conclusions would certainly be even more biased. We opted for the first option. Hence, the buyout sample is small, which might be the explanation behind the loss of significance in the estimation coefficients.

As to future research, it would be interesting to investigate the behavior of economies that are structurally similar to Spain. Since the purpose of this study was to analyze the performance of Spanish buyouts during a period of severe economic breakdown, comparing these results with those of obtained from economies that are on the same economic, financial and development level would as Spain would validate our results and conclusions.

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9. Appendix

Table 9 - Probit estimation for the propensity score matching

Variables	**Short Run**	**Medium Run**	**Long Run**
Assetsempl	0,0000	-0,0022	0,0000
	(0,0000)	(0,0041)	(0,0001)
Logsales	0,3921***	0,5188***	0,4446***
	(0,0585)	(0,0904)	(0,0789)
Assetsempl*Logsales	0,0000	0,0002	0,0000
	(0,0000)	(0,0004)	(0,0000)
Constant	-6,4273***	-7,9588***	-7,0815***
	(0,8428)	(1,2117)	(1,0677)
Industry dummies	Yes	Yes	Yes
Observations	10 644	7 230	5 481
Pseudo R-squared	0,3172	0,4141	0,3537
Log-Likeliwood	-103,6361	-66,6750	-66,8865
Balancing Property	Satisfied	Satisfied	Satisfied

The table reports the probit estimates for the propensity score matching. Estimation regarding the industry dummies were omitted due to presentation purposes. Standard errors are in parenthesis. *** denotes p-values < 0,01, ** denotes p-vales < 0,05, * denotes p-values < 0,10