

Long-term performance of Private Equity backed Mergers and Acquisitions

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Abstract

This paper explores the impact of Private Equity funds on firms' performance post-deal, in the period of investments made between 2011 and 2017. Further analysis is made to explore the divergence in performance for Anglo-Saxon and non-Anglo-Saxon countries. Our sample is composed of 129 deals, of which 86 are from non-Anglo-Saxon and 43 from Anglo-Saxon countries. Our results do not suggest a unanimous behavior of general overperformance from our target firms, but rather specific areas of enhanced performance. We found a statistically significant decline in profitability for Return on Assets, and EBIT margin. But in contrast, concerning operating efficiency level, we found signs of a positive increase in Sales over Employees, post-deal. Our DID regression shows evidence of a positive increase in the number of employees. Finally, moving to leverage, our results show statistical significant results, expecting leverage to increase post-deal.

Sumário

Esta tese analisa o impacto de *Private Equity funds* no desempenho das empresas-alvo após investimento, no período de investimentos realizados entre 2011 e 2017. Uma análise mais aprofundada é executada com o intuito de explorar a divergência de desempenho entre países de origem anglo-saxónica e países sem ser de origem anglo-saxónica. A amostra utilizada é composta por 129 observações, dos quais 86 pertencentes a países não anglo-saxónicos e 43 de países anglo-saxónicos. Os resultados obtidos não demonstram um comportamento unânime de desempenho geral superior por parte das empresas *PE-backed*, exibindo um aumento de desempenho em níveis específicos. Os resultados apontam para um decréscimo estatisticamente significativo a níveis de lucratividade para *ROA* e *EBIT margin*. Em contrapartida, no que respeita ao nível de eficiência operacional, encontramos sinais de um aumento em *Sales over employees*. Os resultados da regressão *Difference-in-Difference* feita sobre o número de funcionários apresenta evidências de um aumento positivo. Por último, e passando para a *Leverage*, os nossos resultados mostram provas de um aumento de *Debt over Equity*.

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Chapter 1: Introduction

A major player in the funding industry these days, is established in the private equity fast-growing market (George W. Fenn, Nellie Liang, Stephen Prowse, 1997), reaching a record global buyout value, in 2021, of approximately \$1.1T, Bain report on global private equity (2021).

And around this giant, there has been a huge controversy around the real impact of private equity funds on target companies. There has arisen a question regarding if short-term improvements occur at the expense of long-term performance. Stringham, E., Vogel, J., 2018, propose that private equity managers' incentives align with the ones of the company managed. This, together with their expertise, can lead to the creation of value for the fund, the company, the limited partners, and the company's shareholders, focusing on a long-term approach, and increasing job growth, not having to trade it for its short-term needs. Different studies support this idea, suggesting that with Private Equity (PE) backed companies, management actively involved in running the business can focus on a more long-term approach, leading the company to achieve an overperformance compared to their non-PE backed counterparts, resulting in profitability and job growth (Stringham, E., Vogel, J., 2018) (Kaplan, 1989) (Strömberg, 2009) (Jain and Kini, 1995). Experts like Harford and Kolasinski (2013) trying to solve this question, tested and rejected the hypothesis that "private equity sponsors merely transfer wealth to themselves or achieve short-term improvements at the expense of the long-term".

From a different perspective, Desbrières and Schatt (2002) result on the French market, analyzing the performance of French companies involved in a leveraged buyout. observed that MBOs obtain better returns before the buyout but become less profitable on a long-term basis. Amess, K. and Wright, M. 2010 in their study tackling post-exit long-term abnormal operating performance, concluded that PE-backed buyouts do not exhibit post-exit underperformance, but also fail to exhibit over-performance compared to their non-PE backed counterparts.

There have not been absolute and unanimous conclusions on the problem, leading us to execute an analysis on the subject, complementing the already existing studies, focusing on post-deal performance. Based on Jelic and Wright (2011) and Barber and Lyon (1996) suggestions, to measure the proper impact of PE on target companies' performance, our

approach holds its foundations on 4 different scopes: Profitability, Operating Efficiency, Employment, and Leverage:

Profitability:

Return on Assets (ROA) = Profit before tax (\$ Millions) divided by total assets (\$ Millions)

EBIT margin % = EBIT divided by Sales

Operating Efficiency:

Sales efficiency = Sales (\$ Millions) divided by the number of employees (Unit)

Employment:

Total employment (EMP) = Total number of employees

Leverage:

Debt to Equity (D/E) = Debt (\$ Millions) divided by Equity (\$ Millions)

Therefore, this paper explores the impact of Private Equity funds on firms' performance after the acquisition, in the period of investments made between 2011 and 2017. Further analysis is made to explore the divergence in performance for Anglo-Saxon and non-Anglo-Saxon countries. Our sample is composed of 129 deals, of which 86 are from non-Anglo-Saxon and 43 from Anglo-Saxon countries. We use Propensity Score Matching with the necessity to know the performance outcome the PE-backed companies would have without the investment made. PSM serves to "find in a large group of nonparticipants those individuals who are similar to the participants in all relevant pre-treatment characteristics X." This methodology creates a Control group with 589 companies for Hypothesis 1 and 163 and 399 companies for Anglo-Saxon and non-Anglo-Saxon groups, respectively, for Hypothesis 2.

Using a Difference-in-Difference (DiD) technique, a quasi-experimental econometric approach to estimating causal effects at a given period on its target population, our results do not suggest a unanimous behavior of general overperformance from our target firms but rather specific areas of enhanced performance. Regarding our first hypothesis, our results do suggest a statistically significant decline in profitability for Return on Assets, being aligned with EBIT margin results. As for operating efficiency level, our results indicate a highly positive increase in Sales over Employees, post-deal. On an employment level, our DID regression on the number

of employees shows evidence of a positive increase, being aligned with Davis et al. (2014) and Amess et al. (2014) studies. Finally, moving to leverage, our results show statistical significance for all 4 DIDs', which indicates an expectation for leverage to increase post-deal. As for our conclusions on the 2nd hypothesis, discriminating on the 4 levels of performance, and looking into the 5 indicators, we can observe, although negative and statistically insignificant, that EBIT margin is the only indicator that, for non-Anglo-Saxon companies, obtains constant inferior values over Anglo-Saxon companies. ROA and Sales efficiency measures show the opposite behavior, with non-Anglo-Saxon companies obtaining constant superior values. Over the remaining indicators and years, we can observe a variance of magnitudes in both Anglo-Saxon and non-Anglo-Saxon companies.

In sum, our study is organized as follows: In section 2, we describe and give an overview of the private equity market and discuss the most updated studies on it. In section 3 we present our final data, its sources, and the treatment steps executed to achieve it. In section 4 we discuss the methodology implemented. In section 5 we present our results and finalize in section 6 with our conclusions on the work.

Chapter 2: Literature Review

Private Equity Overview

One of the most crucial sources of funding these days, for the large scope of diversified industries, is established in the private equity market, a fast-growing market (George W. Fenn, Nellie Liang, Stephen Prowse, 1997), closing the year 2021 with a global buyout deal value of approximately \$1.1T, a record-breaking year for private equity deal value, Bain report on global private equity (2021).

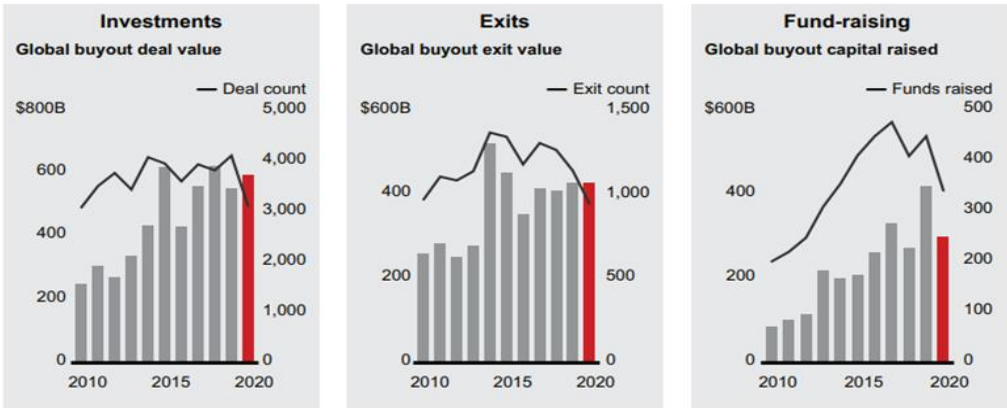
Throughout the years, a definitive definition of Private Equity has not been established, having different experts on the subject given their definitions. But accurately explained by Invest Europe (2022), “Private equity is a form of professional investment that involves taking an ownership interest (equity) in a company and holding it in private hands – as opposed to on a public stock exchange”. To better understand the subject, one must analyze and learn from other experts’ definitions. For instance, in a study conducted by Fenn, Liang, and Prowse (1997), Private Equity is defined as “professionally managed equity investments in the unregistered securities of private and public companies”, as for John Gilligan and Mike Wright (2014), it is described as “risk capital provided outside the public markets”.

The term Private Equity has a misleading definition, with many confusing it with Venture Capital. Private Equity comprises the entire stage spectrum of a company the fund is targeting, varying from early-stage ventures, usually entitled Venture Capital investments, and over-development capital to the purchase of a corporation in a management buyout or buy-in. As mentioned before, there is a broad definition for PE as equity provided outside the public markets and a more precise definition referring specifically to the market of private equity funds that target buy-outs and growth capital, John Gilligan and Mike Wright (2014). As Venture Capital represents part of the Private Equity focused on early-stage companies (start-ups), supporting entrepreneurs with revolutionary ideas but lacking the necessary funds and expertise to expand their companies, Europe Invest (2022). As all the events involve private equity, nowadays the term mostly makes mention of later-stage development capital, buy-outs, and buy-ins of established businesses.

Market capitalization on Private equity M&A

These last couple of years were a roller-coaster for the financial world. A worldwide pandemic, the rising of police brutality and manifestations, the Biden election, and more recently the war between Ukraine and Russia, and so on, all impacted the economic world, bringing markets up and down in a matter of months. And Private Equity absorbed this shock, but as of the end of 2020, despite deals and exit values remaining constant, fund-raising, which registered record activity in 2019, experienced a major decline (Figure bain report). But despite all the events, PE keeps outperforming other private markets, and asset classes. Deeper research by McKinsey on Private Equity concludes Private Equity outperforms its equivalents in public markets, with net global returns of over 14%.

Figure 1: Yearly Private Equity market development



(source: Bain report on global private equity, 2021)

As history tells us, generally, it takes years for an industry to make an observable rebound, but observing the quarterly behavior, private equity reacted effectively in the third quarter, with a pandemic correction, bringing Deal and Exit values to a high, exceeding the 2018 and 2019 years. This fast reaction suggests “resilience and continued momentum” explained by investors' pursuit of higher potential returns in the private equity market, Bain & Company Global Private Equity Report (2021). As for 2021, it is marked by strong early activity, partially explained by the overall 24% drop in the deal count during 2020, leading to a

high number of unfinished deals to be concluded in the coming year, possibly resulting in a positive impact on 2021 deal final numbers, McKinsey Global Private Markets Review (2021).

Figure 2: Quarterly Private Equity market development



(source: Bain report on global private equity, 2021)

According to an Andrew Metrick and Ayako Yasuda (2010) study, worldwide, two-thirds of the capital managed by private equity capital is managed by buyout funds. And in contrast to Venture Capital funds, buyout funds invest in later-stage businesses, usually obtaining a controlling interest, needing to use larger amounts of leverage to magnify the rate of return. There are 3 different types of buyouts pointed out by Catherine Cote, Harvard Business School (2021):

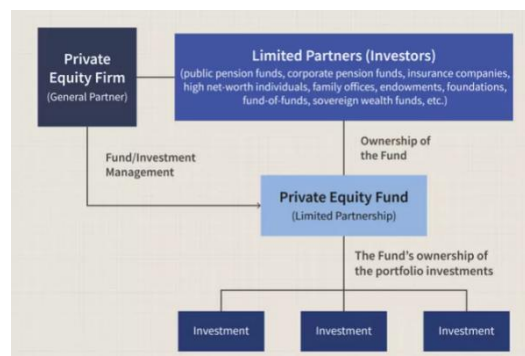
- Management Buyout (MBO) - the acquisition starts with the existing management team buying the company’s assets and taking the controlling share.
- Management Buy-in (MBI) - takes place when the management team of a different company buys the company and takes over both management responsibilities and a controlling share.
- Leveraged Buyout (LBO) - in the simplest way, represents buyouts funded with borrowed money.

Structure of a Private Equity fund

Private equity is managed by a Private Equity fund, which is organized in the following manner, according to an Andrew Metrick and Ayako Yasuda (2010) study:

Limited Partners are represented by institutional investors, such as pension funds and investment funds, and high net worth individuals, which amount to the bulk of the investment; the private equity firm itself, denominated as General Partners, has the purpose of managing the fund. These limited partnerships typically last around 10 years (5 years to allocate the capital and another 5 to earn a return, Stringham, E., Vogel, J. (2018)). The figure below illustrates the structure of a private equity fund.

Figure 3: Structure of Private Equity fund



(source: Investopedia, 2020)

Compensation

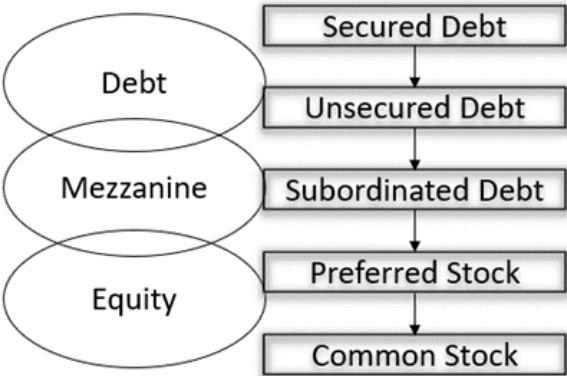
Regarding General Partners compensation, it occurs through 2 different vehicles. Managers are agreed to receive management fees expressed as a percentage of the funds raised, which varies from 1% to 3% according to the fund size. As for the second source of compensation, it emerges as a share in the profits of the fund, commonly mentioned as carried interest. Once the hurdle rate is achieved, general partners receive a percentage of the excess, assuming frequently a 20% excess, John Gilligan and Mike Wright (2014). This is a good

method of compensation, as it represents a way to incentive fund managers to achieve the best performance possible, as their compensation is directly related to the fund’s profitability.

Financing types

Talking about Financing options available, and when it comes to Leveraged Buyouts, equity typically represents 40% to 30% of the financing structure, from both sponsors and the management, being the larger “slice of the cake”, from debt origin. This tranche of the financing structure includes a large variety of instruments, leading to diverse conditions that appeal to different classes of investors (Rosenbaum and Pearl, 2013). Ahead, we will discuss the 3 major categories of LBO financing sources, shown below, ranked by their general terms of risk.

Figure 4: Financing structure



(source: Based on Joshua Rosenbaum, Joshua Pearl, 2013)

Debt

Debt financing is known as the financing type with the lowest level of risk, being the safest, meaning the cheapest type of financing available for LBO. Upon the agreement moment, it is settled the horizon time in which the debt will be repaid, and its interest payment through the time horizon. Debt financing represents the safest financing type, for providing its lenders the highest priority on claims in case of liquidation processes, insolvency, or bankruptcy.

Mezzanine

Mezzanine debt, is a highly negotiated instrument, representing a combination of capital situated between debt and equity (Rosenbaum and Pearl, 2013). This type of financing constitutes an alternative able to raise additional capital at a lower cost than equity. For example, when we observe a high yield financing market, mezzanine debt can be seen as a substitute for these unfavorable markets.

Equity

Regarding Equity, the last level of LBO funding is provided by a financial sponsor or/and the target company management. It typically assumes a value of 30% to 40% of the financing structure, although debt market conditions represent a major factor in the Equity values of the funding. Depending on the size of the LBOs, different individuals might work together, creating a consortium of buyers and reducing the amount of equity contributed (Rosenbaum and Pearl, 2013). Equity contribution represents a safety pad for Debt lenders, as if the target company suffers a hit, equity value is the first to suffer the impact.

Exits

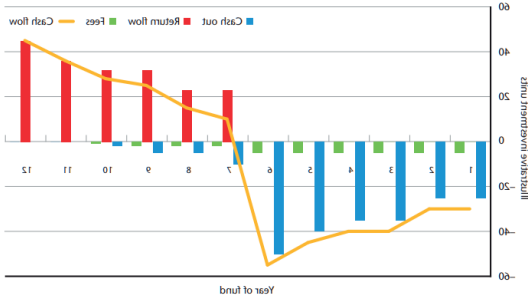
All transactions made in this line of work are structured with an exit in mind, to achieve a higher value than the entry one. Limited Partners receive every amount of the exit proceeds until they receive back their entire capital invested, and then the General Partners will receive around 20% of the increment produced, making it imperative to determine the best exit strategy. They are defined as follows:

- Initial Public Offering - refers to the process of offering shares of an organization to the public through a new stock issuance, allowing a company to raise capital from public investors, Jason Fernando (2021). An IPO normally implies a higher company valuation, mainly when the market is in a growing stage, often being the preferred exit strategy chosen by corporations, Fenn, Liang, and Prowse (1997). According to Invest Europe (2022) study, IPOs represented 12% of divestments made in 2020.
- Trade Sale - defined as the sale of a company to investors typically operating in the same industry or sector. Trade sales can assume different forms such as the sale of the company's shares, or underlying business assets such as goodwill or premises. An intermediary, for instance, a business broker, normally acts on behalf of the corporation, making contact with parties interested in acquiring the business, Jonathan Munnery (2021). According to Invest Europe's (2022) study, Trade sales represented 25% of divestments made in 2020.
- Secondary Buyout - one of the most common forms of exit, is a transaction involving the sale of the privately-owned company to a third party, another private equity fund. John Gilligan and Mike Wright (2014) point out that up to 2007 secondary buyouts accounted for a third of large buy-out exits. According to Invest Europe (2022) study, Secondary Buyouts represented 35% of divestments made in 2020. This form of exit needs to be ignored when analyzing the company performance, as it would represent the analysis of the performance of a company, passed from one fund to another fund, not capturing the added value of being managed by a PE fund.
- Buyback - as the name indicates, is an exit type that occurs when the company acquired by the private equity fund is bought back from previous owners. According to Invest Europe (2022) study, Buybacks represented 4% of divestments made in 2020.

J-Curve Development of Private Equity Funds

When it comes to the financial world there is always uncertainty about an investment outcome, but there can be predicted cash flow returns. In the Private Equity fund business, there is a common pattern behavior, marked by net cash out during the first 5 years as funds are allocated (Stringham, E., Vogel, J. 2018), and net cash in the remaining years. The following example is a schematized normal cash flow structure, not assuming any early realizations from successful investments, John Gilligan and Mike Wright (2014).

Figure 5: J-Curve Development of Private Equity Funds



(source: Gilligan and Wright, 2008)

The controversy around the short-term vs long-term impact of PE funds on companies

There has been controversy around the impact of private equity funds on the companies acquired regarding if short-term improvements occur at the expense of the long-term performance. But a study conducted by Harford and Kolasinski (2013) tested and rejected the hypothesis that “private equity sponsors merely transfer wealth to themselves or achieve short-term improvements at the expense of the long-term”. Other experts express that by keeping a company private, the managers, actively involved in running the business, can focus on a more long-term approach and even increase job growth by restructuring companies, rather than having to attend to the needs of stock markets and shareholders, and it’s short-term needs (Stringham, E., Vogel, J., 2018) (Invest Europe (2022)).

Private Equity added value

For a proper analysis of the performance of Private-Equity backed mergers and acquisitions, there are two main scopes in which the expert's analysis can be divided. Analyzing the company performance before vs during the holding period, having the acquisition point as the separating line, and the company performance during the holding period vs after exiting. Curiously, the majority of studies done throughout the years have been focused on the first scope, analyzing companies' performance before and after the acquisition point, making a short-term analysis of the company's performance, and analyzing a horizon up to 4 years after the acquisition (Amess, 2003; Jelic & Wright, 2011). The majority of studies on this post-deal PE added value focus on specific countries or areas.

Private Equity added value post-deal

As mentioned before, different studies tackle the mystery of whether PE funds focus on improving short-term performance to the detriment of long-term growth, for individualistic benefit. There has been a "gray area" around this subject, as there have not been absolute and unanimous conclusions on the subject. Experts Lerner, Sorensen, & Strömberg (2011) have conducted a study on 472 LBO transactions, observing no evidence that LBOs sacrifice long-term investments in favor of the short-term benefit. This study aligns with a study carried out 2 years later by Harford & Kolasinski (2013), which rejected the hypothesis that private equity funds obtain high short-term performance resulting from sacrificing their long-term value.

On a different note, concerning only post-deal performance, Jelic and Wright (2011) and Barber and Lyon (1996) suggest that to measure the proper impact of PE on target companies' performance, our approach to companies' performance must hold its foundations on at least these 4 different scopes: profitability, operating efficiency, employment, and leverage. Regarding sales efficiency, George E. Halkos, Nickolaos G. Tzeremes (2013), observed that "the majority of the potential bank M&As under examination were unable to generate short-run operating efficiency gains". This contrasts with the "efficiency hypothesis" which, according to Craig and Dinger (2009), in the event of an M&A, sales efficiency should increase due to the creation of economies of scale and other efficiency gains. From an

employment perspective, Lehto et al. (2008), which analyzed the employment effects of M&A, concluded that these events lead to downsizing in employment. A possible explanation is presented by Shleifer and Summers (1988), suggesting that the existence of a new management team emerged from the M&A deal, with the mindset to originate profits and cut costs, using employment reductions as a tool to achieve such objectives, as this new team “renege on implicit labor contracts that have constituted obstacles for layoffs”. On the other hand, Davis et al. (2014) study suggests that buyouts can lead to large increases in gross job creation, being aligned with Amess et al. (2014), who also took conclusions from his work that is, in reality, creates jobs. As for PE’s impact on companies’ leverage, Cioli et al. (2020) study suggest that target companies show evidence of increased leverage post-deal. Yet, according to NM Leepsa, CS Mishra (2012), their work proposes a Debt ratio decrease after the investment was made, although not statistically significant.

Private Equity added value after exit deal

A Kaplan 1989 paper, based on a sample focused on more than 50 large buyouts of public companies, shows evidence that companies experienced increases in operating income and net cash flow, and a decrease in capital expenditures, aligning with an increase of 96% and 77% in both mean and median of MV, two months before the buyout announcement to the post-buyout sale. A more recent study conducted by Strömberg (2009) states the same conclusions, observing a positive effect between the performance and productivity of Leveraged Buyout firms. This can imply, on a macroeconomic level, that Private-Equity backed mergers and acquisitions result in a better allocation of capital, being a powerful mechanism to re-organize and reinforce economies.

Amess, K. and Wright, M. 2010 study came to more neutral conclusions. Analyzing the long-term abnormal operating performance in the UK, from 1980 to 2009 and with a dataset of 1,225 buyouts, their analysis indicates that private equity-backed buyouts fail to over-perform their non-PE backed counterparts but also do not show evidence of underperformance.

Leaving the UK, Desbrières and Schatt (2002) take a deep look into the French market, analyzing the performance of French companies involved in a leveraged buyout. From a 161

MBOs sample, between 1988 and 1994, it is observed that MBOs are carried out on firms whose financial situation is already better than their counterparts acting in the same sector of activity. Contrary to results obtained regarding Anglo-Saxon studies, these companies obtain better returns before the buyout but become less profitable afterward. Desbrières and Schatt still mention that according to their study, “it cannot be concluded, as in the USA and the UK, that LBOs improve the performance of the acquired firms”. French MBOS suffer undesirable effects from their low levels of leverage, which overplay the positive aspects MBOs bring.

Passing on from Buyout exits to other exit channels, there are only a couple of papers that tackle this field of study. Jain and Kini (1995) study address a very specific niche, analyzing the post-issue operating performance of venture capitalist-backed IPOs with an alike sample of non-venture capitalist-backed IPOs, observing a superior post IPO operating performance from venture capital-backed IPO firms. Meles, Monferrà & Verdoliva (2014) withdraw the same conclusions from their study. Analyzing a dataset comprising PE investments exiting through all major channels, they observe that PE-backed firms outperform other firms. Going even further, their study points out that PE investments gained from portfolio firms link to whether the investment is venture capital or buy-out, the length of it, the nature of the PE investor (bank-based versus non-bank based), and the exit strategy used.

Amess, K. and Wright, M. in 2010 in their study tackling post-exit long term abnormal operating performance, did not obtain the same conclusions as previous studies mentioned, concluding private equity (PE) backed buyouts do not exhibit post-exit underperformance, but also fail to exhibit over-performance comparing to their non-PE backed counterparts.

On a similar matter, but focusing on funds' performance, instead of the target companies, Robert S. Harris, Tim Jenkinson, and Steven N. Kaplan (2012), supports the idea that US Buyout and Venture Capital funds tend to overperform in comparison to their peers in the market. In a study regarding the performance of 1,400 U.S. buyout and venture capital funds, they found better buyout fund performance than previously documented performance of public markets. The increment in their performance versus the S&P 500, reaches an average of 20% to 27% over a fund's life, representing a 3% annual increase. Their conclusions are robust to different indices and risk controls, having their performance results (resulted from the Burgis data set) aligned to the ones from Cambridge Associates and Preqin.

Chapter 3: Data

Data computation

Setting up a sample of Private Equity deals was rather exhaustive work. We have faced a diversity of obstacles, from privileged information, only available on paid platforms, like Capital IQ, through information being privately held, right to having deals that lead companies to have their financial statements consolidated, becoming unavailable for studies purposes. To help us confront the challenges presented, we made use of 2 tools, provided by ESCP and Católica Business School, Orbis and Refinitiv Eikon. At the end of the process, our sample comprised 168 investment deals, happening between 2011 and 2017.

As mentioned before, our dataset was constructed with the support of Refinitiv Eikon, a tool made available by Católica, and Orbis, accessed with my ESCP credentials. Having our hypothesis linked with PE investments, our 1st task for the construction of our sample, was to obtain all deals related to Investments made by PE firms. We took advantage of the application Private Equity Screener, an available app from Refinitiv Eikon (“Screen on private equity/venture capital investments based on a variety of criteria.”), giving information on all deals related to Private Equity. For both 2 hypotheses, the data goes from 2011 to 2017, being restricted by the need of having to collect pre-and post-investment data. The data started in 2011, as we needed to retrieve 1 year of data before the deal, for Propensity Score Matching (PSM) purposes. The year 2011 was specifically selected trying to decrease the sample bias as much as possible, escaping from any impact related to the 2008 crisis. The last investments took place in 2017, as we needed to extract until 4 years after the investment, reaching 2021 (for the 2017-year deals, a lot of information was missing for the year 2021, explained by the companies not having their financial statements closed). Having a sample with this window gives 7 years of Investment deals to use, having “blocks” of 6 years, from $n-1$ to $n+4$.

Regarding the Private Equity Screener, from Refinitiv Eikon platform, to acquire all the Investments deals, 4 filters were used:

- Specification of Investment stage: Private Equity Screener must classify the Investment made by the Private Equity firm as LBO, MBO, or MBI.
- The Investment date must be from the last 20 years, being impossible to personalize the platform to obtain data since 2011. We had to manually delete all years that didn't matter.
- Investment Deal value > €50M. Having the intention of producing a sample with a minimum value of €50M per deal, as again, the focus of the study is on the Private Equity industry. With this filter, we eliminate part of Venture Capital investments, which usually are smaller.
- Portfolio Status: Formerly PE/VC backed. This filter serves to guarantee that each company will not participate in a PE deal more than 1 time.

From this first gathering, we retrieved up to 8600 lines of deals, between 2022 and 2002. In this set of data, we had at our hands a plurality of deals from different unnecessary years, and repeated deals for the same company. Data treatment was conducted, meaning all deals outside the range between 2011 and 2017 were deleted, and all deals with the same company target, happening on the same date, and by the same investment fund, were deleted. It occurred that some deals were conducted by different PE firms on the same target, on the same day, and those deals were added up to one, for deal value purposes. At the end of this round of data treatment, we were left with 1024 deals.

The next step was to use the Orbis platform, to retrieve the necessary information for the study being made. Having the deals separated by year of investment, from year to year, we retrieved the information, 1 year prior and 4 years after the investment. A problem related to Orbis recognition of Eikon names emerged, and we ended up only getting 838 deals out of 1024. Having to conduct a Propensity Score Matching (PSM), the indicators used for that link were: Country ISO code, NACE Rev. 2 core code, Year, n° of employees, Operating Revenue, Current ratio, EBIT margin, and asset turnover. Other than that, for the performance analysis of the firms, we additionally retrieved EBITDA margin, Cash flow and Cash flow/Operating revenues, and some other indicators that ended up being deleted for the lack of information for all companies. Once we had all information retrieved for the 838 deals, once again, data treatment was conducted. A lot of information was missing, some companies had no information, others had partial, and others had their full information. After treatment, we were left with 168 deals from all over the world.

For our hypothesis, a Control Group was created, containing 61000 companies from all over the world, extracted from Orbis, being mandatory to not be PE-backed. From the random group extracted, despite that filter, it was important to be sure that none of the companies from our data set was presented in the Control Group.

Data analysis

The final sample resulting from the process described above consists of 129 deals from all over the world. A slice of 0.031% of all deals executed for the studied period. This short number of deals represents, in part, the lack of information available in the Private Equity industry. And combined with the process executed to gather such a sample, demonstrates the challenge to assemble such a valid sample of formerly PE-backed firms. The following table illustrates the 4 steps in which our data sample was cut in size:

Table 1: Summary of sample treatment

Tool	Deals amount	Δ
Private Equity Screener	416047	
PE Screener filters	1024	-415023
Data treatment	168	-856
PSM	129	-39

A sample of 129 deals that meet in full the following filters:

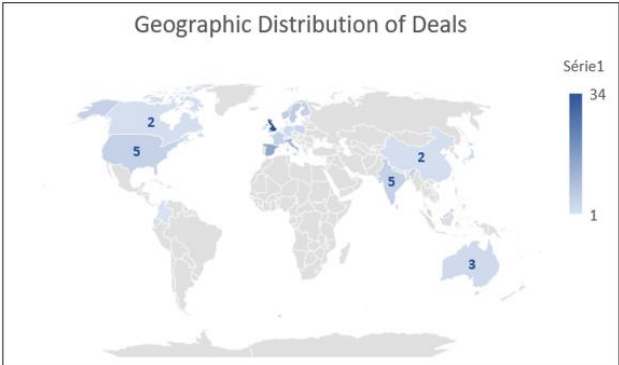
- Specification of Investment stage: LBO, MBO, or MBI.
- Investment date executed between 2011 and 2017.
- Investment Deal value > €50M
- Portfolio Status: Formerly PE/VC backed.

Our sample composed of 129 deals is present in 23 countries all over the world, in 10 major industries, with its deals being executed through 7 different years. Bellow, in figure 1, we present the geographic, deal year, and industry distribution of our sample, throughout the different panels. Looking at panel A, we can observe a strong presence of target companies in the European Continent, being the United Kingdom the dominant country in several deals, with a total sum of 34 deals, 26% of the total sample. Panel B represents the yearly distribution of transactions, showing a decline in the number of deals throughout the years. The data treatment combined with the PSM process and the lack of information available for the most recent deals represents a strong bias, making it incorrect to assume and generalize that the deal's evolution is declining. Looking at the Bain report, studies suggest a steady although a small increase in deal size through recent years. As for the 3rd panel, illustrating the industry distribution through 10 different industries, we can observe a clear dominance of the Consumer Cyclical industry, representing 1/3 of all deals in the sample.

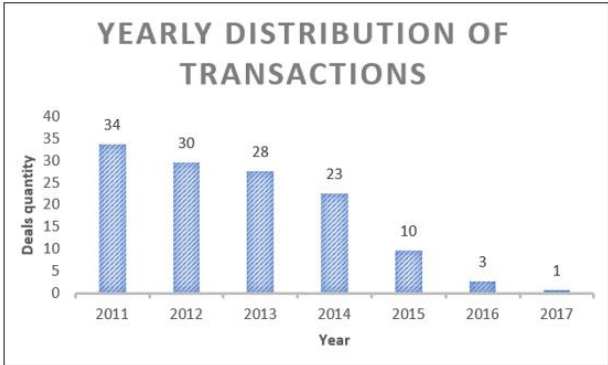
Figure 6 - Sample description

The graphs below describe the final sample characteristics. Panel A illustrates the geographic distribution of our sample's deals on the world map. Panel B reports the yearly distribution of transactions. Panel C shows the breakdown by industry level.

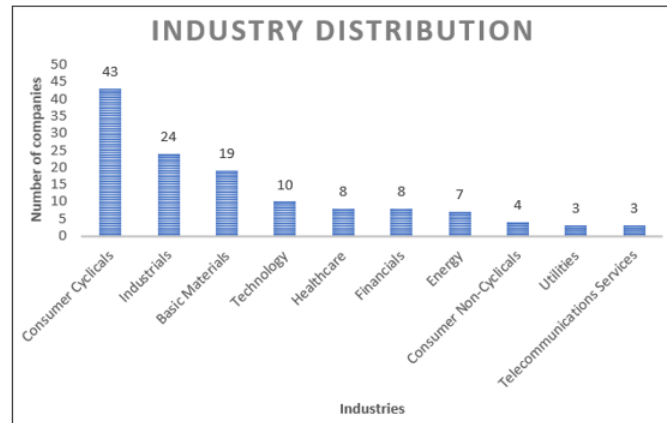
Panel A - Geographic distribution of deals



Panel B - Yearly distribution of transactions



Panel C - Industry distribution



In table 1, panel A we can observe the summary statistics of our sample on PSM indicators, for the year before the investment. Panel B, shows the summary statistics for our sample on DID indicators not included in the PSM process, for the year before the investment. In blue we can also find the average value of each indicator for year 6 (last year retrieved from the companies, 4 years after the investment), with its growth in green, if positive, or red if negative. For any future mention, Y1 represents the year before the investment, which is the year used for PSM, Y2 represents the year of the investment, Y3 represents the +1 year after investment, and so on.

Table 2 - Summary Statistics for indicators for the year before the investment, having in blue the average for all indicators for year 6, 4th year after the investment, together with a simple growth percentage

Panel A - Summary statistics of the sample on PSM indicators, for the year before the investment.

	EMP	Operating revenue	D/E	EBIT margin (%)	Asset turnover
Average	468,84	Average 133,25	Average 1,74	Average 5,49	Average 1,53
	42%	666,36 78%	236,98 11%	1,93 42%	7,77 -6%
Median	174,00	Median 55,43	Median 1,40	Median 6,23	Median 0,92
Moda	97,00	Moda 65,89	Moda 1,38	Moda 3,44	Moda 1,02
σ	796,38	σ 207,13	σ 1,54	σ 26,35	σ 1,90
σ2	634215,76	σ2 42901,67	σ2 2,37	σ2 694,27	σ2 3,63
Min	2,00	Min 0,00	Min 0,00	Min -106,16	Min 0,00
Max	4488,00	Max 1176,60	Max 8,99	Max 99,64	Max 12,37
Sum	60481,00	Sum 17189,58	Sum 224,95	Sum 707,84	Sum 197,63
Observations	129,00	Observations 129,00	Observations 129,00	Observations 129,00	Observations 129,00

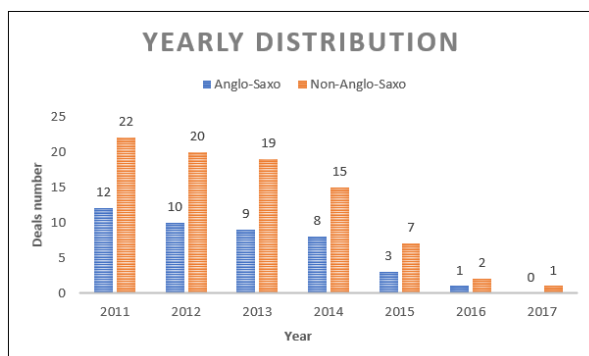
Panel B - Summary statistics of the sample on DID indicators not included in the PSM process, for the year before the investment

	Total assets	EBITDA margin (%)	CF	ROA	Sales Efficiency
Average	252,93 35%	Average 13,17 10% 14,46	Average 1790,12 -22% 1392,18	Average 7,53 -11% 6,67	Average 63,66 10% 69,83
Median	64,75	Median 10,39	Median 5,19	Median 5,22	Median 36,00
Moda	64,75	Moda 7,96	Moda 60,08	Moda 3,50	Moda 34,68
σ	641,06	σ 25,99	σ 10401,57	σ 62,49	σ 93,99
σ^2	410952,08	σ^2 675,45	σ^2 108192726,82	σ^2 3905,15	σ^2 8834,54
Min	0,00	Min -92,57	Min -151,49	Min -359,17	Min 0,00
Max	5977,69	Max 99,64	Max 100612,31	Max 254,48	Max 571,03
Sum	32627,35	Sum 1698,93	Sum 230925,17	Sum 971,06	Sum 8211,94
Observations	129,00	Observations 129,00	Observations 129,00	Observations 129,00	Observations 129,00

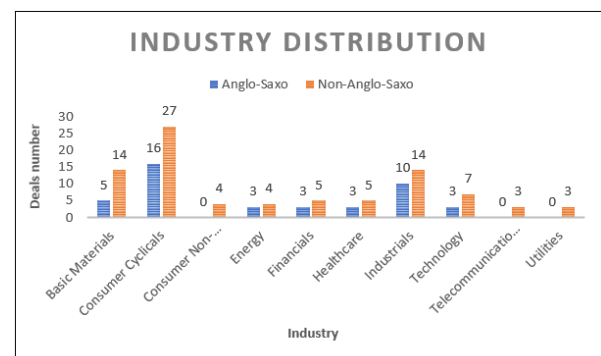
Figure 7 - Sample description of Anglo-Saxon and non-Anglo-Saxon companies

The graphs below provide a visual comparison of the year and industry distribution for our 2nd hypothesis final sample, being divided, and characterized as Anglo-Saxon and non-Anglo-Saxon companies. The sum of deals equals 129 investments, 86 of non-Anglo-Saxon origin, and the remaining 43 of Anglo-Saxon origins. Panel A reports the yearly distribution of transactions for Anglo-Saxon and non-Anglo-Saxon companies, having the non-Anglo-Saxon total dominance over the distribution. Panel B illustrates the breakdown by industry level, with the non-Anglo-Saxon group, having, once again, total dominance over the distribution.

Panel A - Yearly distribution of transactions



Panel B - Industry distribution of transactions



Chapter 4: Methodology

Hypotheses

In this paper, we will be testing 2 hypotheses, intending to make an in-depth analysis of the impact of Private Equity on firms' performance. We will take advantage of this study and data set created, to make an additional analysis, controlling for the company's headquarter location, and understanding any existing divergence between Anglo-Saxon and non-Anglo-Saxon backed companies. For this type of analysis, it is mandatory to clarify the type of performance we are expecting the company to have, if not PE-backed. So, on both hypotheses, a difference-in-differences method (DID) will be used, an approach that compares the divergence in outcomes over time between a sample enrolled in an event (The World Bank), being in this case the investment made by the Private Equity firm (treatment group), and the sample not enrolled in the event, not being impacted by PE (control group). Being unable to predict the behavior and performance of the PE-backed companies if they were not impacted by the PE funds, during that time, it is crucial to obtain a data sample to be as similar as possible to the companies from the Treated group, in the year previous the investment made, named Control group. So, in this thesis, to estimate the causal treatment effects, we will make use of the Propensity Score Matching (PSM) to obtain such a group, Marco Caliendo, Sabine Kopeinig (2008). Regarding the 2 hypotheses to be studied in this thesis:

- Assess companies' performance after the investment is made, to observe the real impact a PE company has on its target, comparing the impact that the PE left on the firm, through an analysis between PE-backed M&A and their peer group, a group of companies with no interactions with PE.

H1: Private Equity-backed companies exhibit superior performance, compared to their peers, after PE firm investment.

- Assess companies' performance after the investment is made, to observe the real impact a PE company has on its target, comparing the impact that the PE left on the firm, through an analysis between Anglo-Saxon and non-Anglo-Saxon companies.

H2: Anglo-Saxon Private Equity target companies overperform, compared to their non-Anglo-Saxon peers.

To test our second hypothesis, aligned with a paper by Thomas M. Begley and Wee-Liang Tan (2001) on "The Socio-Cultural Environment for Entrepreneurship: A Comparison Between East Asian and Anglo-Saxon Countries", we will be using Anglo-Saxon countries for our deals sample, with relatively similar backgrounds and tax systems, all deals that happen in the following countries: Australia, Canada, the UK, and the US. The remaining deals used in our 1st hypothesis will belong to the non-Anglo-Saxon group.

Selection of performance indicators

When it came to deciding which key performance indicators (KPIs) to measure companies' performance, we took special consideration to Jelic and Wright (2011) study, and one of the studies they supported their work on, Barber and Lyon (1996). In Jelic and Wright (2011) study, to compute operating performance they measured performance at 6 different levels. We encountered some limitations in finding enough information to cover all indicators for companies in all years, so an adaption and reduction in levels was necessary. So, in our paper, we will study performance in terms of:

Profitability:

Return on Assets (ROA) = Profit before tax (\$ Millions) divided by total assets (\$ Millions)

EBIT margin % = EBIT (\$ Millions) divided by Sales

Operating Efficiency:

Sales efficiency = Sales (\$ Millions) divided by the number of employees (Unit)

Employment

Total employment (EMP) = Total number of employees

Leverage

Debt to Equity (D/E) = Debt (\$ Millions) divided by Equity (\$ Millions)

Barber and Lyon (1996) mentioned favoring operating income over earnings per share. It is explained “that operating income is a cleaner measure than earnings of the productivity of operating assets”, existing a possibility for operating performance to be obscured by factors such as “tax considerations, or accounting for minority interests”. With PE involvement, such events might result in a variation of shares outstanding, being reflected on indicators using such measures as shares outstanding. Secondly, operating income is not affected by changes in the company capital structure (Barber and Lyon, 1996), being leveraged as a tool Private Equity companies use during their “reign”. So, aligned with their recommendations, the KPIs applied to measure Profitability is Return on Assets (ROA), and EBIT margin. For Operating Efficiency we use Sales efficiency. For employment, it is straightforward, as we will use it to measure the number of employees. As for Leverage performance, and to validate or not the veracity of studies related to if PE funds increase or not the acquired firm Leverage for personal benefits (Rosenbaum and Pearl, 2013), being of relatable importance, we will be using the KPI Debt to Equity (D/E).

Propensity Score Matching

PSM’s role in this thesis appears with our necessity to know the performance outcome the PE-backed companies would have without the investment made. This dual observation is inconceivable for the same individual in the same time horizon.

PSM comes to solve this problem, as according to Marco Caliendo and Sabine Kopeinig (2008), PSM serves to “find in a large group of nonparticipants those individuals who are similar to the participants in all relevant pre-treatment characteristics X.” Having a matching group with the same characteristics, any future observable differences in outcomes between the

Treated (PE-backed companies) and Control group (non-PE backed companies), can be assigned to the event.

Rosenbaum and Rubin (1983) propose using balancing scores $b(X)$, 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”. The balancing score applied in this thesis is the propensity score, which gives the probability of an individual having participated in a given event, taking into consideration certain characteristics X . The method using this balancing score for matching is known as Propensity Score Matching.

According to Dr. Richard Gallenstein, once decided to use PSM, there are two main assumptions needed to be validated, for PSM to be used properly:

Assumption 1 - Selection of observables

This assumption is validated if in the model being studied, all characteristics X considered for the PSM, represent the totality of all necessary factors to execute the most assertive match, eliminating all biases derived from the process. Unfortunately, this assumption can't be validated empirically. This way, it is not possible to understand to what extent in our model, all factors that determine whether or not companies received PE investments are being considered and observable in our data. Our validation of the selection of observables comes from the thinking behind the selection of the characteristics X , explained in the previous topic. An additional step to validate this assumption comes from using a very informal method through the function: *probit*, on Stata, to see how well our *probit* model fits the data:

f1- probit Treated NACE EMP Operatingrevenue Currentratio EBITmargin Asset turnover

(Treated is the dependent variable representing if a company is PE backed or not, NACE represents the numerical classification of economic activities used in the European Community, EMP gives the number of employees the company has, and Operatingrevenue represents the Revenues generated by a company from its primary business activities, Current ratio represents the Debt-to-Equity ratio, EBITmargin represents the company's operating earnings as a % of its revenue, Assetturnover represents the ratio of revenues to average assets)

Table 3 – *probit* regression

Probit regression	Number of obs = 715
	LR chi2(6) = 586.25
	Prob > chi2 = 0.0000
Log likelihood = -42.857934	Pseudo R2 = 0.8724

It is important to mention that according to Stata, Probit regression R-squared output does not have an equivalent to the R-squared that is found in OLS regression, being incorrect to interpret it the same way. From our *probit* function, we obtained a pseudo-R-Squared of 0,8724, a pretty decent R-squared. This way, combined with the previous discussion on why we believe all factors to be observable, we acknowledge that assumption 1 holds.

Assumption 2 - Common Support

Common support represents the idea that there exist “Individuals” in the Treated group that contains very similar characteristics to the “Individuals” in the Control group, overlapping. To validate this assumption, we need to generate the balancing score, in this case, the Propensity Score. The Propensity Score gives the predicted probability of participating in the event (probability that the company suffered a PE investment), PE-backed, from a *probit* model. So, to validate this assumption, and continue using Stata, after using the function *f1*, we use the following function:

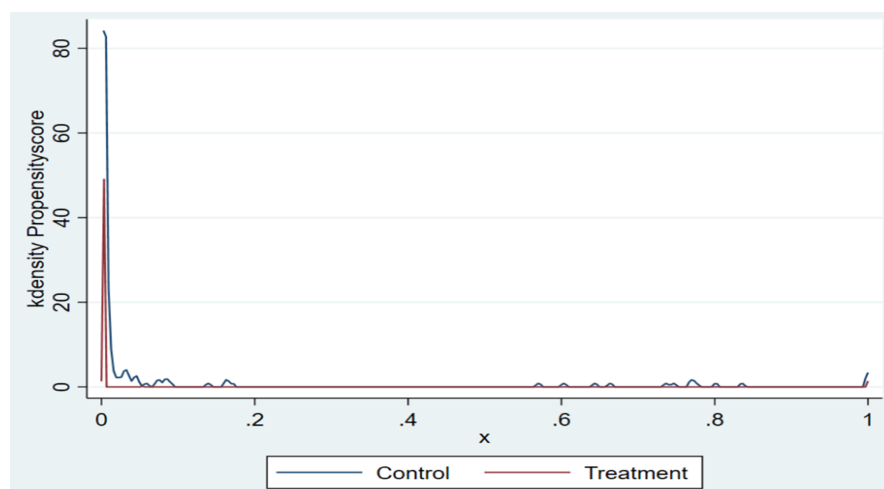
predict pscore

As mentioned before, the output of this function gives the probability of each company participating in the event. To have a more visual understanding of the output, we ran the function written ahead:

*twoway (kdensity pscore if Treated==1, fcolor(blue)) (kdensity pscore if Treated==0,
 legend(order(1 "Treatment" 2 "Control")) fcolor(none))*

Figure 8 – Graphic illustration of empirical distribution of Propensity Score

(Figure 8 illustrates the Propensity Score distribution of both Treated and Control groups, having on the x line the Propensity Score, varying between 0 and 1, and on the y line the density of companies)



From the output, we observe there are enough companies from the Control group, represented in blue, to properly match and compare with the companies from the Treated group, existing common support. This way, with both assumptions validated, we can conclude that PSM is an effective method to use.

Now, having our assumptions validated, we can continue with the PSM, which intends to match companies from the Treated group with the Control group, based on the pscore. For the PSM process, for simplicity purposes, we used the Excel tool, XLSTAT (XLSTAT is an Excel data analysis add-on). As it was mentioned before, during the Assumptions validation, to assign matches from each of the treated group firms with its similar from the Control group, comprising around 60 000 companies, we considered as quantitative explanatory variables the number of employees, size (Operating Revenue), operational efficiency (Asset Turnover), profitability (EBIT Margin), and capital structure (Debt-to-Equity Ratio). All these factors are

taken into consideration during the year previous to the investment year. Additionally, as qualitative explanatory variables, we used Industry, Continent, and Year to exactly match each sample. We then activated the Optimal algorithm and selected the Mahalanobis distance, which allows a simultaneous comparison for the same sample's averages measured for several variables, as our sample is described by several variables.

So, in conclusion, through XLSTAT statistical software, it was possible to determine the propensity score related to each participant in the study and execute a matching operation between participants based on the propensity score. After the PSM we ended up with a Treated sample of 129 companies, and a Control group of 589.

Table 4 – Summary of matched observations

Categories	Number	Matched	Percentages	Unmatched	Percentages
1	168	129	77%	39	23%
0	60993	589	1%	60404	99%

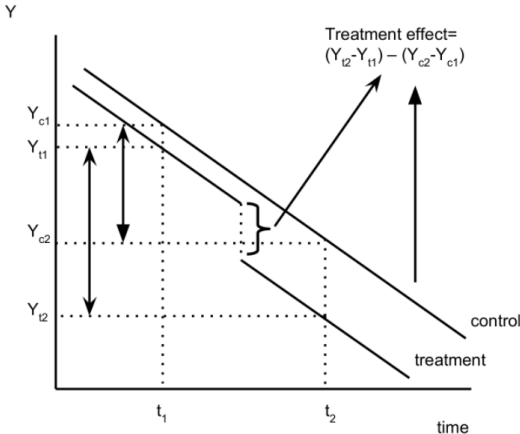
Difference-in-Difference

The Difference-in-Difference (DiD) technique, popularly used in empirical economics, is a quasi-experimental econometric approach to estimating causal effects at a given period on its target population. For this technique, 4 different groups can be observed, differentiating in terms of being treated or not, and if the sample is composed of individuals before or after the event (M. Lechner (2011)). Generally speaking, the 4 different groups are as followed:

- the treated group after their treatment (after-treatment treated)
- the treated group before their treatment (pre-treatment treated)
- the non-treated group after the treatment period (after-treatment non-treated)
- the non-treated group before the treatment period (pre-treatment non-treated)

The objective of this technique is to conduct a double difference, a difference over the period (before vs after treatment), and a difference over if the individual was affected by the treatment (treated vs non-treated). Here, it is important to have validated the parallel trends assumption, that the treated and the non-treated groups are influenced by the same time trends, having the same outcome trend before the treatment period. From a more visual approach, the technique is as follows:

Figure 9 – Graphic illustration of Difference in Difference



The general regression model for the Difference-in-Difference technique is:

$$y_i = \beta_0 + \beta_1 \text{treated}_i + \beta_2 \text{after}_i + \beta_3 \text{treated}_i * \text{after}_i + \epsilon_i$$

Adapting the formula to our specific situation leads to the following formula:

$$y_i = \beta_0 + \beta_1 PE_i + \beta_2 \text{after}_i + \beta_3 PE_i * \text{after}_i + \epsilon_i$$

From this regression, y represents the performance measure, and I a firm index. Briefly explaining, if our firm belongs to the Treatment group, the “PE” variable equals 1, the other

way, belonging to the Control group, it equals 0. Concerning the variable “after”, it equals 1 if the firm I belongs to the after-treatment group, whether being or not from the Treatment group and equals 0 if it belongs to the pre-treatment group.

From the output obtained from running the previous regression, the coefficient to conduct our focus is β_3 , which gives us the difference-in-differences (DID) estimate of the treatment effect, the statistically significant difference in performance.

Chapter 5: Results

Hypothesis 1

Making an analysis aligned with Jelic and Wright (2011), and Barber and Lyon (1996) studies, for proper performance analysis, we are approaching companies' performance from 4 different scopes, profitability, operating efficiency, employment, and leverage. Therefore, in the table __, we present the results related to the 5 performance indicators linked to the 4 different levels: Return on Assets (ROA), EBIT margin for profitability; Sales efficiency for operating efficiency; Number of employees (EMP) for employment; and Debt to Equity (D/E) for Leverage performance.

To compute our results, as mentioned in Methodology, a DID regression was conducted. Considering our timespan, 4 different DIDs were executed for each performance indicator, making a comparison of 4 different "Differences" in time, from the year after the investment was made until the 4th year after the investment was made. So, our DIDs are using data from the year previous to the Investment deal, with the 4 first years after the deal has been executed.

Table 5 – Difference-in-Difference regression results for H1

This table presents results for the comparison between the post-deal performance between Private Equity targets and a Control group. The indicators being measured are return on assets (ROA), EBIT margin, sales efficiency, number of employees (EMP), and debt-to-equity (D/E). As for our dummy variables for the regression, not presented in the table, the “PE” variable equals 1 if the target company belongs to the Treated group, and 0 if belonging to the Control group. As for the dummy variable “after”, equals 1 if the firm belongs to the after-treatment group, and 0 if it belongs to the pre-treatment group. Regarding the first column, each DID Y1-Y_n represents one DID regression between 2 years. Y1 represents the year before the investment, Y2 represents the year of the investment, Y3 represents the 1st year after the investment, and so on. ***, **, * denote statistical significance at a 1%, 5% and 10% level, respectively.

		ROA	EBIT margin %	Sales Efficiency	EMP	D/E
DID Y1-Y6	<i>Coefficient</i>	-4,03*	-13,35*	2,40	125,66	1,38**
	<i>t stat</i>	-1,65	-1,78	0,08	0,34	-2,23
	<i>p value</i>	0,10	0,07	0,94	0,96	0,03
DID Y1-Y5	<i>Coefficient</i>	-4,93*	-15,35*	7,61	65,75	0,76*
	<i>t stat</i>	-1,75	-1,67	0,23	0,54	1,91
	<i>p value</i>	0,08	0,09	0,82	0,59	0,06
DID Y1-Y4	<i>Coefficient</i>	-14,84**	-10,17	1,96	42,16	1,06*
	<i>t stat</i>	-2,13	-0,61	0,06	0,36	1,68
	<i>valor P</i>	0,03	0,54	0,95	0,72	0,09
DID Y1-Y3	<i>Coefficient</i>	-5,18	-15,46	-9,27	27,03	1,26*
	<i>t stat</i>	-1,07	-1,14	-0,24	0,24	1,73
	<i>p value</i>	0,29	0,25	0,81	0,81	0,08
Observations		1432	1432	1432	1432	1432

Profitability

Starting with the first performance level presented by Jelic and Wright (2011), operating performance, we should observe the results obtained on a regression made on the performance measures ROA and EBIT margin. Our results propose a decline in profitability for Return on Assets, which is aligned with the negative growth in EBIT margin. ROA shows a negative coefficient for the 4 regressions, although only with statistical significance for the last 3 years,

being statistically insignificant for the year after the acquisition was made. For the DID Y1-Y4, we observe a statistical significance on a 5% level, with a coefficient of -14.84. As for EBIT margin, although representing consistently a negative coefficient, it is only statistically significant for the 3rd and 4th years after the investment is made.

Operating efficiency

Taking a look at the operating efficiency level, one of the main sources of value creation (Krishnan and Park, 2002), our results on the Sales Efficiency measure indicate a general positive increase in Sales over Employees, despite starting with the year right after the investment is made with a negative coefficient, being statistically insignificant for all cases. In the first year after the deal is made, the coefficient obtains the value of -9.27, with a p-value of 0.81. For the remaining years, this value becomes positive, reaching a maximum of 7.61% in the DID Y1-Y5.

Except for the year right after the deal, these results, statistically insignificant, are not aligned with the results obtained by George E. Halkos, Nickolaos G. Tzeremes (2013), which observed that “the majority of the potential bank M&As under examination were unable to generate short-run operating efficiency gains”. A possible clarification for this positive growth in sales efficiency is explained by the “efficiency hypothesis” which, according to Craig and Dinger (2009), in the event of an M&A, sales efficiency should increase due to the creation of economies of scale and other efficiency gains.

Employment

On an employment level, by having a look at the performance measure EMP, our DID regression shows evidence of a positive increase in the number of employees after the Treatment, although not having a statistical significance for all the years. Over the years, we see an increase in the coefficient, going from 27.03% in the DID Y1-Y3, reaching a value of

125.66% in its final year, an increase higher than 100%, although with a p-value of 0.96. Our results are not aligned with the ones achieved in the Lehto, E., & Böckerman, P. (2008) study, which analysis the employment effects of mergers and acquisitions. They concluded that in both cross-border and domestic M&A, these events lead to downsizing in employment. According to Shleifer and Summers (1988), the existence of a new management team resulting from the M&A event, to make quick profits and cutting in costs, represents a possible explanation for employment reductions, as this new team “renege on implicit labor contracts that have constituted obstacles for layoffs”. On the other hand, Davis et al. (2014) study suggests that buyouts can lead to large increases in gross job creation, being aligned with Amess et al. (2014), who also took conclusions from his work that is, in reality, creates jobs.

Leverage

As for the last performance indicator, being used to study the Leverage performance level, our results suggest an increase in leverage for companies, after the M&A deal. Our results show statistical significance for all 4 DID's, being statistical significance at a 10% level for the DID's between Y1-Y3 to Y1-Y5, and statistical significance at a 5% level for the DID Y1-Y6. In the year right after the investment is made, there should be an increase of 1.26% in Debt-to-Equity target companies (p-value of 0.08), finalizing in the 4th year with an increase of 1.38% in D/E (p-value of 0.03). Our results are aligned with V. Cioli, A. Giannozzi, V. Ippoliti, and O. Roggi (2020) study, which concluded that target companies have higher leverage after an M&A. Yet, according to NM Leepsa, CS Mishra (2012), their found a Debt ratio decrease after the investment deal, although not statistically significant, going against our conclusions.

Hypothesis 2

In our 2nd hypothesis, we intend to assess companies' performance after the M&A, comparing the impact that the PE left on the firm, through an analysis of Anglo-Saxon and non-Anglo-Saxon companies. Aligned with Hypothesis 1, companies' performance will be measured according to Jelic and Wright (2011), Barber and Lyon (1996) studies, analyzing the same 4 different scopes: profitability, operating efficiency, employment, and leverage. Therefore, in the table __, we present the results related to the 5 KPIs linked to the 4 different levels, for both Anglo-Saxon and non-Anglo-Saxon companies: Return on Assets (ROA), EBIT margin for profitability; Sales efficiency for operating efficiency; Number of employees (EMP) for employment; and Debt to Equity (D/E) for Leverage performance. Our results were computed with the support of a DID regression for each performance indicator, a span of years, and divided by Anglo-Saxon and non-Anglo-Saxon companies.

Table 6 – Difference-in-Difference regression results for H2

The following table exhibits the results for the comparison between the post-deal performance between Private Equity targets and a Control group, discriminated by Anglo-Saxon and non-Anglo-Saxon companies. The indicators being measured are return on assets (ROA), EBIT margin, sales efficiency, number of employees (EMP), and debt-to-equity (D/E). As for our dummy variables for the regression, not shown in the table: the “PE” variable equals 1 if the target company belongs to the Treated group, and 0 if belonging to the Control group; the dummy variable “after” equals 1 if the firm belongs to the after-treatment group, and 0 if it belongs to the pre-treatment group; our final dummy variable is a multiplication between the 2 previous variables. Regarding the first column, each DID Y1-Y_n represents one DID regression between 2 years. Y1 represents the year before the investment, Y2 represents the year of the investment, Y3 represents the 1st year after the investment, and so on. The letter A stands for Anglo-Saxon companies and N for non-Anglo-Saxon companies. ***, **, * denote statistical significance at a 1%, 5% and 10% level, respectively.

Dependent	ROA		EBIT margin %		Sales Efficiency		EMP		D/E		
	A	N	A	N	A	N	A	N	A	N	
DID Y1-Y6	Coefficient	-12,98**	-4,04	-133,48	-168,98	-19,44	12,82	98,69	139,55	0,31	0,89
	t stat	-2,01	-0,64	-0,62	-0,98	-1,09	0,28	0,48	0,85	0,41	0,81
	p value	0,04	0,52	0,53	0,33	0,28	0,78	0,63	0,40	0,68	0,42
DID Y1-Y5	Coefficient	-16,49*	-3,57	-135,15	-144,14	-2,37	10,31	69,45	62,50	0,87	0,74
	t stat	-1,92	-0,57	-0,63	-0,81	-0,17	0,21	0,35	0,42	1,14	0,67
	p value	0,06	0,57	0,53	0,42	0,87	0,84	0,73	0,68	0,26	0,51
DID Y1-Y4	Coefficient	-40,96**	-1,75	-140,28	-162,78	-5,46	3,29	58,17	34,33	0,72	1,29
	t stat	-2,26	-0,28	-0,64	-0,94	-0,40	0,07	0,31	0,24	0,93	1,30
	valor P	0,02	0,78	0,52	0,35	0,69	0,95	0,75	0,81	0,35	0,19
DID Y1-Y3	Coefficient	-12,73*	-1,33	31,74	-162,10	-7,23	7,43	47,41	17,06	2,14**	0,89
	t stat	-1,68	-0,21	0,08	-0,94	-0,54	0,20	0,26	0,13	2,45	0,90
	p value	0,09	0,83	0,94	0,35	0,59	0,84	0,80	0,90	0,01	0,37
Observations	412	968	412	968	412	968	412	968	412	968	

Profitability

Starting with operating performance, 2 measures should be examined: ROA and EBIT margin. For our Anglo-Saxon group, our results propose a sharp decline in profitability for Return on Assets, which is aligned with the negative growth in EBIT margin, except for the DID Y1-Y3. For the 2nd year after the investment deal, ROA shows the most negative coefficient, of 40.96%, with a 5% significance level. As for our non-Anglo-Saxon group, despite also showing a negative coefficient for all DID's, it has a smaller impact, although with no statistical significance. Regarding EBIT margin, both groups show high negative values for the coefficient, meaning both groups of companies perform poorly when compared with their peers

in the Control group. All values have no statistical significance, and only for group A, DID Y1-Y3, the coefficient assumes a positive value. In conclusion, with all bias being ignored, PE impact is bigger on Anglo-Saxon companies, with statistical significance, although negatively, for ROA. The opposite happens for EBIT margin, with no statistical significance.

Operating efficiency

As for our second scope, operating efficiency, our results on the Sales Efficiency measure indicate a negative increase in Sales over Employees, for our Anglo-Saxon group of companies, all statistically insignificant. In the 4th year, the Sales over Employees coefficient reaches a value of -19.44%, compared to a positive 12.82% value from group N. Non-Anglo-Saxon company's results show evidence of an overperformance over the Control group, although, also demonstrating statistical insignificance. Their lowest value is presented in the second year after the investment deal (DID Y1-Y4), with a coefficient of 3.29%. In conclusion, with all bias being ignored, on a sales efficiency level, PE has an inversed impact on both Anglo-Saxon and non-Anglo-Saxon companies, with no statistical significance. For group A, it has a negative impact, and for group N a positive.

Employment

On an employment level, by having a look at the performance measure EMP, several employees, our DID regression shows evidence of a positive increase in the number of employees after the Treatment, although not having a statistical significance for all the years, for both Anglo-Saxon and non-Anglo-Saxon companies. Over the years we can observe a continuous increase in the coefficient, reaching a value of 98.69% in its final year for group A, and a value of 139.55% for group N, although with a p-value of 0.40. Group N's growth in employees over the 4 years after the investment in its Control group, demonstrates a higher performance when compared to group A. Our results end up not being aligned with the results achieved by Lehto, E., & Böckerman, P. (2008), that observed a decrease in employment over the years. In conclusion, with all bias being ignored, on an employment level, PE has a similar

positive impact on both Anglo-Saxon and non-Anglo-Saxon companies, with no statistical significance.

Leverage

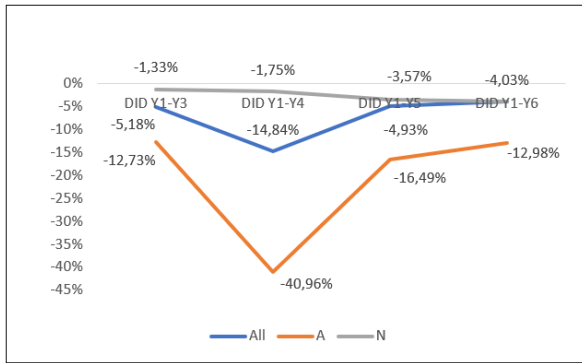
As for the last performance indicator, being used to study the Leverage performance level, our results suggest an increase in leverage for both groups of companies. Our results show statistical significance at a 5% level for the DID Y1-Y3 for Anglo-Saxon companies, with a 2.14% increase in the first year right after the investment deal. The remaining DID's show no statistical significance for any level, although they always present a positive coefficient. In conclusion, with all bias being ignored, on a Debt-to-Equity level, PE has a similar positive impact on both Anglo-Saxon and non-Anglo-Saxon companies, with no statistical significance.

The figure below illustrates the results obtained in the previous DID regressions. It provides a simpler and cleaner opportunity to better compare PE's impact on Anglo-Saxon and non-Anglo-Saxon firms' performance. From Panel A and C, we can observe a constant superior result of non-Anglo-Saxon companies over Anglo-Saxon companies, suggesting PE has a bigger negative impact on ROA and Sales Efficiency for companies belonging to Australia, Canada, the UK, and the US. Panel B, with evidence on EBIT margin impact, suggests that Anglo-Saxon BE-backed companies obtain constant better results than their peers, non-Anglo-Saxon companies. From the remaining 2 Panels, depicting Employment and Leverage evolution, we cannot observe the total dominance of one group over the other.

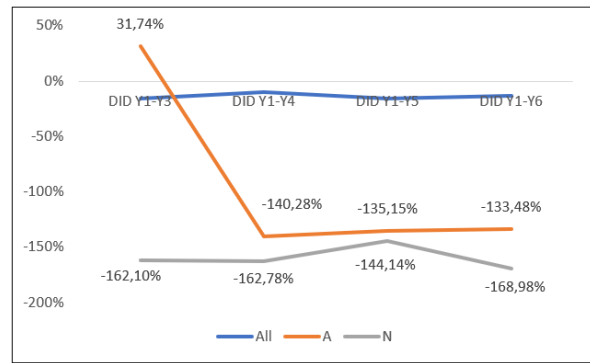
Figure 10 – Trends through the years for the 5 performance indicators

Figure 10 is a graphic illustration of the results obtained in the DID regressions executed for both hypotheses, for all 5 measures being used to analyze companies' performance (ROA, EBIT margin, Sales Efficiency, Employment, and Leverage). The period being measured includes the first 4 years post-deal, starting with the 1st year after the investment is made (DID Y1-Y3) and finishing with the 4th year after the investment is made (DID Y1-Y4). All represent the entire Treated group (Hypothesis 1), A represents the Anglo-Saxon companies (Hypothesis 2), and N represents the non-Anglo-Saxon companies (Hypothesis 2).

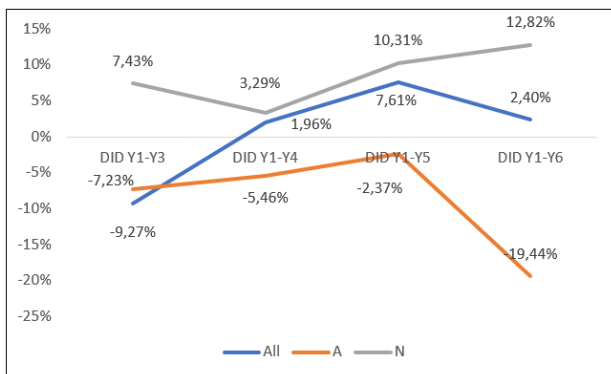
Panel A – ROA evolution



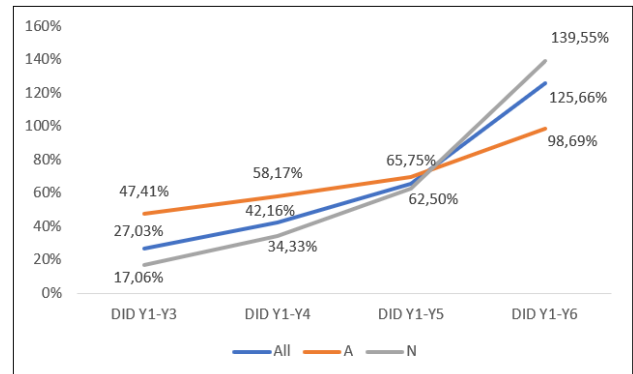
Panel B – EBIT margin evolution



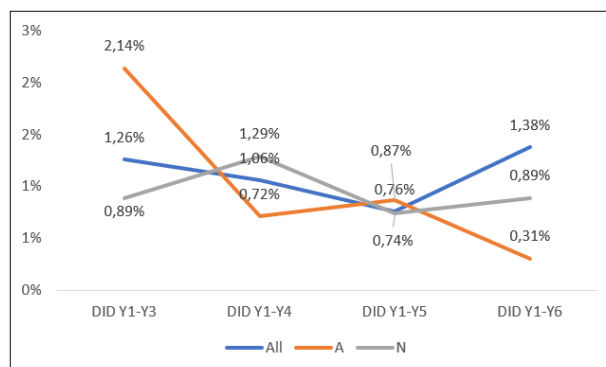
Panel C – Sales Efficiency evolution



Panel D – Employment evolution



Panel E – Leverage evolution



Chapter 6: Conclusion

This paper explores the impact of Private Equity funds on firms' performance after the acquisition, including a further analysis to investigate the divergence in firms' performance in Anglo-Saxon and non-Anglo-Saxon countries. The period of investments considered for the sample construction contains deals executed between 2011 and 2017. It used a time window of one year previous to the deal (starting in 2010, escaping the 2008 crisis), to apply Propensity Score Matching to create a Control group, and up to 4 years post-deal. As the main approach for the empirical analysis of PE's impact on firms' performance, we used the quasi-experimental econometric approach Difference-in-Difference. Our sample is composed of 129 deals, of which 86 are from non-Anglo-Saxon and 43 from Anglo-Saxon countries.

Regarding our first hypothesis, our results do not suggest a unanimous behavior of general overperformance from our target firms, but rather specific areas of enhanced performance. Supporting our performance analysis on Jelic and Wright (2011) and Barber and Lyon (1996) study, our results propose a statistically significant decline in profitability for Return on Assets, being aligned with EBIT margin results. As for operating efficiency level, a major source of value creation (Krishnan and Park, 2002), our results indicate a positive increase in Sales over Employees, post-deal. Passing to employment level, our DID regression on several employees shows evidence of a positive increase, being aligned with Davis et al. (2014) and Amess et al. (2014) studies, as they suggest that buyouts can lead to increases in gross job creation. Finally, moving to leverage, our results show statistical significance for all 4 DIDs', which indicates an expectation for leverage to increase post-deal. Our results are aligned with V. Cioli, A. Giannozzi, V. Ippoliti, and O. Roggi (2020) study, which concluded that target companies have higher leverage after an M&A.

As for our conclusions on the 2nd hypothesis, once again our results do not suggest a unanimous behavior of general overperformance from Anglo-Saxon or non-Anglo-Saxon companies. Discriminating on the 4 levels of performance, and looking into the 5 indicators, we can observe, although negative and statistically insignificant, that EBIT margin is the only indicator that, for non-Anglo-Saxon companies, obtains constant inferior values over Anglo-Saxon companies. ROA and Sales efficiency measures show the opposite behavior, with non-Anglo-Saxon companies obtaining constant superior values. Over the remaining indicators and

years, we can observe a variance of magnitudes in both Anglo-Saxon and non-Anglo-Saxon companies.

During this paper execution, we encountered some limitations that have delayed the gathering process of our sample and deteriorated it. As mentioned in Chapter accountable for data computation, with Orbits, we have encountered limited accounting data available for the public, both in terms of companies with available information but also have the right information for the computation of our measures, resulting in a decrease in the number of our treated group. Having a diminished number of deals with available information for our last years, this limitation precludes the analysis of COVID on PE deals, giving space for future studies to be made on such impact. A second limitation comes from the worldwide 2008 crisis, forcing us to constrain our data, to use only information starting from 2010, to escape any abnormal data and bias provoked by the crisis. In conclusion, including a variety of countries in our data sample, makes it inaccurate to assume this behavior for any specific countries.

Finally, with the results obtained, this study gives a valuable, updated, contribution to the literature concerning decreases in profitability performance from the impact of PE funds but also enhanced operating efficiency performance, resulting from a highly positive increase in Sales over Employees. However, to extend the findings of this study, and to approach the totality of the 6 levels of performance depicted by Jelic and Wright (2011), and Barber and Lyon (1996), further research needs to be conducted in the future.

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Chapter 8: Appendix

Appendix 1 – Variable's definition

Variable	Definition
Total assets	Total amount of assets owned by the company
EBITDA margin (%)	EBITDA over Operating Turnover
EMP	Number of employees at the end of the year
Operating revenue	Revenues generated by a company from its primary business activities
Asset turnover	Operating Turnover over Total Assets
ROA	Net Income over Total Assets
EBIT margin (%)	EBIT (\$ Millions) divided by sales
Sales Efficiency	Sales (\$ Millions) divided by the number of employees (Unit)
D/E	Debt-to-Equity ratio

Appendix 2 – Sample of DID Regression Estimations for hypothesis 1

		EMP	Op Rev	D/E	EBIT marg %	Asset turnover	Total assets	EBITDA marg %	CF / Op Rev %	CF	ROA	Sales Efficiency
DID Y1-Y6	<i>Coefficient</i>	125,66	-13782,90	1,38**	-13,35*	54,76	-20770,07	-48,71	-429,18*	-1634,86	-4,03*	2,40
	<i>t stat</i>	0,34	0,64	-2,23	-1,78	0,64	-0,26	-0,47	-1,76	-0,20	-1,65	0,08
	<i>p value</i>	0,96	-0,47	0,03	0,07	0,47	0,80	0,64	0,08	0,84	0,10	0,94
DID Y1-Y5	<i>Coefficient</i>	65,75	-1640,29	0,76*	-15,35*	55,15	-176,38	-48,55	-302,61	551,46	-4,93*	7,61
	<i>t stat</i>	0,54	-0,06	1,91	-1,67	0,47	0,00	-0,46	-1,19	0,07	-1,75	0,23
	<i>p value</i>	0,59	0,95	0,06	0,09	0,64	1,00	0,64	0,24	0,94	0,08	0,82
DID Y1-Y4	<i>Coefficient</i>	42,16	-1323,13	1,06*	-10,17	54,57	-4394,28	-56,84	183,75	3984,03	-14,84**	1,96
	<i>t stat</i>	0,36	-0,05	1,68	-0,61	0,47	-0,06	-0,54	0,57	0,51	-2,13	0,06
	<i>valor P</i>	0,72	0,96	0,09	0,54	0,64	0,96	0,59	0,57	0,61	0,03	0,95
DID Y1-Y3	<i>Coefficient</i>	27,03	-1678,72	1,26*	-15,46	54,59	-14118,15	-42,96	-164,88	1324,46	-5,18	-9,27
	<i>t stat</i>	0,24	-0,06	1,73	0,25	0,47	-0,17	-0,40	-0,63	0,17	-1,07	-0,24
	<i>p value</i>	0,81	0,95	0,08	-1,14	0,64	0,86	0,69	0,53	0,87	0,29	0,81
Observations		1432	1432	1432	1432	1432	1432	1432	1432	1432	1432	1432

Table 1 - ANOVA regression executed on data between Year 1 and Year 6 from the H1 sample

	<i>Coefficient</i>	σ	<i>Stat t</i>	<i>p value</i>	<i>Lower 96%</i>	<i>Higher 95%</i>
Intercept	0,17	0,01	14,09	0,00	0,14	0,19
EMP	0,00	0,00	0,95	0,34	0,00	0,00
Operating revenue	0,00	0,00	7,12	0,00	0,00	0,00
D/E	0,00	0,00	-2,41	0,02	-0,01	0,00
EBIT margin (%)	0,00	0,00	0,56	0,58	0,00	0,00
Asset turnover	0,00	0,00	-2,48	0,01	0,00	0,00
Total assets	0,00	0,00	-8,12	0,00	0,00	0,00
EBITDA margin (%)	0,00	0,00	0,25	0,81	0,00	0,00
ROA	0,00	0,00	2,11	0,03	0,00	0,00
Sales Efficiency	0,00	0,00	2,42	0,02	0,00	0,00
Observations	1432					