

St. Petersburg State University
Graduate School of Management

Master in Corporate Finance

ANALYSIS OF THE RELATION BETWEEN
PRIVATE EQUITY INVESTMENT TENURE
AND PERFORMANCE OF EUROPEAN COMPANIES

Master's Thesis by the 2nd year student
Concentration – Master in Corporate Finance

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АННОТАЦИЯ

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Описание цели, задач и основных результатов	<p><u>Цель:</u> Определить наличие взаимосвязи между сроком private equity инвестиций и результативностью европейских компаний.</p> <p><u>Задачи:</u></p> <ul style="list-style-type: none"> • Изучить деятельность private equity фондов и их инвестиционные стратегии. • Проанализировать возможные причины применения private equity фондами различных инвестиционных стратегий, включая сроки инвестиций. • Провести эмпирическое исследование с целью выявления взаимосвязи между сроком private equity инвестиций и результативностью компаний. • Провести анализ полученных результатов, сформулировать выводы и практические рекомендации, основанные на проведенном исследовании. <p><u>Основные результаты:</u> Была обнаружена положительная взаимосвязь между сроком private equity инвестиций и результативностью компаний, измеряемой и как темпами роста денежных потоков, и как отношением чистого финансового долга к операционной прибыли. Предложенные меры результативности выше для компаний со сроком private equity инвестиций менее 6 лет по сравнению с остальными, включая те, в которых не наблюдалось private equity инвесторов; меры результативности не отличаются от остальных компаний при сроках инвестиций выше 6 лет.</p>
Ключевые слова	Частные инвестиции, срок инвестиций, альтернативные инвестиции, частные инвестиции в публичный капитал

ABSTRACT

Master student's name	Aleksandr Burov
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Master thesis title	Analysis of the relation between private equity investment tenure and performance of European companies
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Description of the goal, objectives and main results	<p><u>Goal:</u> To determine whether the tenure of private equity investments in European companies has relation to their performance.</p> <p><u>Objectives:</u></p> <ul style="list-style-type: none"> • To conduct a study of private equity funds' activities and their investment strategies. • To analyze the causes of different investment strategies used by private equity funds, including different tenures. • To conduct an empirical study in order to examine the relationship between private equity investments' tenure and companies' performance. • To analyze the obtained results, formulate conclusions and practical recommendations based on the research. <p><u>Main results:</u> Positive relation of the investment tenure and companies' performance has been discovered, both in terms of their cash flow growth and solvency (as measured by net financial debt to EBITDA ratio). The suggested performance measures (either cash flow growth rates or net financial debt to EBITDA) are higher for companies with private equity tenure below 6 years as compared to other companies, including those with no private equity investors at all. There is no difference in the suggested performance measures for companies with private equity investment tenure above 6 years and other companies, including those with no private equity investors at all.</p>
Keywords	Private equity, investment tenure, alternative investments, private investments in public equity

ЗАЯВЛЕНИЕ О САМОСТОЯТЕЛЬНОМ ХАРАКТЕРЕ ВЫПОЛНЕНИЯ ВЫПУСКНОЙ КВАЛИФИКАЦИОННОЙ РАБОТЫ

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Introduction

Private equity (PE) has a significant role in the modern economy. Funds, which operate in the industry, attract investable capital from, among many others, insurance companies, pension funds, corporate investors, government agencies, and private individuals. Attracted resources are invested in a wide range of portfolio companies: from start-ups and small companies that are close to bankruptcy and require expertise in corporate recovery to large companies that lack growth-oriented strategies. Apart from the plain provision of capital to such firms, private equity funds bring managerial expertise and are actively involved in succession planning and post-investment support. Funds' management can also help with implementing distress measures, which provide companies an opportunity to survive and to enhance productivity.

As a result, there is a number of positive outcomes of private equity investments. For example, company performance increases as PE funds improve existing management practices and supervise resources allocation. Greater innovation as private equity funds finance new research and development projects as well as young and innovative firms. The positive impact of PE on the performance of their investees in terms of their profitability and growth also translate into improvements in overall competitiveness of particular companies and industries as a whole.

As a consequence, private equity essentially contributes to economic growth. At the same time, PE funds are notorious for exceptional realized returns on their transactions. For instance, Nordic Capital's 3-year investment in Nycomed (pharmaceuticals company based in Switzerland) granted the fund an unprecedented 74% gross return on investment. Another example of a transaction involves Lux Med (health care services company based in Poland) buyout. A landmark 1,000% gross return has been earned by Mid Europa Partners fund on this 6-year long transaction.

The key question that raises is what factors drive private equity investment strategies that make such outstanding returns possible? What approaches do they use to determine their investee firms? Why would a PE fund choose to invest for 3 years in one company and twice as much in another? What is the impact of such investments on a portfolio company? Is there any relation between the investment tenure and the performance of investee?

Thus, the **goal** of this paper is to determine whether the tenure of private equity investments in European companies has relation to their performance. In order to achieve the specified goal, the paper will strive to provide new approaches in answering the above-mentioned questions through a number of **research goals**:

- To conduct a study of private equity funds' activities and their investment strategies.

- To analyze the possible causes of different investment strategies used by private equity funds, including different tenures.
- To conduct an empirical study in order to examine the relationship between private equity investments' tenure and companies' performance.
- To analyze the obtained results, formulate conclusions and practical recommendations based on the research.

The paper will particularly focus on private investment in public equity (PIPE) transactions executed by PE funds. Within such transaction, a qualified investor buys a share in a listed company that wishes to raise capital in a cost- and time-efficient manner, as compared to seasonal equity offerings (SEOs). This effectiveness is achieved because PIPEs have a number of benefits over other methods of equity financing: PIPEs do not require immediate regulatory registration of the equity issue, do not need expensive roadshows while placement agents' fees are lower than such of underwriting banks. These features have made PIPE transactions increasingly attractive in the recent years: in 2015, an increase of 38.7% in global capital raised through PIPEs and total market size of \$85.7 billion could be observed (PrivateRaise, 2016).

The paper structure is following: the first chapter is devoted to the study of private equity activities and investment strategies. This chapter also focuses on peculiarities of PIPE transactions. The second chapter analyzes the possible causes of different investment strategies of PE funds. This chapter also addresses theoretical approaches, which describe the relationship between PE investment tenure or presence in general and performance of the portfolio firms. The third chapter is dedicated to the empirical study of the relationship between private equity investment tenure and performance of the target companies. This chapter also covers all the steps of the empirical research: its methodology, results of econometric and statistical analysis, discussion of main findings, as well as practical recommendations.

The paper also applies several theoretical concepts covered in existing academic research. For instance, research methodology draws particular ideas from "Determinants of Private Equity Investment in European Companies" paper of Badunenko, Barasinska, Schäfer (2009) and "Access to Private Equity and Real Firm Activity: Evidence from PIPEs" paper of Brown and Floros (2012).

The empirical part of the paper is based on a sample of PIPE transactions that took place in the years 2005 – 2014 and had European target companies. The sample is based on transaction, financial, and shareholder structure information acquired from Thomson Reuters Eikon and Datastream databases.

Main findings of the paper extend currently available research of both PIPE transactions and private equity by introducing several approaches, which were not previously covered in

academic papers. What is more, practical recommendations of the paper are useful for both the firms, which consider PIPE financing, and for private equity investment decision-making.

Chapter 1. Private Equity Funds

Private equity (PE) has become an important element of the modern financial system from a niche activity. As opposed to public equity, private equity is generally an asset class that is not listed on a stock exchange. However, over the years of the industry’s development, private equity investments began to appear in a form of convertible debt, public equity taken private, or even private investments into a listed company’s specific instruments, which are not available to the broad public. Typically, such investments are made by private equity firms, financial intermediaries for their investors, which in turn establish specialized private equity funds. Globally, an increasing demand for such funds exists: PE fund-raising has increased by almost 5 times from an estimate of \$105 billion in 2003 to \$499 billion in 2014:

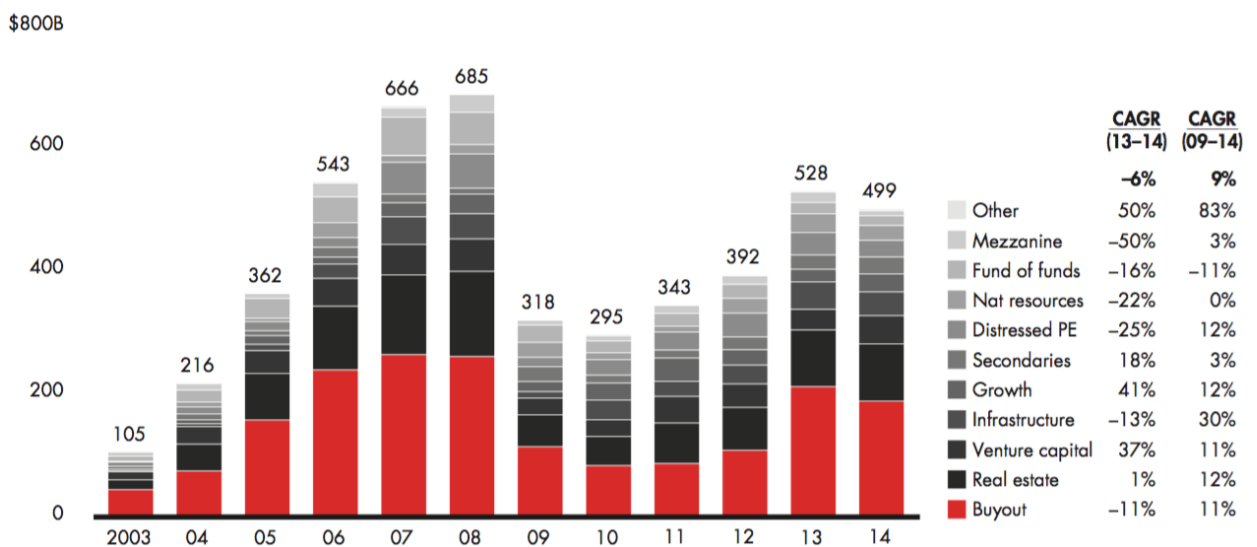


Figure 1. Global private equity capital raised by fund type (Bain & Company, 2015)

Each of the PE funds selects multiple companies (portfolio of companies), shares in which can be sold after a few years, fulfilling the main goal of funds – generating a capital gain. The capital gains are generated because the targets of PE funds are often underperforming businesses so that the funds’ management can increase target’s profitability over the term, or tenure, of investment. Increased profitability is reflected in higher valuation of the target company, which is sold to other investors later at profit for a PE fund. Further on, the possible variations in each of the steps of this business model are described in more detail.

1.1. Private Equity Fund Structures

1.1.1. Private Equity Fund Classifications

Private equity is classified into 3 broad categories, depending on various factors (European Private Equity & Venture Capital Association, 2016):

1. *Venture capital*. The category includes *seed stage* (business ideas without prototypes), *start-up stage* (business and marketing plans are usually established), *expansion stage* (products are already marketed, but funds for expansion are insufficient), and *replacement capital* (financing to buy back shares from existing venture capital investors or to reduce debt burden) funds, depending on the stage of financing of portfolio companies. Target businesses for venture capital are usually non-mature and are limited in financing, thus, represent an attractive investment due to new technologies, as opposed to stable revenue flows.
2. *Buyout*. This category includes *acquisition capital* (debt and equity financing for a company acquiring another firm), *leveraged buyout* (company buyout financed by excessive use of debt capital – either junk bonds or loans – with company acquired serving as collateral) and *management buyout* (management financed to acquire firm or its part), depending on type and purpose of financing. Target businesses in this broad category are usually acquired entirely, but the strategy of providing development capital may also be possible. As opposed to venture capital investments, portfolio enterprises in this category are mature, while technology considerations are rather irrelevant for investment decision-making. Most of the times, if the target is listed on a stock exchange before the transaction, further delisting process is expectable. This category historically has been the most popular in terms of invested money (Fraser-Sampson, 2007, p. 8).
3. *Special situations*. This category includes *mezzanine finance* (financing in the form of subordinated debt and equity), *distressed securities* (financing of distressed companies), *one-time opportunities* and others.

The first two categories, buyout and venture capital, are main categories of funds both in terms of a number of funds and invested amounts (CFA Institute, 2015, p. 137). The categories listed above, however, are not the only ways to classify private equity funds: very often funds are also broken into smaller categories by geographical location and sector focus of target companies.

1.1.2. Private Equity Legal Structures

The *limited partnership* – an agreement between general partner (GP, fund's manager, a private equity firm) and limited partners (LPs, fund's investors) – has become the most

widespread structure of private equity funds (Fraser-Sampson, 2007, p. 11). Due to private equity funds often being highly leveraged entities (especially for LBO transactions), the GP of a fund shares the risk and is liable for all the debts of a fund. On the contrary, LPs' risk is limited to the initial amount invested.

Another type of organizational structure for a PE fund is a *company limited by shares*, which is similar to a limited partnership agreement, but sometimes provides better legal protection to the GP as a receiver of operational fees charged by PE funds. Some other fund structures may also provide more legal protection to the LPs, depending on fund's jurisdiction.

1.2. Private Equity Fund Life Cycle

Terms of PE funds tend to be between 10 to 12 years (from initiation to termination), usually extendable by up to 3 years (CFA Institute, 2015, p. 152). The life stages of a fund can be generally described as follows:



Figure 2. Life stages of a private equity fund

1. The **marketing** stage is crucial for a PE fund as raising funds is the second most important goal of a fund after generating capital gains. The intentions to create a new fund are marketed to investors in advance to meet *target fund size* by the launch date. The target fund size is fixed by the *fund prospectus* and indicates the fund manager's ability to both manage and raise corresponding amounts of money.

Maintaining long lasting investor relationships is very important for success during the marketing stage: not only can the private equity firm attract current or former funds' investors, but convince them to co-invest in portfolio companies. Trust is fundamental in private equity fundraising, especially after the financial crisis of 2007-2008, and only by running consistently overperforming funds the private equity can succeed at this stage: PE global fundraising in 2009 has been in trouble with total capital raised declining by more than 50% as compared to 2008 (as can be seen in figure 1), however, 2011 has seen considerable increase in positive cash flows generated by PE funds, increasing LPs' willingness to become a party in new fundraising campaigns. Nevertheless, increased returns in the private equity asset class alone cannot compensate for imbalance between the supply of PE fund offers and aggregated capital, available LP for investments:

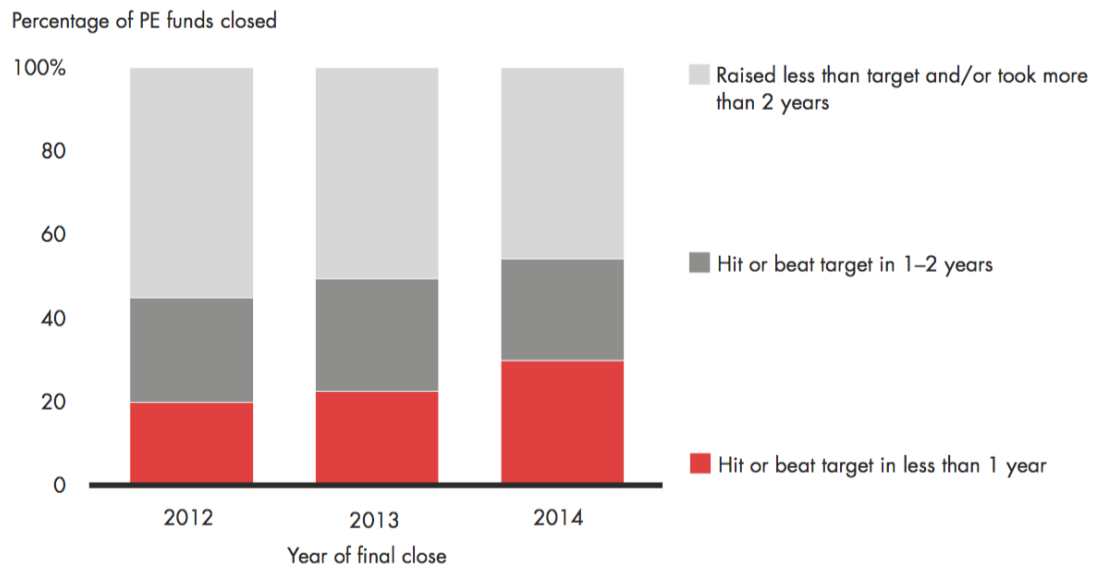


Figure 3. Successful private equity fundraising in 2012 – 2014 (Bain & Company, 2015)

As we can see in the figure above, private equity market remains highly competitive, with only less than 30% of the funds raising funds' targets in less than 1 year. To further enhance the trust and attract more investors, new models in the private equity investor relations emerged lately (Bain & Company, 2013). For example, in 2012, CVC Capital Partners, a UK-based PE firm founded in 1981, which manages numerous ten years or more closed-end funds on behalf of over 300 institutional, government and private investors (CVC Capital Partners, 2016), sold 10% stake in itself to sovereign wealth funds, like Government of Singapore Investment Corporation and the Kuwait Investment Authority. Such non-traditional new fund marketing is beneficial both for the managing firm and its investors: the GP receives a long lasting capital base, which can be split between new funds in the future, while investing LPs will also receive increased cash flows from funds due to the share in fees the PE firm receives from managing them.

Another example of new-coming investor relations strategies is running special accounts – particularly used by one of the biggest private equity firms, Kohlberg Kravis Roberts (KKR). KKR is US-based and was founded in 1976 while seeing first public pension funds' investments in its funds already in 1982 (Kohlberg Kravis Roberts & Co., 2016). In 2012, KKR received \$3 billion in commitments from Teacher Retirement System of Texas, which would pay lower fees than a common LP of KKR's fund, and would have an opportunity to participate first on many of the KKR's deals on preferred strategies. In its turn, KKR demands capital commitments to be longer lasting than such of a typical LP.

One of the more traditional measures to increase investors' trust even during a marketing stage is *key man clause*, which is essentially a certain group of executives with

diverse backgrounds that would manage the fund. This clause may restrict the GP from making new investments in case a pre-defined part of the initial key group wasn't participating for the whole term of the fund. Such restrictions are put on a fund until new key executives are negotiated with the fund's investors. Another instrument is *no-fault divorce* agreement, which may be implemented into the fund's legal base, allowing the super majority of investors' to vote for removing fund's manager throughout fund's term without providing any specific reason. On the contrary, *removal for cause* agreement allows removing the fund's GP or terminating the fund itself before its termination for a pre-defined set of reasons like material flaw being found in fund's prospectus.

2. The **investors' commitments** (signing a legal agreement to provide a certain amount of capital to the PE fund upon *capital drawdowns*, which are discussed below) stage is often held parallel to the marketing campaign, and multiple "closings" are offered to potential investors. This reflects the fact that most of the funds operate as "closed-end" funds, thus, such legal agreements with PE funds can only be made at pre-defined by the GP periods and subsequent investments cannot be redeemed over the lifetime of a fund. However, this doesn't mean that investors receive no cash flows until fund's termination: such occur as soon as the fund exits an investment, and cash is distributed among investors immediately. Thus, the tenure of an investment in private equity is not equal to the term of the fund but is rather unpredictable when the fund is started. This subject is discussed in more detail further.

Private equity funds usually raise funds from either from institutional investors (pension funds, endowments, insurance companies) or from wealthy individual investors, who invest through fund-of-funds or directly. Fund-of-funds intermediaries exist to provide their investors more diversified solutions. From the committed capital *management fees* (1.5% – 2.5%) are usually charged by a PE fund on an annual basis after the *vintage year* – year the fund is launched (CFA Institute, 2015, p. 153). Less frequent fees are calculated relatively either to *invested capital* or to the *net asset value* of fund's current investments.

3. Before a fund makes any **investments**, screening of opportunities and preparing proposals for the most attractive target companies' investors is conducted. Valuation throughout the whole expected investment horizon is also carried on this stage and exit routes are being considered to apply stress tests to the appraisal in order to consider possible outcomes depending on possible market conditions and financial forecasts. If a company is perceived as a profitable investment by a PE fund, further structuring of the deal takes place before the stake purchase takes place.

The LPs have no right to reject investments selected by the fund, as *commitments* are legally defined and the *drawdown notice* just notices the purpose of the call for money.

However, to limit fund's investments activities, such usually have *restrictions* defined in the fund's prospectus like the minimum level of diversification or maximum levels of the fund's leverage. Another restriction on investments is *co-investment* agreement between fund's GP and LPs, allowing the latter to co-invest in a target company first (in case the fund doesn't execute a buyout solely), while the GP is restricted from such activities to avoid conflicts of interest (like one arising from the GP investing in the same target with another fund).

The GP often benefits from *transaction fees* on this stage if the GP is involved in due diligence or advising on mergers and acquisitions (or an IPO on the next stage). In case such fees are shared with LPs, such are deducted from their future management fees.

It is important to notice that PE funds usually have highly unpredictable cash flows – both in size and timing. Even though the *committed capital* of the fund has been legally set on previous stages of the fund's life, actual *capital drawdowns* – calls for investors' money – take place only upon identifying advantageous investment opportunities.

4. Even though **exit** opportunities are considered and planned in advance, even before any investments are made, a lot can change in market conditions. This may cause inevitable changes to the plan by either speeding up the exit not to lose current opportunity, or postponing such and, for example, proceeding with more organizational changes to the portfolio firm and waiting for better market conditions. This makes the actual timing of selling a fund's investment highly unpredictable, thus extending uncertainty of cash flows to investors from amounts only to timing. Whenever a fund exits its investment by one of the strategies discussed in a separate paragraph below and most likely realizes a capital gain on the invested capital, a *distribution notice* is sent to investors, defining time and amount of future cash flows to them.

Another possible distribution mechanism is the *distribution in specie*, which is popular for US venture funds, but has met adverse reactions in EU and is barely used in the region (Fraser-Sampson, 2007, p. 14). This form of distribution implies proportional transfer of a target's ownership to investors instead of exiting an investment. Because the shares are often a *restricted stock* (which cannot be sold for a set amount of time, like 6 months), such distributions often lead to massive sales on the first available day and, as a consequence, to unsatisfactory prices for fund's investors.

Even though that profits are most likely to be realized at this stage, it is not obligatory for funds to report publicly their performance. Recent legislative acts require public pension funds to report performance of the funds they invest in, however, the list of PE funds' target companies may still remain confidential. The lack of transparency in the industry is largely motivated by limiting uninformed analysis and coverage of complicated

returns analysis and desired privacy of venture capital funds on the matter of their target investments (Fraser-Sampson, 2007, p. 94). However, this issue also complicates outsider analysis of the industry, with very few percentage of the PE funds' transactions covered even in modern databases.

One of the most important features of private equity as an asset class is the *j-curve effect*. An investment in a PE fund is characterized by a stream of cash flows, like bonds, with an exception that both size and timing of cash flows are unpredictable. As mentioned above, outflows occur after issuance of drawdown notices for each of PE fund's investments and depend on opportunities found by the fund, while inflows occur after PE fund generates (perceived) maximum value per its investment in a portfolio company and exits the investment. Obviously, investors tend to receive drawdown notices closer the vintage year of a fund, while distributions of gains to investors tend to be concentrated around the termination of a fund. This makes annual returns, as opposed to compound returns, an invalid measure of a PE fund's performance. At the same time, compound returns, depicted by a fund's IRR curve, take a J-shape because of negative returns in the early years, which revert as a PE fund begins to carry out its exit strategies. Negative returns are driven by value creation strategies, discussed in a separate paragraph below, which are restructuring changes a fund enforces upon investing in a portfolio company. The steeper the curve is, the faster cash is returned by a fund to its investors. As a consequence of annual returns being an inadequate measure for PE funds, benchmarking of private equity returns against other asset classes requires extra measures to be taken, while comparison of PE funds' returns between each other makes sense only between funds of the same vintage year.

Two other remarkable features of private equity returns are (Fraser-Sampson, 2007, p. 30):

- Persistence of returns over time: worst performing funds are likely to underperform further on while best performing are likely to overperform in the future. As investment opportunities for funds have already been identified during funds' early years, it is unlikely that less advantageous investments will perform better towards fund's termination.
 - Performance differences are very high across funds. This is also a consequence of high competition of funds for extremely attractive investment targets: while certain funds are successful at finding and investing in such, others are left with only decent opportunities.
5. As simple as it implies, an **extension** is a mutual agreement between the GP and LPs to extend the term of the fund. In case LPs did not enter the agreement to extend the term of the

fund, such fund is terminated. Upon fund's termination, *clawback provision* is often due. This provision requires fund's manager to return capital (including fees and other expenses) to investors in excess of the pre-agreed profit split between GPs and LPs. GP's share of profits generated by the fund (*the carried interest*) is usually around 20% of fund's total profits net of management fees (CFA Institute, 2015, p. 153). Allocations of carried interest to the GP are only possible when fund's IRR is above a pre-defined *hurdle rate*. The hurdle rate is an additional incentive for fund's manager to outperform a certain return benchmark over the corresponding amount of time.

Two *distribution waterfalls* are possible for the fund's profits:

- a) *Deal-by-deal*: carried interest is distributed to the fund's manager after each deal is closed.
- b) *Total return*: investors receive their distributions earlier in this case as carried interest is calculated on the profits of entire portfolio and carried interest is distributed to the fund's manager after all the drawn down capital is returned to LPs.

1.3. Value Creation for Private Equity Portfolio Firms

An essential part of private equity industry is the ability to create value for portfolio firms and generate highly positive returns on selling fund's stake. Exploiting the advantages of non-public terms of entering target companies is crucial for overall sustainability of the private equity business and generally include:

- *Opportunity to take active control of a portfolio firm, granting:*
 - *The ability to restructure its business model to increase the profitability.* Improving operational efficiency of portfolio companies has been claimed as the primary source of increasing portfolio companies' value (Koller, Goedhart and Wessels, 2010). Many of the PE firms hire consulting companies to conclude, whether specific changes to the company's business model are feasible over the investment period. Some of the largest private private equity firms even have dedicated positions for consultants with diverse managerial backgrounds. One of them is Blackstone – a major US-based private equity market player, founded in 1985 (Blackstone Group, 2016). Such advisors are capable of providing the PE firm insights on local markets, industries and assist firm funds' ability to capture global opportunities and exploit such by, for example, increasing target firm's earnings growth, expanding operations or reducing debt by the time of exit. However, business model restructuring alone would not be able to generate abnormal returns for private equity funds, otherwise, superiority of

private equity firms in this field would mean that public companies are unable to function efficiently without an intervention of PE funds.

- *The ability to restructure target's administrative model to increase incentives for the firm's management to perform better.* Full or a great extent of control over a portfolio company allows a PE fund to change existing compensation of management for it to be in line with a fund's exit price from the company (or total fund's returns from the transaction), or simply to replace positions with more motivated executives. Investment terms, specified in the *term sheet*, pre-defines rights and obligations between a PE fund and its portfolio companies. The most widespread provisions are *tag-along* and *drag-along* rights, which are incorporated into investments' legal structure to protect minority shareholders' rights. Tag-along right allows minority shareholders to join majority shareholder and sell their stake at the same price and terms while drag-along forces minority shareholders to do so. In both cases, such rights prevent any future buyer of the company from gaining control over a company, until the offer is extended to all shareholders, including executives. This legal measure ensures that minority shareholders' rights are taken into consideration by PE funds and investments of the latter are not detrimental to existing owners of the company. Among other instruments, aimed at balancing PE fund's and management's interests are:

- *Availability of corporate board seats*, which ensures PE fund's control over a portfolio company and ability to block major events like restructuring or selling.
- *Preferred dividends and liquidation preference* are rights for a PE fund to receive distributions from a target company before other investors of such company.
- And even if a PE fund doesn't achieve a controlling stake in its target firm, *reserved matters* allow the fund to block major decisions like business model changes or acquisitions.

Therefore, legal structuring of the deals alone can be a source of a PE fund's gains. Contractual terms of investments are especially important for a fund, willing to gain major control over their venture capital portfolio firms, which are facing particularly unclear prospects both financially and strategically.

Moreover, since shareholders' and equity market players' expectations are pressuring public companies, incentives for meeting short-term goals, like increasing sales or margins, exist. By exiting broad markets, executives of private companies are

more interested in approving longer-term projects, which eventually would bring more value for a company under question, even at the cost of short-term effects, which could possibly be perceived as negative by the market.

- *Access to debt markets at favorable terms, which were unavailable for the target firm alone.* Even though regulatory guidance for banks in the US states that it is not advised to finance takeovers with Debt / EBITDA ratios of more than 6, in 2014, 40% of the LBOs were still financed at higher ratios (The Wall Street Journal, 2014). Such high levels of leverage highly exceed the comparable use of debt by public companies. This provides PE funds a unique opportunity to exploit tax shields from their deals while such tax benefits still exceed bankruptcy costs. Track record of a PE firm's debt repayments, as well as ability to control target firms' management, is paramount to access the syndicated loan market or high-yield bond markets. Most of the times, such syndicated loans are re-engineered later into either collateralized loan obligations (CLOs), or collateralized debt obligations (CDOs), which partially transfer credit risks from a PE firm to investors of such instruments.

Apart from favorable terms, leverage may also assist target firms at a better distribution of its free cash flows. According to Jensen (1986), slow growth firms tend to distribute their excess free cash flows to projects, which destroy company's value. Utilization of high debt burden by private equity funds re-allocate such cash flows to debtholders, ultimately imposing discipline on target companies' management and adding value to the target company.

1.4. Private Equity Exit Routes and Risks

1.4.1. Private Equity Exit Strategies

Even though the previous part of the proves PE funds' ability to *create* value, it is also necessary to *extract* such value. A PE fund may attempt to increase its profitability by picking out a strategy of exiting portfolio firm's ownership that will increase the price of exit to the greatest extent. Expected valuation of investment by the time of exit and deal's IRR are closely tied to the exit route, therefore, such strategies' feasibility should be considered in advance. Four possible options are:

1. *IPO*. Initial public offering results in higher valuation multiples due to the higher liquidity of the stake a PE fund is selling, as well as access to a broader market of investors. Even flexibility in gradually selling tranches of securities is possible if fund's termination time allows doing so. However, IPO is not always an optimal route for an exit due to high costs and increased time needed to execute the exit. Moreover, there is

empirical evidence that timing of an IPO is essential for it to be successful (Lowry and Schwert, 2002) while market conditions for the exit are barely predictable during fund's initiation of investment in a company.

2. *Private sell*. This option implies selling fund's stake to another financial or strategic investors, like ones willing to expand their operations geographically or integrate upward / downward their value chain. Secondary buyouts to other private equity funds are also possible, whether the latter expects such transaction to be profitable. This is possible because of private equity market being highly segmented, thus, where one firm may be specialized at restructuring, another firm may still earn high returns from investing in the same portfolio company by merging such with other investments and achieving synergies from this transaction. Overall, a nonpublic market sale will have a discount for lack of liquidity, but will still yield highest valuation multiples, where an IPO is not possible.
3. *MBO*. A management buyout with the use of high leverage is also possible. Nevertheless, this option reduces the potential sell price due to management's perfect understanding of the business and excessive debt used in the transaction, thus this exit strategy is usually considered where other options are unavailable.
4. *Liquidation*. Even though this exit route will result in the lowest price, it may still be considered in the shortage of other options, for instance, when market conditions are highly unsuitable for other ways of selling the stake. Even though a fund's term is pre-determined and all investments should be sold by the termination of the fund, undertaking this option may have serious negative impact on PE firm's reputation, for instance, if many workers have been laid off as a result of the liquidation.

1.4.2. Private Equity Risks

Private equity investments' increased returns come at the cost of increased risks, associated with the asset class. Some of the risks, associated with this asset class are following (CFA Institute, 2015, p. 156): lack of liquidity, unquoted investments (lack of frequent market pricing, while valuation of investments using complex techniques like DCF, relative, real option, and replacement cost valuation is subject to judgement), high competition for attractive target firms, agency risk (of delegating investing decisions to the fund's management), changes in government regulations and / or tax treatment of capital gains (especially high due to long-term nature of the asset class), lack of capital for target companies (if fund's investment is insufficient for reaching its goals), lack of diversification (due to how costly each investment in target companies is), market risk (for interest rates, currency exchanges, etc.).

Because of high agency risks, there is also no guarantee that fund's management will put their best efforts in seeking lowest costs for any of the necessary fund's activities, such as: transaction fees (debt financing, legal fees, etc.), legal entity setup costs, administrative and audit costs, dilution of ownership (in case stock options are granted for portfolio company's management), and others.

Due to such high risks, associated with private equity, such investments have certain barriers to entry for individual investors. Even though fund of funds, which are reducing risks by using expertise in selecting particular PE funds, may grant access to the asset class, many of such funds are «invitation only». Moreover, in Europe, funds of funds usually have low allocations to private equity itself (Fraser-Sampson, 2007, p. 3). Direct investments in PE funds are complicated too: in most countries such investments are available only to accredited investors – either financial institutions or wealthy individuals. The definition for individuals depends on legislation system of the country under question (Wikipedia, 2016):

- USA: a person with net worth of \$1 million (excluding the value of primary residence), or having an annual income of \$200,000 (\$300,000 combined income if married) over the last two years.
- EU: a person who worked in the financial sector for at least one year which requires knowledge of services under question, and possessing financial instrument portfolio worth more than €500,000.

1.5. Private Investment in Public Equity

Private Investments in Public Equity (PIPEs) are discussed separately in the paragraph below as the main target of the study. PIPE is a transaction, in which a private equity fund, hedge fund or another qualified investor purchases a privately issued share in a public company. Similar to initial and secondary public offerings (IPOs and SPOs), the main purpose of a PIPE is to raise additional capital for growth or to refinance. Typically, PIPEs involve issuing common or convertible preferred equity, but structured issues of convertible instruments like debt are also possible (Latham & Watkins, 2010). This source of financing has become increasingly interesting for issuing companies with a total of \$85.7 billion raised in 1,294 global PIPE transactions during 2015. This is 39% higher in proceeds than in 2014.

As we can see from the figure below, the demand for PIPE placements has been growing for 3 past consecutive years, showing recovery of the market. Huge amounts of capital raised during the financial crisis mainly consist of large transactions: for instance, in 2007, plenty of mega-PIPE issues by financial firms in response to crisis-related write-downs accounted for \$40

billion in capital raised, 48% of the total market (Sagient Research Systems, 2016). In 2008, 87 mega-PIPE transactions have already accounted for \$165.1 billion raised, 93% of total market. This abnormal use of PIPEs during years 2007 and 2008 indicates that, from issuer’s point of view, such transactions are extremely attractive during times, when other sources of equity financing become hardly achievable.

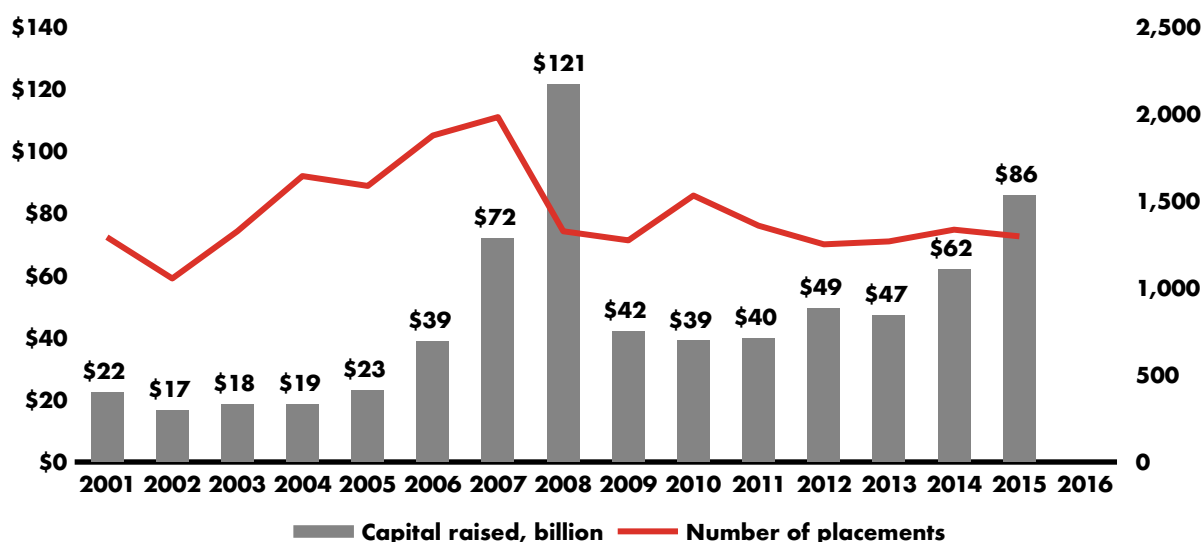


Figure 4. Global historical PIPE transactions and capital raised (PrivateRaise, 2016)

For the non-crisis periods, biotech companies, real estate investment trusts, and technology companies have been historically dominating in the numbers of PIPE transactions, representing industries, which are also attractive for private equity funds (Morrison & Foerster, 2016). In more recent years, mature companies in more established industries, apart from financial services, have also shown interest in PIPE transactions, seeking an alternative source of capital: the average U.S. PIPE proceeds were \$56.5 million with 9 deals having proceeds of more than \$1 billion with only a few of such attributed to the financial services industry, while more traditional IPO capital-raising proceeds averaged at \$176.5 million throughout 2015 (Zacks Equity Research, 2016).

1.5.1. Strengths and Weaknesses of PIPEs

Under certain circumstances, a PIPE, even during non-crisis times, may be more attractive for an issuing company than an SPO for the following reasons:

1. *Delayed registration of the issue with regulatory agencies.* A PIPE involves the placement of unregistered securities, thus, there is no immediate burden, including fees, from registering the issue with the U.S. Securities and Exchange Commission (SEC) or its counterparts in European countries. Usually, the registration is deferred to a later date – 60 to 90 days from

the initial sale, to provide PIPE investors ability to freely sell the securities on the public markets later (Taft Slettinius & Hollister, 2009).

2. *No expensive roadshows held by underwriting investment banks.* Private investments in public equity are marketed by *placement agents*, which are similar to underwriting investment banks in IPOs, but among a relatively small group of investors, thus making overall transaction expenses lower than such for an SPO. Moreover, the marketing stage may remain confidential, thus reducing the possible negative impact of market reactions to the deal's announcement, which is impossible under SPOs.
3. *Increased time efficiency of the issue.* Due to the reasons given above, a PIPE can also be completed more quickly than an SPO, which can be especially attractive for fund-raising during volatile markets.

For the above-mentioned reasons, and especially because PIPEs provide a relatively cost-effective alternative source of financing, such transactions became attractive for enterprises with substantial capital requirements. Nevertheless, such efficiency of PIPEs comes at cost of specific disadvantages for the issuer, such as:

1. *Unfavorable pricing of equity shares.* The transaction implies selling initially unregistered securities, which are, like in IPOs, are subject to *black-out periods*, during which the share purchased cannot be resold. Because of this, application of a discount for lack of liquidity, compensating initial restrictions for investors, should be expected during the valuation of the stake offered.
2. *The discount from a PIPE may cause an adverse market reaction.* Upon the announcement of the sale later, traded equity may negatively reflect the discount, which is applied to the investors of a PIPE.
3. *Restrictions on investors for PIPE transactions.* The PIPE can only be marketed to accredited investors, limiting the issuer's flexibility (Morrison & Foerster, 2016). Moreover, the pool of investors for a PIPE transaction is limited to such, willing purchase no more than 20% of the company's ownership in total, which represents an upper limit of an offering not requiring prior shareholder approval.

From the investor's point of view, PIPE transactions are attractive for a number of reasons:

1. *Investments are made at a discount.* As mentioned above, the initial lack of liquidity of PIPEs causes such to be discounted for selected investors. The strongest point of the transaction is when the securities become registered or converted to common equity instruments, enabling the investor to sell his share freely. Using equity markets for exiting investments is much more convenient for private equity funds, as compared to other

investments, like buyouts, where additional substantial costs are incurred at this stage (as expressed by either IPO or M&A advisory fees). However, this discount may be instantly reflected in the downward movement of market prices upon the public disclosure of the deal by issuing company, making this investment riskier over the short-term horizon.

2. *Expansion of investment opportunities for funds.* In a heavily competitive environment of seeking more traditional private equity investments, PIPEs offer new opportunities for funds, willing to invest in companies without gaining control. Even though the target company is public, due to the timing of capital infusion for the company, the investment may still offer private equity-type return (Fraser-Sampson, 2007, p. 49).
3. *Fixed sale price* for the share in PIPE transaction, which means that it is not adjusted for market price or to fluctuating ratios. This is a major advantage for investors of PIPEs, as compared to investors of IPOs and SPOs, because upon discovering potentially underpriced investment opportunities, a fund may fix its invested capital immediately by signing the purchase agreement. Under certain circumstances, investor of a PIPE may negotiate a *downside protection* of their investment's value in the event of stock's price decline on the markets by issuing additional shares. On the other hand, public companies may also negotiate *caps and floors*, which limit the number of issued shares as a result of price changes. Overall, the investor (not the issuer) of a PIPE will still bear the market risk to a certain extent.
4. *Instrument's structure flexibility.* As noted above, most of the PIPEs involve the purchase of common or convertible preferred stock, as well as less popular convertible debt instruments. Any of the convertible securities is ultimately converted to common stock for easy market access of traded securities: either through a mandatory conversion (upon the appearance of a triggering event, like reaching a certain price per share) or through investor's or issuer's option. The structure of cash flows before the conversion is also highly negotiable. Apart from cash dividends at a pre-defined rate, a *pay-in-kind* dividend with compounding effect is also possible, obliging the company to issue additional securities for holders of such instrument at an increasing rate. Investors protection may also be embedded into the instrument, like a *springing board appointment right*, which entitles the investor to introduce additional directors to the company's board in case it hadn't paid dividends for a pre-defined number of periods.

Summary

In this chapter, a wide range of private equity peculiarities has been reviewed, including strategies of private equity funds to enter and exit their investments in companies, sources of

value creation for their portfolio firms, and industry-specific risks. Moreover, the potential of growth in PIPE transactions segment has been highlighted, as well as strengths and weaknesses of such financing both for the target company and investing private equity fund. Over the course of the next chapter, a considerable variation in private equity investment holding periods will be shown and explained through the study of market and existing papers.

Chapter 2. Private Equity Investment Tenure

Holding periods (from initial investment to complete exit) of shares in portfolio companies vary between private equity firms, funds, investing and exit strategies, and industries of target companies. For example, buyouts, which have historically represented the largest portion of total private equity fundraising, have also seen their average holding periods varying across years:

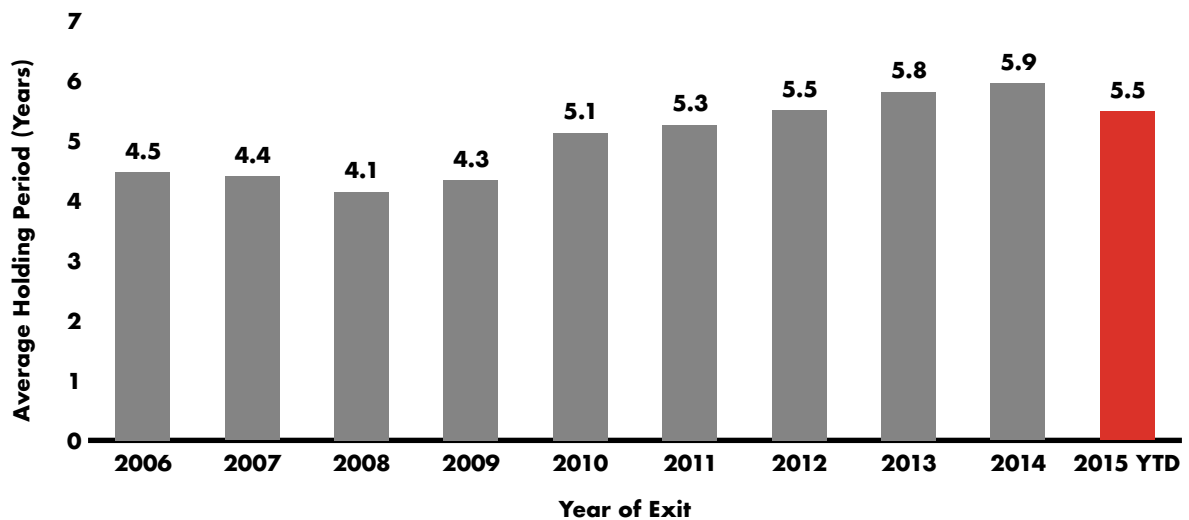




Figure 5. Global Average Buyout Holding Period by Year of Exit, 2006 - November 2015 YTD (Preqin, 2015)

The differences between holding periods are illustrated best with real-life examples, having their own similarities. There are 2 transactions with targets with absolutely unfamiliar industries, but with quite similar value creation route taken by investing private equity firms. What is more interesting, those transactions have different investment periods, while a longer investing period is not accompanied with increased returns: Nordic Capital (founded in 1989 in Sweden, currently – Jersey) has invested in Nycomed (a pharma company founded in 1874 in Norway, currently – Switzerland) 2 times: for 3 years with an approximate gross return of 74% and for 6 years with approximate gross return of 34% (Nordic Capital, 2016). Apax Partners (founded in 1969 in the UK), on the other hand, invested in Tommy Hilfiger (a fashion company founded in 1985 in the US) only once for 4 years with approximate gross return of 44% (Apax Partners, 2016). As we can see from these 3 buyout examples alone, gross returns are lower as investment tenure increases. A short summary of the transactions is given in a table below:

Nycomed and Tommy Hilfiger Transactions Summary

Target companies		
Target industries	Pharmaceuticals	Fashion
Investing PE firms	Nordic Capital	Apax Partners
Transaction	Buyout	Buyout
Exit route	Trade sale	Trade sale
Investment period(s)	1999 – 2002 (3 years), 2005 – 2011 (6 years)	2006 – 2010 (4 years)
Value Created Through	<ul style="list-style-type: none"> • Expansion in new European markets • Investments in R&D and marketing • Complementary businesses acquisition • New products sourced through in-licensing • Deleveraging • New CEO, Håkan Björklund, who led Nycomed from 1999 to 2011 	<ul style="list-style-type: none"> • Stores expansion • Investments in growth, including e-commerce platform relaunch • Consolidation of suppliers • Distribution agreement with a major retailer • Deleveraging (Net Debt reduced by 50%) • New CEO, Fred Gehring
Purchase price	<ul style="list-style-type: none"> • Approx. €512 million (1999) + €176 million (2001) • Approx. €1.4 billion (2005) + €7.2 billion (related acquisition, 2006) 	<ul style="list-style-type: none"> • \$1.6 billion
Sale price	<ul style="list-style-type: none"> • Approx. €1.2 billion (2002) (74% gross return) • Approx. €9.6 billion (2011) + €1.9 billion (related spin-off, 2012) (34% gross return) 	<ul style="list-style-type: none"> • \$2.3 billion (44% gross return)

Even though investment tenures and gross returns differ significantly for the 3 transactions, private equity funds, the exit routes were the same. What is more, we can see clear similarities between the strategies of the 2 companies during investment periods of corresponding private equity firms:

- Both companies expanded geographically: Nycomed was entering developing markets in Western Europe while Tommy Hilfiger was developing its retail stores globally.
- Both companies made investments with a substantial part of such allocated to marketing: Nycomed invested heavily in research & development of new products and marketing for new markets while Tommy Hilfiger required investments for new stores and re-development of its e-commerce platform to sell products online.
- Both companies deleveraged heavily and introduced new management teams, including CEOs, for the whole period of private equity presence in their ownership structures.

It would be easier to say that different holding periods for Nycomed and Tommy Hilfiger are attributed to industry specifics, but can also be proven not to be the only reason. As we can see from the figure below, average holding periods between consumer and healthcare industries differ by less than half a year:

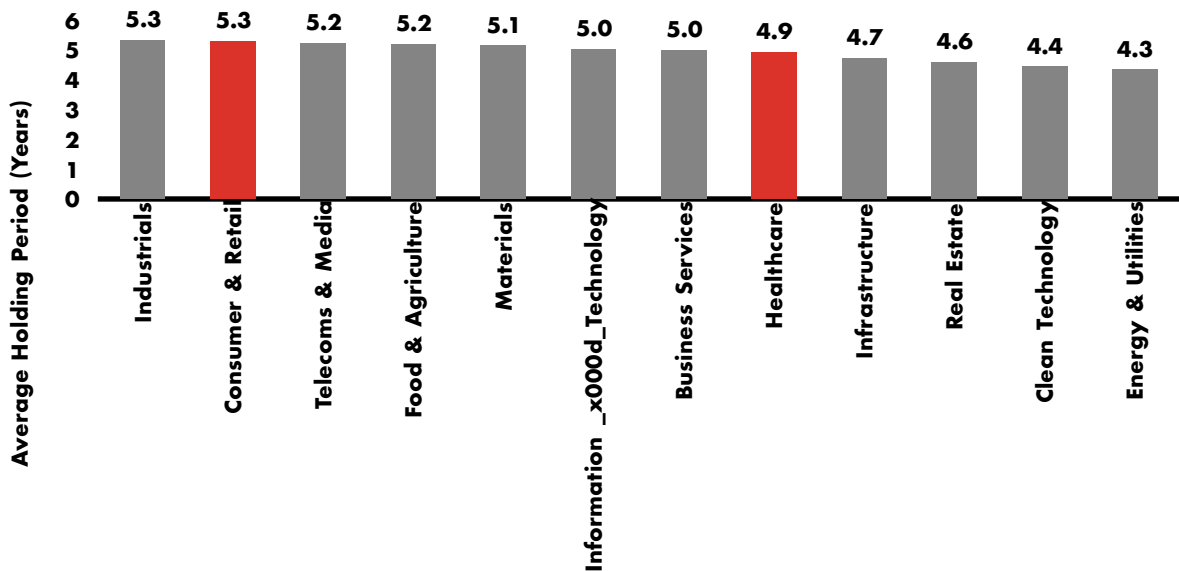


Figure 6. Global Average Holding Period by Industry for All Exits, 2006 - April 2015 YTD (Preqin, 2015)

Another example of transactions with similarities includes comparably smaller businesses – buyouts of Magellan and Lux Med, both established in Poland and operating in the healthcare industry (Invest Europe, 2016). Brief information on the transactions can be found below:

Magellan and Lux Med Transactions Summary

Target companies	Magellan	Lux Med
Target industries	Healthcare	Healthcare
Investing PE firms	Enterprise Investors	Mid Europa Partners
Transaction	Development capital into buyout	Buyout
Exit route	IPO, SPOs	Trade sale
Investment period	2003 – 2007 (4 years) Minority until 2013 (10 years)	2007 – 2013 (6 years)
Value Created Through	<ul style="list-style-type: none"> • Investments in new clinics, equipment and IT systems • Integrated several businesses • New management 	<ul style="list-style-type: none"> • Investments in customer service improvements • Expanded operations to Slovakia and Czech Republic • New management

These 2 cases prove that longer investments are not always detrimental from private equity firm's point of view, as it might seem from Tommy Hilfiger and Nycomed cases: Mid Europa Partners has managed to earn about 2.5x gross return upon selling their stake in Lux Med 6 years later (The Alternative Assets Network, 2013); Enterprise Investors have reached landmark 10x gross return on initial investment made 10 years before by selling 34% share in Magellan on the Warsaw Stock Exchange (MergerMarket, 2013). Moreover, the 2 buyouts prove industry specifics not to drive differences in holding periods solely.

Throughout the next chapter, different academic papers will be reviewed in order to find possible explanations behind the differences in private equity investment periods, and how such investments might be reflected in company's performance.

2.1. Private Equity Investment Holding Period

2.1.1. Private Equity Investment Tenure Impact on Portfolio Firm's Performance

Few papers examine the relation between private equity holding period and performance of portfolio companies. In one of such articles Badunenko, Baum and Schäfer (2010) examine, how the presence of private equity investments influences the performance of European companies, and how it changes over the holding period. To test the hypothesis of significantly increased performance for firms with PE investments, the authors have chosen to compare firms with private equity presence and without. Another possible suggested method is to compare firms that *attract* PE investors' entry and exit with those which don't. Authors have also assumed that effects of private equity-forced restructuring decisions would not be reflected in company's performance immediately, suggesting that superior performance of PE-backed companies would

only be appreciable after some time. In other words, the second hypothesis of the paper is that the longer PE investors are in the company, the larger impact from their presence would be on the performance of a company.

For the analysis, a sample of 159,425 firm-years has been collected, containing firm-level and macroeconomic data from 2002 to 2007 in 22 European countries. Such large-scale sample is driven by both private and public enterprises being included by the authors, as well as minimal annual revenue requirements for the company to be included set at only 5,000 Euros, justified by a higher cutoff being unnecessary as small companies might be important. Nevertheless, the observations across the sample are not persistent, and the panel is claimed to be highly unbalanced. For the given years, around 2.69% of observations conforming for inclusion in the study are related to presence of at least one private equity the investor in ownership structure, with the highest portion of 5.30% attributed to the year 2007. The countries with largest portions of observations with at least one PE investor are: Ireland (14.87%), Luxembourg (5.85%), United Kingdom (5.36%), Netherlands (4.04%), France (2.95%), Belgium (2.80%), and Finland (2.32%) with the rest 15 countries having less than 2% of observations.

As a measure of company's performance, return on assets has been used, with top and bottom 1% of observations dropped from further analysis as perceived to be outliers, resulting in a total average of 5.81% between all years. In the same manner, companies with 1% highest logarithm of revenues, debt ratios, and cash flows were omitted from the sample. It is unclear, however, why authors have only used return on assets, not accounting for the case where interest expenses on outstanding debt could represent a major part of operating incomes, which makes return on equity a more adequate measure of performance for company's stakeholders.

The tenure of private equity in a company's ownership structure is controlled by a separate variable, which is equal to 1 for the first year of PE investment, and increased by 1 for each additional year during which the company had at least one PE investor. It is worth noting that authors do not differentiate between investments of specific private equity funds, thus, the variable will still increase by 1 if PE investor "A" exits a company and investor "B" enters in the following year. Nevertheless, only 0.30% of companies have seen PE investments lasting for 6 years, or the total interval of the sample. To control for other possible sources of changes in company's performance, a wide range of variables has been used – both internal and external, some of them having noteworthy features:

- Instead of Altman Z-Score authors used Bureau van Dijk database estimate of the default probability.
- In case any share of a company is held by a legal title owner and beneficial owner is identifiable, a specific dummy variable is attributed value of 1 to control for

environmental differences in which firms operate – with not further clarifications on how this variable could be a proxy for such.

- Debt variable is expressed as a ratio of current liabilities to total assets instead of total debt, which doesn't control for overall financial leverage of a company.
- Any balance sheet items were preliminarily divided by firm's country harmonized CPI to control for macroeconomic differences.
- Local stockmarket-to-GDP ratio was used as a proxy for country's financial development.
- Possible variations in global economic business cycles are accounted for by implementing 6-month LIBOR rate as a separate variable.

The conclusions of the analysis state that private equity ownership alone has no significant influence on the firm's performance in a given year. Nevertheless, when the impact of the fact of ownership is analyzed together with its tenure, both have statistically significant relationship to the company's performance. Authors claim that this might imply dependence of the PE effect on how long private equity funds have been investing in the particular firm. By further analyzing the marginal effect of the private equity's tenure, the authors have also found that statistically significant increase in company's performance is only achieved after 6 years – the longest tenure possible in the sample. Thereby, the initial hypothesis of increased performance among firms experiencing private equity ownership is proved to be true only for the PE tenure of 6 years, while hypothesis of increasing performance for longer tenures of PE investments couldn't be proved to be true for the sample.

2.1.2. Tenure of Leveraged Buyouts and Probability of Their Reversals

Leveraged buyout transactions – backed by private equity funds or not – most of the times end up with either firm going for an IPO, or with a secondary market sale. In case the initial company has already been public, IPO or a sale to a public enterprise, which force the company to become public again, would cause the so-called “reverse LBO” (RLBO). The probability of reversal of LBO transactions and, what is more important, factors that influence the timing of the reversal if it occurs, have been studied by Van de Gucht and Moore (1998) in their research paper. The idea of the research emerged from controversy in current academic research of LBOs: some authors believe LBOs to be superior to public equity as ownership concentration reduces agency conflicts between management and shareholders (Jensen, 1986), while others believe that LBOs result in net disadvantage for enterprises due to increased risks and vulnerability to financial crisis, thus should be reversed at some point (Rappaport, 1990). To provide further empirical insights on the issue, the authors have made the following hypotheses:

- There is a non-linear relation between firm size and reversal probability and timing as both large and small enterprises are claimed to have their own incentives to reverse LBOs.
- Divisional management buyouts (MBOs) are expected to have a lower probability of the reversal and have longer tenures because management teams possess asymmetric information and are able to capitalize on increased control over investment target.
- LBOs related to growing industries with favorable public market conditions, as expressed by relatively higher Tobin's q-values (market-to-book value ratios), are more likely to become public again.
- Shorter LBO tenures are expected in early stage industries, which are experiencing high ratios of research & development expenses to revenue. This is hypothesis is based on an assumption that non-mature industries exhibit increased needs in external financing for further growth.

The analysis is conducted on a sample of 343 global LBOs in years 1980 – 1992 with the transaction size of no less than \$100 million. 26.8% of LBOs in the sample have been reversed with an IPO after 43 months on average, 9% were acquired by public enterprises in 46 months on average, while the remaining either 48.4% remained private (48.4%), filed for bankruptcy (12.2%), or had been acquired by another private firm (3.5%). Entire company LBOs accounted for 54.5% of the observations while that related to management buyouts – 54.8%. What is more interesting, LBO reversal tenures ranged from 4 months to more than 12 years.

The authors have found that probabilities of LBO reversal increase steadily after the transaction up to seventh and eighth years, and decline thereafter. Highest probabilities of reversal and earliest public sales occur for medium-sized LBOs, proving the initial hypothesis of a non-linear relation of LBO size to such true, yet the other way round: the authors initially expected the result to be corresponding to small- and large-sized transactions. For the LBOs with management participation, which eventually reversed, the decision of going public is delayed, as compared to other transactions, which also proves the corresponding hypothesis to be true. In the same manner, LBOs within high growth industries tended to be more likely to reverse and to reverse faster, which also confirms the author's hypothesis. Nevertheless, LBOs within non-mature industries, as expressed by relatively high R&D expenses, didn't prove to reverse neither more likely nor faster.

2.2. Private Equity Presence and Performance of Firms

2.2.1. Private Equity Investment Impact on Industry Performance

Jensen's (1986) paper on agency costs of free cash flow has frequently been cited as a basis for a widespread opinion that private equity investments are able to improve company's performance. Bernstein et al. (2010) have decided to take a look at the issue from the perspective of industry-wide performance. The authors hypothesize that industry performance might improve if private equity activities are common to such. By analyzing the PE impact on industry level authors hope to capture "contagion" effects: that is if improvements in bought-out firms tend to force their industry competitors to improve. The authors also pay special attention to economic cycles as a major determinant of the impact of private equity activities: they suppose that private equity investments during economic booms have comparably minor impact on industry-wide performance, as many sources of financing for growth is widely accessible. On the other hand, the concentration of ownership, associated with PE investments, during economic downturns may help companies raise additional financing on terms, which are unavailable to enterprises not backed by PE investments.

To put the suggested hypotheses under test, the authors used a sample of 14,300 transactions announced between years 1986 and 2007 with 13,100 different firms from Organization for Economic Co-operation and Development (OECD) countries, each involved in any of the following PE-related transactions: management buyout, leveraged buyout, or going private. The large-scale sample is possible because authors used fitted values of deals sizes instead of omitting about 50% of announced transactions from the analysis. They acquired such values by regressing deal size on fixed effects for the economy, investment year and target industry, without providing any reference to a possible misstatement of the results. Industry-related data, consisting of 11,135 country-industry-year observations for the same period, includes:

- Gross output of industry in current prices. This measure includes both sold and stocked goods and services, but authors didn't clarify if a major portion of stocked items in gross output would signify inefficiency within the industry in a given year.
- Value added (output net of materials purchased) as a proxy of industry's contribution to *national* GDP. The authors have mentioned possible differences in calculating the value across countries but stated that the main interest is differences across time for a given nation.
- Total labor costs, including wages, salaries and other distributions like pension contributions and health insurance.

- Number of paid employees within the industry, excluding self-employed.
- Gross capital formation as the closest proxy for aggregate capital expenditures, calculated as assets acquisitions (including intangibles like IT-technologies) less disposals.
- Consumption of fixed capital as fixed assets value reduction per year due to use or deterioration of such.

By combining the industry- and private equity-related data, a total of 8,596 country-industry-year observations for the period from 1991 to 2007 were obtained, as private equity activity is expressed as volume of PE deals that took place over the previous five years in the given country and industry. The authors were able to observe that private equity activities were especially present among “traditional” industries like textiles, machinery, paper products, electric equipment, and chemicals while the countries with greatest levels of PE activities were the US, the UK, Netherlands, and Sweden.

By conducting an empirical study, authors have found that industries, which received PE investments over the past five years, were growing more quickly as reflected by several of the suggested measures increasing. This finding proposes initial hypothesis to be true, including the inference that industry peers without PE-backing are also forced to perform better to maintain their competitive positions. By examining industry performance during different economic cycles, authors concluded that PE-backed industries are less exposed to industry shocks, while performance during more stable times doesn't significantly differ among industries that are receiving PE investments and those that do not. This also proves both related hypotheses to be true. Among other interesting findings of the paper, is the fact that for the studied sample there is no statistically significant difference in private equity investment impact on industries' performance between Europe, USA, and the United Kingdom, even though the level of PE activities is reported to be higher for the latter countries.

2.2.2. Impact of Private Equity Investments on Listed Equity

In order to understand possible motives behind choosing specific investment holding periods of private investments in public equity, peculiarities of capital gains generation for open-market share acquisitions should also be reviewed. In their paper, Stotz, Wanzenried and Döhnert (2010) have analyzed general effects of open-market investments by private equity funds, as well as provided a more detailed look at size and home-bias effects. Authors have also analyzed whether private equity investments increased the value of target firms – both in the short- (upon deal announcement) and long-term. The key hypothesis of the research is that success of private equity investments is related to possession of non-public information, which can later influence portfolio companies' corporate decisions. As a proxy for this non-trivial factor, authors used

indicators, which support better information flow: home bias and the size of the target company. I.e. authors believe that companies, which belong to the same country as investing funds, will experience increased open-market acquisition returns because it's easier for local investors to communicate their business ideas to firm's management. At the same time, small companies, which have less public and analyst coverage, are believed to be more likely to obtain private information from its investors.

Authors have used a sample of 689 global open-market deals, related to 100 largest private equity companies, during the period from 1999 to 2007. The median size of the transactions globally was \$50 million with a very high heterogeneity of the deal size across countries (for instance, an especially high median of \$390 million is attributed to France while transactions related to targets in Germany had a median size of \$27 million). UK and US have accounted for the largest amounts of deals for the period. Globally, the number of deals has increased steadily with each year, but in size the largest median deals size have occurred in 2001 and 2007, which authors attribute to economic downturns during the years.

By further conducting analysis using Fama and French model to reveal short-term and long-term effects of private equity investments, authors have discovered both to be accompanied by abnormal market returns of the stocks. Moreover, investments in small capitalization and local companies have experienced higher excess returns on average, proving the initial hypothesis of the research to be true. What is more important, of authors have made a side discovery that such effects are also extended to the long-term perspective, with investment target values increasing during a period of up to 3 years after the announcement of the deal with a subsequent reversal of the effect.

2.2.3. Private Equity Financing Impact on Firm Activities

Another study of the private equity's investments in public equities relates specifically to PIPE transactions. In their paper, Brown and Floros (2012) have studied how external equity from private placements affects real firm activities, i.e. how the capital raised is allocated inside the company. The authors implicitly hypothesize that proceeds from private investments are mainly used for research & development activities.

To find empirical evidence for their hypothesis, authors have collected data on U.S. PIPE and secondary offerings (SEOs) of 1,532 firms from 1995 to 2008. The sample has shown that PIPE financing has been used more frequently than SEOs: on average, there were 290 PIPE issues and only 34 SEOs per year. Authors have also identified tendency of firms to use PIPE financing repeatedly with those having more than 3 PIPE transactions (2,634 observations, 34%

of total) for the period having substantial differences to those which had only 1 transaction (2,566 observations, 34% of total), which is expressed by:

- 25% higher PIPE proceeds ratios (relative to total assets);
- Negative cash flow ratios (relative to total assets);
- 21% higher cash ratios (relative to total assets);
- 17% higher R&D ratios (relative to total assets);
- 54% lower sales ratios (relative to total assets);
- 10% lower tangibility ratios (net property, plant and equipment minus inventories);
- \$67 million (79%) lower net assets.

These statistics reflect the profile of a typical PIPE issuer, a small high-tech firm with limited internal resources, volatile earnings, and significant R&D expenditures. The authors try to explain theoretical reasons why PIPE financing applies to companies with great intangible investment opportunities better than other sources of external financing in the following way:

- Debt contracts are poorly suited for financing risky investments with volatile returns.
- Intangible investments lack collateral value, thus costs of external debt financing raises dramatically.
- Due to high-tech nature of the firm, information asymmetry between it and potential equity investors may also increase the cost of external equity financing.
- Transaction costs for raising external debt or equity may be too high for small firms.

private equity investors, on the other hand, are more concerned about possible upside of their investments, while collateral value represents a relatively minor interest. Moreover, many PE firms have industry expertise, which allows them to reduce information asymmetry.

The authors proceeded further by specifically analyzing R&D levels between firms based on their PIPE proceeds and other possible sources of financing (internal, debt and SEOs). As a result, they have found that indeed, PIPE financing had a significant impact on levels of R&D spending, as well as increased cash levels, which authors believe are to be used for further R&D expenditures, proving their hypothesis to be true. The authors have also developed side conclusions based on their analysis: on average, R&D expenses were increasing more if a private equity fund was the investor of a PIPE (as opposed to hedge funds and corporations). This effect is claimed to reflect that PIPE capital supplied from non-private equity funds is mainly used for immediate operational needs rather than strategic intangible investments. What is more, a switch of PIPE capital suppliers from one to another is, on average, accompanied with increased capital allocation to R&D, which implies that the real impact of PIPE financing has also depended on relationships between PIPE suppliers and issuers, with latter taking less risks as expressed by relatively lower R&D investments.

Summary

Few research papers on private equity investment tenure exist with more academic focus shifted on the problem of PE impact on companies. Nevertheless, empirical evidence supports the following:

- Private equity presence may not be reflected in a company's performance immediately, as corresponding organizational changes need "time to build".
- The size of the transaction influences the tenure of investments to a great extent, and the relationship may not be linear.
- Buyout deals with management participation have seen longer tenures, which implies that industry expertise also affects investment tenure.
- Private equity investments have proved to have a positive impact on industries' overall performance in countries where present, with comparatively minor impact during economic growth periods. This finding implies that private equity investment holding periods should be analyzed together with global economic environment.
- Private equity investments in listed companies have proved to have short- and long-term positive impact on stock returns. The influence lasts up to 3 years, thus in the context of private investments in public equity, a major focus should be on smaller time intervals.
- For the PIPE transactions a predominant group of issuers has been identified – high-tech companies with comparably small capitalization and complicated access to other sources of capital. Research and development expenditures were a major allocation of the proceeds from PIPE transactions, which needs special attention when evaluating intercompany risks and investment holding period.

Chapter 3. Empirical Study of the Relation Between Private Equity Investment Tenure and Performance of European Companies

3.1. Research Hypotheses

The empirical study is divided into two major stages: firstly, determinants of private investments in public equity will be analyzed. Secondly, the analysis of the relation between private equity investment tenure and performance of European companies will be conducted. In the following section of the paper, the hypotheses regarding the two stages are carried out. Hypotheses 1a – 1c relate to the first stage of the research concerning determinants of PIPE investments while hypotheses 2 and 3 relate to the study of the relation between investment tenure and performance of portfolio companies.

Risky companies are likely not to be able to raise external capital neither from debt capital markets nor through banking system: margin of safety for risky companies is heavily reduced. At the same time, risky companies are often unable to adhere to imposed debt covenants, especially maintenance covenants of banks that relate to running the business under certain ratios (for example, Debt / EBITDA). Thus, obtaining external financing from institutional investors might remain the only vital alternative (CFA Institute, 2013, pp. 650-653). Especially this is the case for small- and medium-sized enterprises, which have historically been the most attractive targets for PIPE transactions (Särve, 2013, p. 31): smaller-sized companies generally have less access to bank loans (The Economist Newspaper, 2009). Badunenko, Barasinska and Schäfer (2009) state that banks would not grant financing to companies that cross certain probability of default threshold (i.e. risk). The authors have also found an empirical evidence that private equity investors, in general, could be such type of investors. The research, however, is based on buyout transactions, which grant the control over a portfolio company. This also allows a private equity fund to shape the target company's strategy and operations and reduce both financial and overall business risks.

On the contrary, most of PIPE transactions involve minority investments (Fraser-Sampson, 2007, p. 49; Särve, 2013, p. 32). Thus, due to the limited control over PIPE portfolio firms, private equity funds are hypothesized to be risk-averse to a certain extent. This means that funds would seek to invest in such targets, which are subject to lower levels of risk, and avoiding investment targets, which are approaching, for instance, a bankruptcy state.

Hypothesis 1a. Companies' risk is negatively related to the likelihood of attracting a private equity investor.

In the same manner as risk, low profitability might constrain a firm's access to debt markets as credit analysts typically assess company's ability to service the debt by analyzing profitability ratios among others (CFA Institute, 2013, pp. 628-631). Would the company choose an alternative source financing its activities through equity markets (for instance, through an SPO), financial statistics with poor profitability ratios would hamper finding new investors for the issue, thus, would increase the discount needed to market the stock (CFA Institute, 2013, pp. 227-232). Särve (2013, p. 29) also emphasizes that PIPE as a category of distressed investing targets companies that both have often been making pre-mature public offerings and are experiencing poor financial performance. Unlike risk, company's performance in relation to its profitability is more likely be boosted with an infusion of external financing. Thus, it may be anticipated that companies with lower profitability levels are more likely to become targets for private equity investors.

Hypothesis 1b. Companies' profitability is negatively related to the likelihood of attracting a private equity investor.

According to Jensen (1986), slow growth firms tend to distribute their excess free cash flows to projects, which destroy company's value. By increasing the leverage of portfolio companies, private equity funds re-allocate such cash flows to debtholders. Kaplan and Strömberg (2009) define such actions as financial value creation for private equity funds in relation to buyout activities. Nevertheless, most of PIPE transactions usually involve an acquisition of minority shares (Fraser-Sampson, 2007, p. 49; Särve, 2013, p. 32) and due to the limited control over PIPE portfolio firms, private equity funds could be unable to increase the company's leverage. What is more, buyout transactions are often financed with debt in order to increase their return on invested capital (The Wall Street Journal, 2014). This is, however, not the case for PIPE transactions: Särve (2013, p. 47) has found that PIPE transactions are hardly financed by debt. In order to compensate for the lack of leverage from the fund's side, it may be anticipated that instead companies with higher leverage are more likely to become targets for private equity investors. This fact also would explain why firms seek private equity backing instead of raising capital on debt markets: higher debt burden comparatively limits access to such (CFA Institute, 2013, pp. 628-631).

Hypothesis 1c. Companies' financial leverage positively related to the likelihood of attracting a private equity investor.

By realizing different strategies of value creation – either financial, governance, or operational improvements, private equity funds increase the target company's value, thus, are able to sell the company at a gain (Kaplan and Strömberg, 2009). Badunenko, Baum and Schäfer (2010) have found an empirical evidence of increases in companies' performance over longer tenures of private equity investors in general. This study, however, focuses on particular PIPE transactions and particular private equity investors, as opposed to the presence of such in general. PIPE transactions tend to be related to minority shares in companies while PIPE investor's control over target companies is rather limited (Dai, 2011). Nevertheless, granting capital that is crucial for the survival and development of small and financially distressed business alone might provide opportunities for *growth*, which is reflected by analyzing the relation of tenure to the *growth* of cash flow. What is more, Gompers, Kaplan and Mukharlyamov (2015) have conducted a survey, which revealed that private equity funds often initially estimate their exit value based on discounted cash flow (DCF) based growing perpetuity. This approach is used in order to estimate the intrinsic value of an investment and to avoid future equity market uncertainties, associated with other multiple-based methods of valuation – comparable companies and transactions. Under DCF valuation, terminal (exit) value is most sensitive to changes in growth rates of cash flows (CFA Institute, 2015, p. 249-250). In this manner, it might be anticipated that private equity funds tend to choose targets with the potential of an increase in performance measures that affect intrinsic value of a company. This is also in line with the main goals of a private equity fund emphasized by current practitioners: to improve the performance of a target firm, achieve higher cash flows, and upgrade the target's valuation even further (Gatti et al., 2015). What is more, corresponding changes in the organization might require “time to build” effect, similar to the one described by Badunenko, Baum and Schäfer (2010), i.e. changes in a performance measure would gradually show up over time. Thus, a positive relation of private equity investment tenure to cash flow growth might be anticipated.

Hypothesis 2. Private equity investment tenure is positively related to the performance of target companies in terms of their cash flow growth.

As it has been mentioned above, PIPE targets are usually small and financially distressed enterprises (Särve, 2013, p. 29; Dai, 2011). Such enterprises might have little external financing alternatives – both from the debt markets and banking system (Badunenko, Barasinska and Schäfer, 2009; The Economist Newspaper, 2009). This category of companies faces such

difficulties because of their frequent inability to meet the imposed debt covenants. For instance, banks often require the business to meet maintenance covenants (such as Debt / EBITDA) for the whole term of the loan, otherwise, an early repayment of debt might be required (CFA Institute, 2013, pp. 650-653). Similar solvency measures are applied by rating agencies in order to determine the credit rating of a debt issue (Standard & Poor's Financial Services, 2013), thus, directly affect the pricing of a bond issue. By raising capital through PIPE transactions, companies might address the issue of inaccessible debt markets by internal restructuring to improve their solvency over the investment tenure of a private equity fund. Thus, a positive relation between the investment tenure and companies' solvency might be anticipated.

Hypothesis 3. Private equity investment tenure is positively related to the performance of target companies in terms of their solvency.

3.2. Research Methodology

In order to test the suggested hypotheses on empirical data, the following econometric models have been chosen:

$$Prob(PIPE_{entry}=1 | Risk, Profitability, Debt) = \frac{\exp(z)}{1 + \exp(z)}, \quad \text{where}$$

(1)

$$z = \beta_0 + \beta_1 Risk + \beta_2 Profitability + \beta_3 Debt$$

$$CF_{growth} = \beta_0 + \beta_1 Tenure + \beta_2 Risk + \beta_3 Profitability + \beta_4 Debt + u \quad (2)$$

$$NFD_{EBITDA} = \beta_0 + \beta_1 Tenure + \beta_2 Risk + \beta_3 Profitability + \beta_4 CF + u \quad (3)$$

3.2.1. Variables

In the following section, descriptions of the variables used in both models are given. All financial data for corresponding calculations, as well as ownership data, has been sourced from Thomson Reuters Eikon database. Market data – capitalization of a given company in a given year – is acquired from Thomson Reuters Datastream database. In relation to **model (1)**, the following variables have been used:

1. $PIPE_{entry}$: a dummy variable, which is equal to 1 if the company has been subject to PIPE investment in the following year, and equal to 0 otherwise. The fact that the

following year is used is an alternative approach to shifting financial-related data 1 year backward, as to capture which financial statements were available to the fund prior to investment.

2. *Risk* : the company's overall risk as measured by Altman's Z-Score. According to Damodaran (2016, pp. 66-67), using proxies for measuring company's risk based on ratios alone would result in a risk of missing information. Thus, the author suggests using Altman's Z-Score, which is based on multiple ratios. The variable is calculated in following way:

$$Risk = Altman's Z - score = 1.2A + 1.4B + 3.3C + 0.6D + 1.0E, \text{ where:}$$

Table 3

Altman's Z-Score components

Ratio	Comments
$A = \frac{Working\ Capital}{Total\ Assets}$	The ratio measures company's liquid assets portion of total assets.
$B = \frac{Retained\ Earnings}{Total\ Assets}$	Measures company's earning power and indirectly indicates firm's age, as higher shares of Retained Earnings in Total Assets are usually achieved for firms that have been present for a relatively longer period.
$C = \frac{EBIT}{Total\ Assets}$	Measures company's operating efficiency.
$D = \frac{Market\ Value\ of\ Equity}{Total\ Liabilities}$	The ratio indicates whether share price fluctuations are relatively risky as compared to company's balance sheet items.
$E = \frac{Revenue}{Total\ Assets}$	Represents company's asset turnover, indicating firm's efficiency in utilizing its assets.

3. *Profitability* : measures company's overall profitability, as measured by net profit margin. The net margin indicates what percentage of firm's revenues are turned into profits, and is calculated in the following way:

$$Profitability = Net\ Profit\ Margin = \frac{Net\ Income\ After\ Taxes}{Revenue}$$

4. *Debt* : is the variable measuring the company's financial leverage in the given year. Calculated by dividing company's total debt by total assets, as presented on the firm's balance sheet.

In relation to **model (2)**, the following variables have been used:

1. CF_{growth} : company's free cash flow growth rate in the given year, which represents changes in company's core performance. Calculated by dividing given year's free cash flow by previous year's free cash flow of the firm. Free cash flow is determined as:

$$FCF = EBIT(1 - T) + NCC - FCInv - WCIInv, \text{ where:}$$

- $EBIT$ – company's earnings before interest and taxes, as presented in the income statement.
- T – company's *effective* tax rate for the given year, which is calculated as:

$$T = \left(1 - \frac{\text{Pretax Income}}{\text{Net Income After Taxes}} \right)$$

- NCC – company's noncash charges for the period, equal to depreciation and amortization, as presented in the income statement.
- $FCInv$ – company's fixed capital investment in the given year, which is equal to the change in gross property, plant and equipment (PP&E):

$$FCInv_t = \text{Gross PP} \wedge E_t - \text{Gross PP} \wedge E_{t-1}$$

- $WCIInv$ – company's working capital investment during the period, which is equal to the change in noncash working capital, as compared to the previous period. It should also be noted that for working capital investment calculation, unreported inventories were assumed to be zero for companies working in information technology and financial services industries. Working capital investment is calculated in the following way:

$$WCIInv_t = \Delta_t \text{Accounts receivable} + \Delta_t \text{Inventories} - \Delta_t \text{Accounts payable}$$

If the company was not listed on a stock exchange in prior years, no free cash flow growth rate is calculated for the first year the stock is traded in order to only include data for companies of similar legal organizational form.

2. $Tenure$: the tenure of a PIPE investor. Calculated as a cumulative number of months, for which the private equity investor has been present in the firm's ownership structure, divided by 12. The data for this variable has been obtained from Thomson Reuters Eikon

database by monitoring ownership structure history of the selected companies for the tenure of such investors.

3. \ln : natural logarithm of the company's revenue in the given year. Choice of such proxy for firm size is motivated by the research conducted by Dang and Li (2015), who have concluded that such measure is more related to firms' products rather than financial markets like capitalization. Since the market is outside the scope of this research, revenue is the preferred measure. What is more, authors have proposed another alternative to measuring firm size – with total assets. Nevertheless, this option is not viable since the sample of the research includes many technology-intensive and service companies, which would certainly have comparatively lower levels of assets, thus making such size measure less representative.
4. The rest of variables (*Risk* , *Profitability* , *Debt*) are used with no alteration to model (1) methodology.

In relation to **model (3)**, the following variables have been used:

1. NFD_{EBITDA} : a measure of company's solvency, often used by rating agencies as one of two *core* payback ratios for assessing firm's credit rating (Standard & Poor's Financial Services, 2013; Moody's Investors Service, 2016). Another *core* ratio is funds from operations to debt (FFO / Debt), which is more complicated to calculate than the selected ratio: Standard & Poor's defines funds from operations as net income from continuing operations plus depreciation, where determining the continuing operations basis is rather complicated on a large scale. The selected measure of solvency is calculated by dividing net financial debt (NFD, interest bearing liabilities minus cash and cash equivalents) by earnings before interest, taxes, depreciation, and amortization (EBITDA):

$$NFD_{EBITDA} = \frac{\text{Interest Bearing Liabilities} - \text{Cash}}{EBITDA}$$

2. CF : is the measure of company's cash flow, calculated in the same manner as for CF_{growth} variable (described above), and normalized by company's total assets in order to prevent size effects.
3. The rest of variables (*Tenure* , \ln , *Risk* , *Profitability*) are used with no alteration to model (1) and model (2) methodology.

3.2.2. Sample Description

For the purposes of empirical analysis, companies, for which PIPE transactions took place were acquired from Thomson Eikon deals database. During the period from the year 2005

to 2014 (total of 10 years), 827 such transactions are identifiable in the database for European target countries. The following limitations have been applied:

- As the purpose of the analysis is to identify the relation between the private equity investment tenure and the company's performance, only initial PIPE investments were included in the sample, thus, transactions, where a private equity fund increases its share in a company, were omitted from the research. This results in the decrease of suitable transactions number to 229 in the given period.
- Transactions, for which target companies were located in Western Europe, Turkey, Cyprus, and several other countries, financial markets of which are comparably less stable and due to other legislation differences as compared to other European countries (S&P Dow Jones Indices, 2016), were omitted from further research. This results in a further decrease of suitable transactions number to 199.
- Even though the companies under study are public, due to data availability, especially for the share of a private equity fund in a given company, the number of transactions has been reduced to 99.
- Due to differences in the analysis techniques used for financial services industry and the rest of industries present in the initial sample, all financial institutions have been removed from the sample. For instance, neither cash flow growth nor net financial debt are adequate measures of changes in a financial company's performance. Thus, the number of transactions has slightly decreased to 91, out of which 79 are attributed to unique companies.

By applying the above-mentioned criteria for building the sample, a diverse range of companies has been obtained. For instance, targets for PIPE deals have occurred in a wide range of economic sectors (using The Global Industry Classification Standard, GICS). Targets for PIPE deals were most frequently operating either in Information Technology sector (25%) or Health Care (19%). This finding – the relative attractiveness of companies, which operate in technology-intensive sectors – is similar to such of Brown and Floros (2012), who have also found that PIPE transactions frequently have target companies that use the investment proceeds for strategic intangible investments (like increasing research & development expenses), as opposed to immediate operating needs, i.e. target companies that operate in technology-intensive industries. The following figure presents sectoral distribution of PIPE target companies, which match the sample forming criteria:

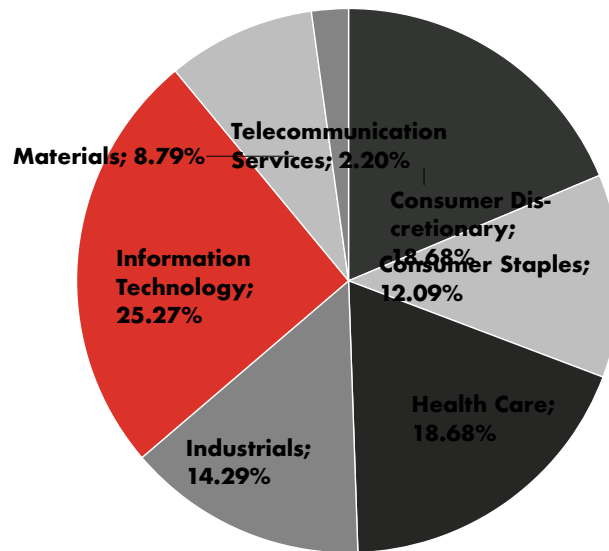


Figure 7. PIPE target companies' distribution by sectors

The diversity of target companies is also present from the country point of view, as can be seen in the following figure, on which the distribution (on transaction basis) of PIPE target companies by country of domicile is presented:

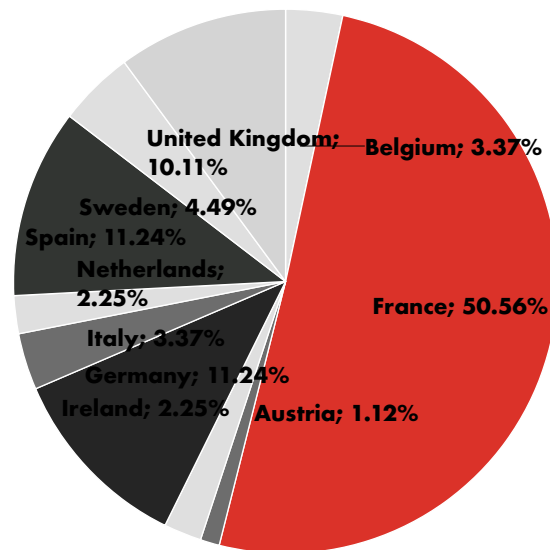


Figure 8. PIPE target companies' distribution by countries of domicile

Such overbalance for France is not only due to increased PIPE activity in the country. Only 29.1% of total initial PIPE investments took place for French targets. The corresponding portions of targets for Germany and the United Kingdom were 14.1% and 29.6% correspondingly. The latter, however, suffered the most from dropping observations due to data availability. This finding differs from such of Badunenko, Baum and Schäfer (2010), who have seen the greatest amount of companies with the presence of a private equity investor to be

domiciled in Ireland (14.9%) and rather a low amount of such domiciled in France (6.0%). Yet, only 2.5% of PIPE targets were domiciled in Ireland. This may be attributed both to the transaction specifics and differences in its relative prevalence in various countries and shift in the observation period to more recent years (from 2002 – 2007 to 2005 – 2014).

Särve (2013, p. 31) also notes that targets for PIPE investments are usually small- and medium-sized enterprises. This is also true for the selected companies: the vast majority (75%) of such have annual revenue less than 100 million EUR while only 16% of companies were comparatively large-sized with annual revenue more than 500 million EUR. The distribution of PIPE target companies by their annual revenue is presented in the figure below:

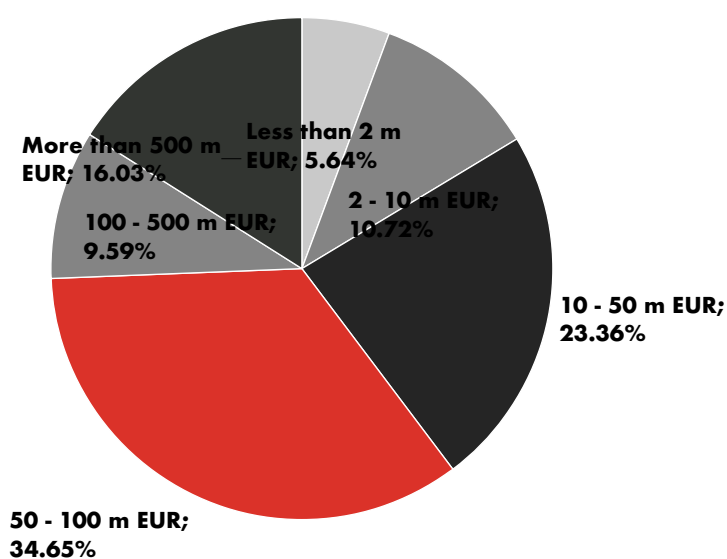


Figure 9. PIPE target companies' distribution by annual revenue

In order to mark out private equity funds' presence in a company's ownership structure relation to the performance of such company, for each transaction in the sample, a comparable company (peer) has been added as identified by Thomson Eikon database. Thomson Reuters proprietary algorithm for choosing peers, as described in the database, includes taking into consideration the following information:

- Competitor lists provided in filings;
- Analyst cross coverage;
- Business classification;
- Revenue proximity.

Such comparable companies have been manually chosen in such a way that ultimate peers would have been listed on a stock exchange during the whole observation period from 2005 to 2014 and were not a subject to private equity investments during any of the given years.

A full list of selected companies, their peers and respective countries of domicile, sectors and industries are presented in *appendix 1*. The peer selection for the sample has resulted in the following distributions of matches and mismatches between PIPE target company and its comparable company's industry, sector, or country of domicile:

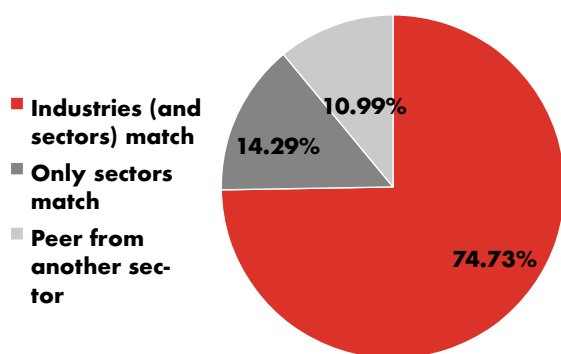


Figure 10. Industry and / or sector match between the target company and its peer

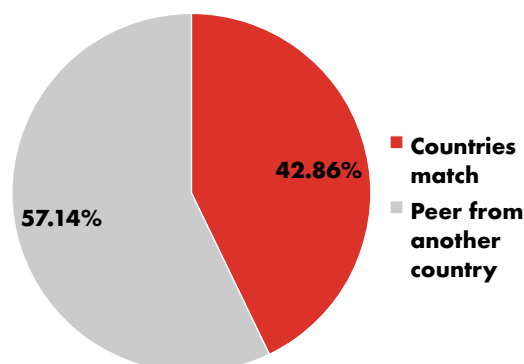


Figure 11. Country match between the target company and its peer

As it can be seen from the figures above, a number of mismatches have occurred. In respect of industry matches, Thomson Reuters peer selection algorithm has been able to offer closely related comparable companies. For 14% of transactions target company's industry did not match comparable company's industry, although the fit is quite decent (for instance, Transportation Infrastructure – Construction; Electronic Equipment, Instruments & Components – Semiconductors & Semiconductor Equipment; etc.). In 11% of the cases, sectors were not matching between the target and comparable company. Such issues were controlled on an individual basis, and the peer's fit was ensured to be adequate (for example, this mismatch was the case for companies involved in Building Products industry in Industrials sector and Construction Materials in Materials sector). In 58% of the cases, Thomson Reuters peer selection algorithm was unable to offer a comparable company from the same country (at least, such, which wasn't a subject for private equity investments during the period from 2005 to 2014). Especially this was the case for a number of French target companies. Nevertheless, the issue was also controlled on an individual basis, where in most cases the peer was selected to be geographically domiciled in a country, close to the target company's domicile (for instance, United Kingdom and France, France and Belgium or Netherlands), thus the suggested by Thomson Reuters database target markets for products and services of such companies were quite similar. Thus, the resulting pairing between PIPE target companies and their peers is assumed to be suitable for further analysis.

In case the company, which was a target for a PIPE transaction, was listed or delisted (most probably, because of a buyout) during the period, data for its comparable company has also been cut. For instance:

- A company was listed in 2007 and has been subject to PIPE investment in 2008. Available data for both the company and its comparable company are taken from 2007 to 2014, regardless of the private equity fund exit.
- A company has been delisted in 2012 and has been subject to PIPE investment in 2007 with private equity fund exit in 2010. Available data for both the company and its comparable company are taken from 2005 to 2011 as financial statements are no longer available to public for the year 2012.
- For the company listed prior to 2005 and not delisted until 2014, available data for both the company and its comparable company are taken for the whole period of observation – from 2005 to 2014.

This approach prevents the sample from exhibiting survivorship bias by including transactions for companies, which are no longer traded. Thus, 79 companies with 91 transactions and 91 unique comparables for each transaction were used in the sample with a total of 1,722 company-year observations for the period. Such size of the sample is more than sufficient for the suggested models.

3.2.3. Descriptive Statistics

The following section of the paper will be structured in the same manner as research hypotheses statement: firstly, it will address the sample regarding the research of private equity investment determinants. Secondly, the section will focus on the sample regarding the research of private equity investment tenure relation to the performance of European companies. Note that all the data in the following section is analyzed to exclude outliers by applying the method of Hadi. In the following table descriptive statistics for the variables used in **model (1)** are presented:

Table 4

Descriptive statistics of the supplementary sample: investment determinants

Variable	Observations	Mean	Standard deviation	Minimum value	Maximum value
<i>PIPE_{entry}</i>	182	0.500	–	0	1
<i>Risk</i>	163	2.550	1.856	-2.263	8.227
<i>Profitability</i>	148	0.043	0.087	-0.235	0.334
<i>Debt</i>	179	0.186	0.165	0	0.641

In order to analyze the determinants of private equity investments, the initial sample has been modified in order to include information on companies and their peers only for those years, during which those companies have been subjects to PIPE investments. In other words, in case the company has been listed prior to the year 2005 and was not delisted until 2014, only 1 out of 10 years is included as an observation in the sample. For the same year, this company has raised capital through a PIPE transaction, data for the company's peer is included in order to compare the interfirm determinants of the investment. Thus, 50% of observations relate to companies that have been subjects to PIPE investments, and 50% relate to their peers. It should also be mentioned that the sample does not capture all exits from observed PIPE investments. The following figure presents PIPE entries and exits distribution across years:

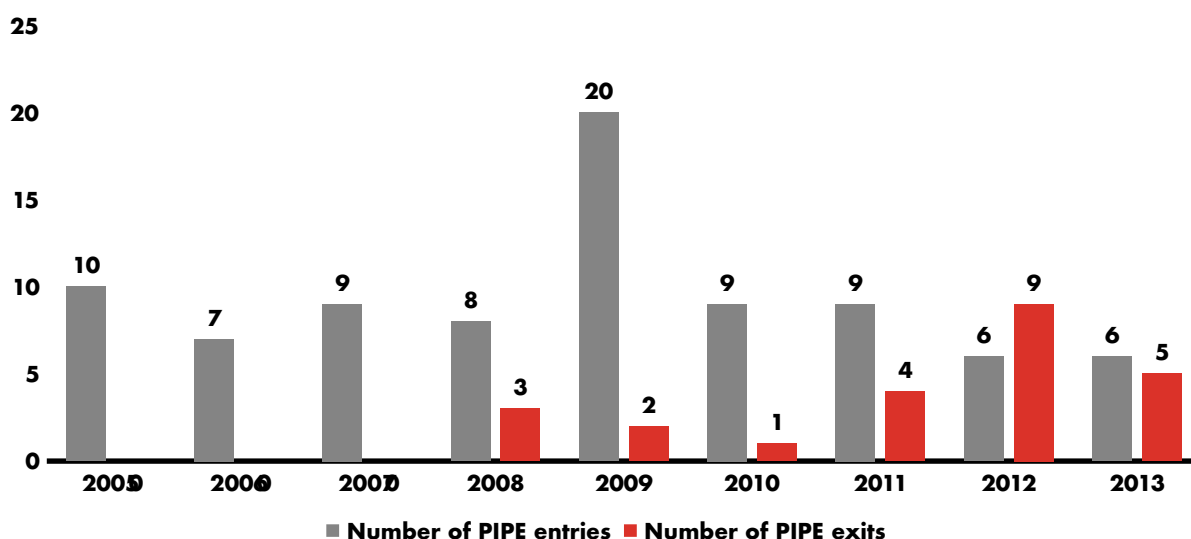


Figure 12. Dynamics of PIPE investment entries and exits

The variability in the number of observations for different variables is due to the fact that Thomson databases in some cases did not provide the financial data necessary for the calculation of some variables. Only observations with all data available may be used in the logistic regression analysis. Heavily negative minimum values of both risk and profitability measures support the findings of Särve (2013, p. 29) and Dai (2011), who have concluded that targets of PIPE investments are often financially distressed enterprises: such companies with the Z-Score below 1.1 account for 18.4% of total observations, while 19.6% of companies were unprofitable. Many of the companies were both distressed and unprofitable simultaneously. At the same time, less risky companies with Z-Scores in the “safe zone” above 2.4 account for 47.2% of total observations. At the same time, only 22.3% of observations were related companies experiencing profitability either more than 10% or below -10%, which, most of the times, were technology-intensive companies (Health Care and Information Technology). As expected, the sample also

includes companies with high levels of leverage, with debt reaching up to 64.1% in total assets. Nevertheless, on average, the companies in the sample have a capital structure primarily financed through equity. Mean profitability and leverage differ among the companies that were subjects to PIPE investments and their peers, as it can be seen from the figures below:

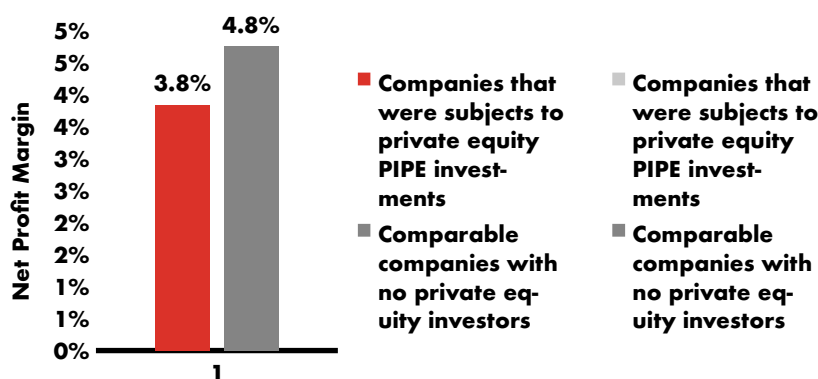


Figure 13. Differences in mean profitability between two groups of companies

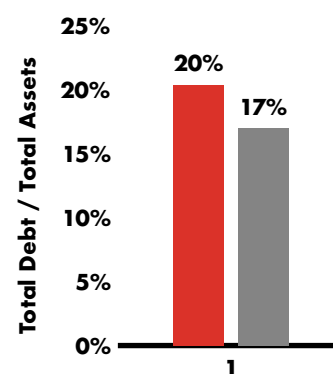


Figure 14. Differences in mean leverage between two groups of companies

However, the conducted mean-comparison tests have shown that the observed visual differences in both profitability (p-value of 0.705) and leverage (p-value of 0.297) do not have statistical confirmation. Most likely, such differences are random.

A major concern for the analysis would be the presence of a strong linear relationship between the chosen variables. Particularly, from the financial point of view, a strong relationship between companies' risk and debt levels might exist.

Table 5

Correlation matrix of the sample: investment determinants

	<i>Risk</i>	<i>Profitability</i>	<i>Debt</i>
<i>Risk</i>	1	–	–
<i>Profitability</i>	0.407***	1	–
<i>Debt</i>	-0.470***	-0.164**	1

Note: symbols *, **, and *** represent significance at $\alpha = 10$, $\alpha = 5$, and $\alpha = 1$ respectively

However, as it can be seen from the table above, the relationship is moderate for the two variables and is rather weak between risk and profitability. Thus, the data can be proceeded with for further steps of econometric analysis.

The following part of the section is appurtenant to the main sample regarding the research of private equity investment tenure relation to the performance of European companies. In the following table, descriptive statistics for variables used in the **model (2)** and **model (3)** are

presented. It should be mentioned that variability in the number of observations for different variables is due to the fact that Thomson databases in some cases did not provide the financial data necessary for the calculation of some variables. Unlike the logistic regression analysis, all observations, even those including missing data, may be used within panel data regression analysis, which refers to an “unbalanced” panel.

Table 6

Descriptive statistics of the main sample: investment tenure

Variable	Observations	Mean	Standard deviation	Minimum value	Maximum value
CF_{growth}	1,454	-0.076	0.473	-2.018	1.771
NFD_{EBITDA}	1,093 ¹	2.811	2.741	0	15.519
<i>Tenure</i>	1,722	0.702	1.548	0	8.917
$\ddot{\iota}$	1,699	18.572	2.615	8.261	25.203
<i>Risk</i>	1,585	2.559	2.327	-6.938	11.929
<i>Profitability</i>	1,486	0.032	0.115	-0.442	0.502
<i>Debt</i>	1,687	0.199	0.169	0	0.895
<i>CF</i>	1,379	0.031	0.158	-0.614	0.682

Proceeding with the discussion of PIPE investment characteristics, it should be mentioned that the majority of transactions involved the purchase of a minority stake, which is also presented in the figure below. This result is conforming to findings of Fraser-Sampson (2007, p. 49), Särve (2013, p. 32), Dai (2011) and Brown and Floros (2012). The mean tenure of approximately 8 months (0.7 years) as presented in the table above has little practical implication as the data is presented for the whole sample. Instead, examining tenure for deals that have already seen investor exits would be more appropriate. A figure corresponding to the distribution of committed exits by cumulative investment tenure is presented below for 32 exits observable in the sample:

¹Comparatively, a low number of NFD / EBITDA observations is related to the limitations of the ratio. *Decreases* in the ratio caused by either net debt reductions or EBITDA increases are both positive signs of *increasing* solvency. In case company’s profit is negative, however, the ratio becomes meaningless. 31.3% of total observations were related to companies with negative EBITDA. Thus, such observations were omitted from related analysis.

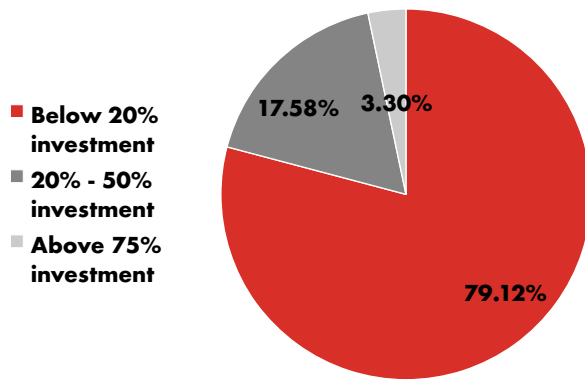


Figure 15. Distribution of company shares purchased within PIPE transactions

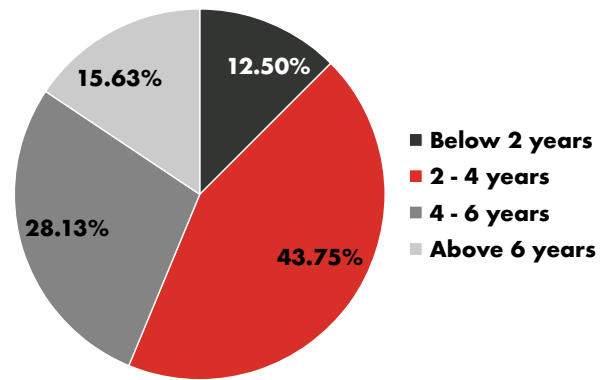


Figure 16. Distribution of committed exits by investment tenure

As we can see, 84% of PIPE investments were exited with cumulative tenure below 6 years, which corresponds to general findings of Badunenko, Baum and Schäfer (2010) and general practice regarding the term of a private equity fund (CFA Institute, 2015, p. 152). For the part of the sample, which corresponds *only* to the companies that have been subjects to private equity PIPE investments, an almost linear growth of mean investment tenure may be observed, as can be seen in the figure below. This peculiarity corresponds to the accumulation of observations with longer tenures over time, but has no side effects within regression analysis, as variability of investments with different tenures for each year is still high.

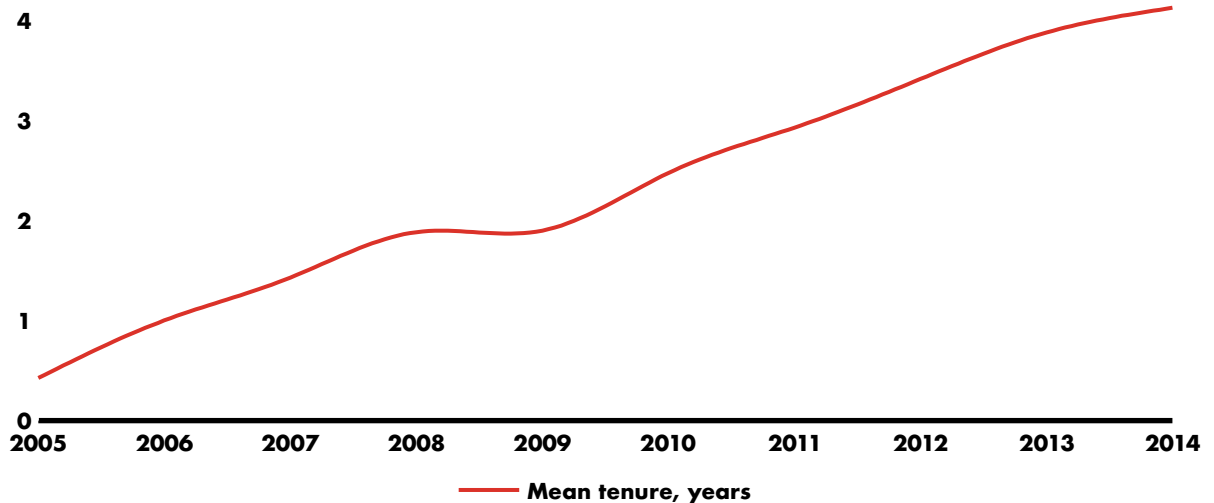


Figure 17. Dynamics of the mean tenure for companies with the presence of a PIPE investor

At the same time, only 19.4% of companies were experiencing cash flow growth either more than 50% or below -50% (which is, still, volatile), 32.4% with profitability more than 10% or below -10%, and 15.4% with normalized cash flow more than 20% or below -20%, which,

most of the times, were technology-intensive companies (Health Care and Information Technology).

From this point analysis of descriptive statistics will be conducted by separating observations that relate to companies, which have been subjects to private equity investments, and observations that relate to comparable companies with no private equity investors for the whole period of observation. In the following two tables separate descriptive statistics for two groups of companies are presented:

Table 7

Descriptive statistics for companies that were subjects to PIPE investments

Variable	Observations	Mean	Standard deviation	Minimum value	Maximum value
CF_{growth}	720	-0.088	0.498	-1.970	1.771
NFD_{EBITDA}	592	3.107	2.902	.007	15.519
Tenure	890	1.358	1.935	0	8.917
$\frac{CF}{Assets}$	872	18.347	2.690	8.261	25.203
Risk	789	2.593	2.393	-6.938	11.929
Profitability	726	0.020	0.116	-0.442	0.459
Debt	867	0.218	0.181	0	0.842
CF	691	0.010	0.167	-0.614	0.682

Table 8

Descriptive statistics for comparable companies with no private equity investors

Variable	Observations	Mean	Standard deviation	Minimum value	Maximum value
CF_{growth}	734	-0.064	0.447	-2.018	1.491
NFD_{EBITDA}	501	2.462	2.496	0	15.128
Tenure	832	0	0	0	0
$\frac{CF}{Assets}$	827	18.810	2.513	8.485	24.749
Risk	796	2.527	2.262	-6.287	11.342
Profitability	760	0.044	0.114	-0.433	0.502
Debt	820	0.179	0.154	0	0.895
CF	688	0.052	0.146	-0.603	0.621

As it has been mentioned above, targets for PIPE transactions might often be described as small and distressed enterprises (Särve, 2013, p. 29; Dai, 2011). Thus, highly negative values for cash flow growth rate, cash flow normalized by total assets, and profitability, as well as high leverage, make sense. General presence of such values for both groups of companies corresponds to Thomson Reuters proprietary algorithm for choosing peers, which seem to also be financially distressed in many cases. From the two tables above certain differences between two groups of

companies can be seen. For instance, the following figures below present differences in cash flow related variables.

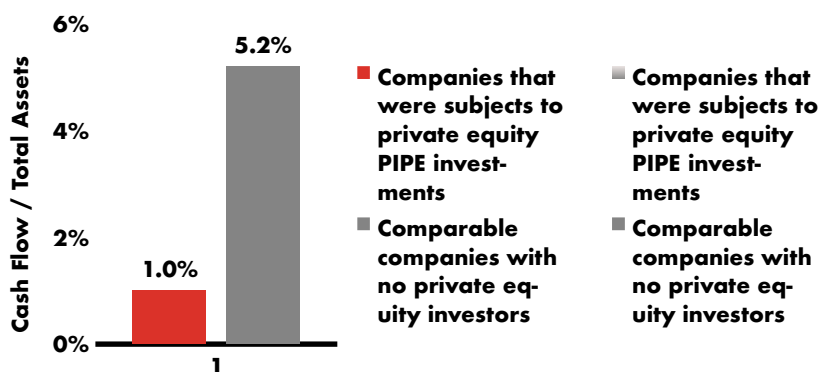


Figure 18. Differences in mean cash flow ratio between two groups of companies

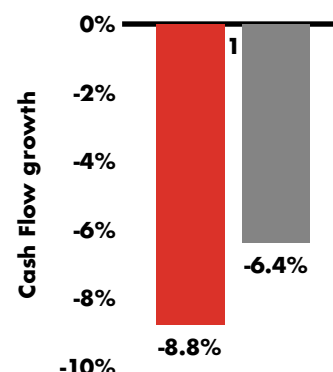


Figure 19. Differences in mean cash flow growth between two groups of companies

The visual differences in the cash flow ratio have been tested with the mean-comparison test (p-value of 0.000). At the same time, similar test for cash flow growth (p-value of 0.335) has shown that the observed visual differences in the means do not have statistical confirmation. Most likely, such differences are random. As we can see, cash flow to total assets ratio (often referred to as free cash return on assets (ROA)) is dramatically lower for companies that have been private equity backed for a certain term during the whole period of observation. This may be thought of as that companies which were targets for PIPE investments were more financially constrained on average. This difference is similar to findings of Brown and Floros (2012), though they have discovered even a negative free cash ROA for PIPE targets. Moreover, both groups of companies had relatively low earning power as measured by free cash ROA. This is in line with high maximum values for both of the variables: pre-mature companies that became listed have experienced high volatility in their earnings. For instance, many observations relate to companies that have been listed after the year 2005 (20 companies in total). Thus, infusion of equity capital could have probably resulted in a rapid growth of such companies, which has eventually changed for a steady decline.

From the perspective of solvency, certain differences between two groups of companies may also be observed. The following figure also presents dynamics of such differences:

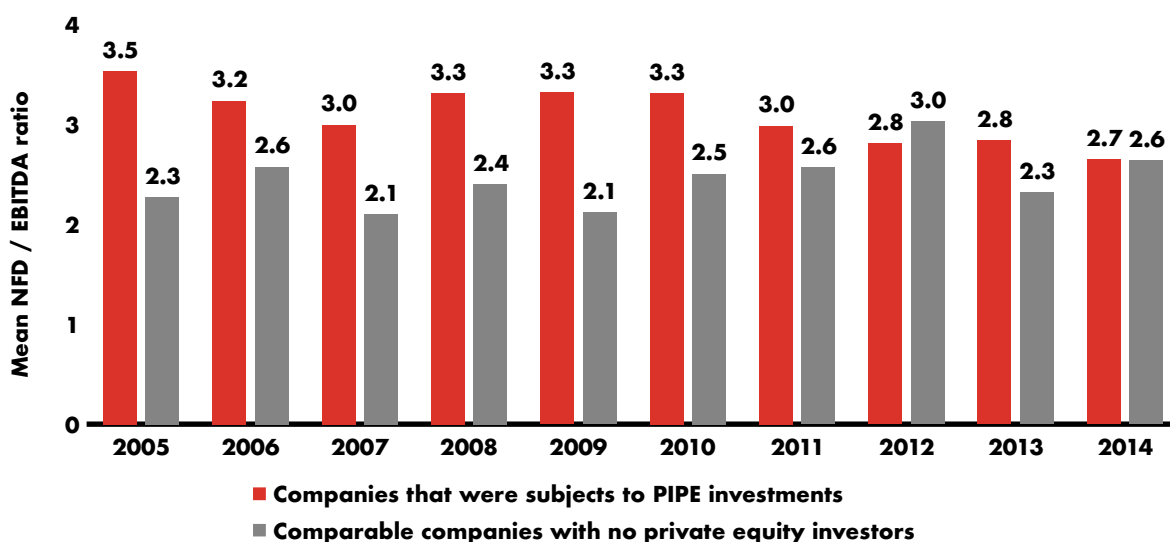


Figure 20. Dynamics of the mean NFD / EBITDA ratio for two groups of companies

The visual differences in NFD / EBITDA have also been tested with the mean-comparison test for all years simultaneously (p-value of 0.000). As it can be seen, the dependent variable of the model (3), on average, has been higher for the companies that were targets for PIPE investments. Since net financial debt is in the ratio's numerator, this implies that such companies were less financially stable than their comparable companies. Indirectly this is related to the background for hypothesis 3: at least, on average, companies with the presence of a PIPE investor had comparatively more potential to improve their solvency over the tenure of a private equity investor, thus, increasing access to debt capital markets. One unexpected finding of the NFD / EBITDA dynamics concerns the lack of relative decrease in both groups of companies' solvency during the crisis period, as compared to previous periods. This effect might be appurtenant to the lack of reduction in companies' interest bearing liabilities with the lack of increase in cash reserves to cover possible shortages of liquidity, rather than increases in mean operating profit during the crisis. Thus, such companies did not take additional measures to reduce their financial risks during the crisis. Overall, mean NFD / EBITDA ratios are below values (around 6.4), which usually correspond to the default state of a company (Moody's Investors Service, 2016).

The mean size of the companies, as measured by revenue, did not have major differences between the groups. The same applies to their risks measured by Altman's Z-Score. However, slight distinctions in their mean profitability and leverage has been found:

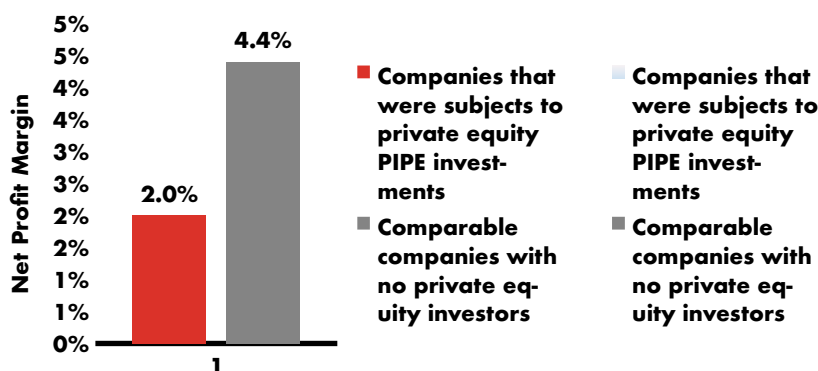


Figure 21. Differences in mean profitability between two groups of companies

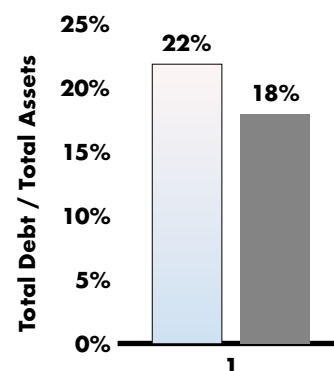


Figure 22. Differences in mean leverage between two groups of companies

The visual differences have been tested with the mean-comparison test for profitability (p-value of 0.000) and leverage (p-value of 0.000). As it can be seen, companies that were targets of PIPE investments, on average, have dramatically lower profitability and slightly higher leverage ratios. This finding is similar to the one for the sample containing only the years of PIPE investments, and most likely represents greater financial stability for comparable companies in terms of their earning power, as well as comparatively less reliance on debt financing.

The concern regarding the presence of a strong linear relationship between the chosen variables has also been addressed. As it can be seen from the table below, only a moderate relationship exists between Debt and NFD_{EBITDA} , which are not used simultaneously:

Table 9

Correlation matrix of the sample: investment tenure

Variable	CF_{growth}	NFD_{EBITDA}	Tenure	$\hat{\rho}$	Risk	Profitabili	Debt	CF
CF_{growth}	1	–	–	–	–	–	–	–
NFD_{EBITDA}	-0.075**	1	–	–	–	–	–	–
Tenure	0.042	-0.033	1	–	–	–	–	–
$\hat{\rho}$	0.144***	0.031	0.000	1	–	–	–	–
Risk	0.165***	-0.136***	-0.015	0.012	1	–	–	–
Profitabili	0.226***	-0.221***	-0.050*	0.147	0.335***	1	–	–
Debt	-0.045*	0.415***	0.072**	0.352** *	-0.390***	-0.118***	1	–
CF	0.222***	-0.056*	-0.028	0.326** *	0.078***	0.233***	0.090** *	1

Note: symbols *, **, and *** represent significance at $\alpha = 10$, $\alpha = 5$, and $\alpha = 1$ respectively

3.3. Empirical Results and Discussion

The following section of the paper will follow the same logic as research hypotheses statement and descriptive statistics sections: firstly, the results regarding the supplementary research of private equity investment determinants will be addressed. Secondly, the focus will shift towards the results regarding the main research of private equity investment tenure relation to the performance of European companies.

3.3.1. Determinants of Private Equity Investment

The main aim of the supplementary study is to determine, whether a company's risk, profitability, and debt affect private equity funds' decision to choose such company as a target for their investments. In order to test corresponding hypotheses 1a – 1c, a basic binary choice model has been chosen. The result of a logistic regression, marginal effects of a variable, would show how values of a given variable affect the probability that the dependent variable would equal to "1". In this case, "1" is attributed to observations, where a private equity fund has invested in the company through a PIPE transaction, while "0" is attributed to the rest.

Financial data for the logistic regression is lagged backward for 1 year in order to capture only such financial information, which was available on the investment date. In other words, for PIPE transactions that took place in the year 2005, financial results for the year 2004 are considered, which prevents the forward running problem in econometric analysis. In the following table descriptive statistics for variables used in **model (1)** are presented:

Table 10

Regression results: investment determinants

Variable	Model (1) coefficients	Model (1) marginal effects
	<i>PIPE_{investment}</i>	
<i>Risk</i>	0.261*	0.065*
<i>Profitability</i>	-1.075	-0.266
<i>Debt</i>	4.683***	1.159***
<i>Constant</i>	-1.834	–
<i>Pseudo R²</i>	0.063	
<i>p - value</i>	0.006	

Note: symbols *, **, and *** represent significance at $\alpha = 10$, $\alpha = 5$, and $\alpha = 1$ respectively

The suggested binary choice model is significant even at $\alpha = 1$, thus, we can proceed with making further conclusions. The model has classified 58.9% of observations correctly, i.e. the fact of a private equity entry or non-entry was estimated correctly for 58.9% of observations. Even though such results are barely usable for making forecasts of a private equity entry, interpretation of results and making conclusions on the suggested hypotheses is still possible.

Interpretation of the coefficients acquired from a logistic regression does not bear any economic sense and the estimates are presented for informational purposes only. Instead, marginal effects of such coefficients should be analyzed:

- An additional point in Altman's Z-Score, on average, increased the probability of a private equity investment by 6.5% (*ceteris paribus*). Since the measure of risk is complex and involves the weighing of various ratios, little further conclusions can be made.
- The estimated coefficient for profitability variable is not statistically significant even at $\alpha=10$, thus, no interpretation is possible.
- An additional percent of the financial leverage (as measured by total debt to total assets ratio), on average, increased the probability of a private equity investment by 1.2% (*ceteris paribus*).

In relation to the suggested hypotheses 1a – 1c, the following conclusions can be made: the initial **hypothesis 1a** of a negative relation between companies' risk and the likelihood of attracting a PIPE investor is accepted. The estimated coefficient is statistically significant while the marginal effects experience a positive sign. The result may seem misleading as the estimated coefficient is positive, however, Altman's Z-Score interpretation is inverse: higher values correspond to lower levels of risk (Altman, 2000). As it has been discussed previously, risky companies might face difficulties with raising external capital either from debt capital markets or through the banking system. The question of the survival of such companies, especially in the case of small and medium-sized businesses, remains open, as their margin of safety is heavily reduced and often they are unable to follow the debt contract terms, particularly, its covenants. Badunenko, Barasinska and Schäfer (2009) believe that banks would not take part in financing companies that are above a certain threshold for the probability of default. What is more, smaller-sized enterprises, which have historically been the most attractive targets for PIPE transactions (Särve, 2013, p. 31), in general, have less capability of borrowing from banks (The Economist Newspaper, 2009). Thus, the only alternative to raising capital from institutional investors might remain (CFA Institute, 2013, pp. 650-653). Badunenko, Barasinska and Schäfer (2009) that private equity investors, in general, could serve as such type of investors and back the businesses ran at higher risks. The research, however, is concentrated around buyout transactions, which grant the control over portfolio companies, thus, a potential to influence target company's business strategy exists, including minimizing operational and financial risks over the term of the investment.

Nevertheless, most of PIPE transactions involve minority investments (Fraser-Sampson, 2007, p. 49; Särve, 2013, p. 32). Thus, due to the limited control over PIPE portfolio firms,

private equity funds were hypothesized to be risk-averse to a certain extent, thus, such funds would seek targets, which operate at lower levels of risk, and avoid investing in targets, which are approaching a bankruptcy state. By discovering the negative relation between the companies' risk and the likelihood of attracting a PIPE investor and failing to reject the corresponding hypothesis, a conclusion can be made: private equity funds, indeed, select portfolio companies, which are less risky as compared to their peers with similar businesses in identical industries. By infusing external capital into such firms, which lack opportunities to finance elsewhere, private equity funds, without taking excessive risks, might intend to recover the businesses from the distressed state, which would be the subject for further analysis. In practice, the finding would imply that private equity funds with PIPE investments do not tend to serve as investors of last resort for those enterprises, which have seen severe decreases in their financial stability. An extreme case for lack of financing sources for higher-risk companies would be either going bankrupt or becoming a target of a buyout.

In respect of the **hypothesis 1b** regarding the negative relation between companies' profitability and the likelihood of attracting a PIPE investor, no conclusions can be made. Even though the discovered marginal effect has a negative sign, the coefficient estimate is not statistically significant.

The initial research **hypothesis 1c** regarding positive relation between the companies' financial leverage and the likelihood of attracting a PIPE investor is accepted. The estimated coefficient is statistically significant while the marginal effects experience a positive sign. Kaplan and Strömberg (2009) have previously defined such actions as financial value creation for private equity funds in relation to buyout activities. By increasing the debt of portfolio companies, private equity funds re-allocate excessive cash flows, which are otherwise allocated to projects destroying company's value (Jensen, 1986). Instead, firms are obliged to repay debt, which disciplines the management in terms of their internal investment decisions. Badunenko, Barasinska and Schäfer (2009) have also found that higher equity levels in firms' capital structures (i.e. lower leverage) increase the likelihood of a buyout.

As it has already been mentioned above, PIPE transactions involve an acquisition of minority shares (Fraser-Sampson, 2007, p. 49; Särve, 2013, p. 32), thus, do not grant a similar extent of control over portfolio companies, as compared to buyouts. In this manner, private equity funds could seek such PIPE targets, which already have higher financial leverage. By experiencing comparatively limited access to external debt financing because of higher current debt burden (CFA Institute, 2013, pp. 628-631), such firms would also be more willing to raise capital through PIPEs. By obtaining a positive relation between the financial leverage and the likelihood of a PIPE investment, it has been found that more leveraged companies are, indeed,

more likely to become targets of such investments. This is also identical to findings of Brown and Floros (2012): the authors describe a typical PIPE target as a more leveraged company, as compared to those, which raised capital through seasoned equity offerings (SEOs) or capital increases. In practice, this finding would imply that companies that have already proved the capability of maintaining higher financial leverage are preferred by private equity funds as the targets for their PIPE investments. Considering that the mean portion of debt financing is rather low for the group of companies backed by private equity funds (20% of total assets), we can conclude that track record of repaying comparatively higher debt plays a certain role during the consideration of investment opportunities. In this manner, hypothesis 3 on the relation between private equity investment tenure and solvency performance of target companies would extend this finding by analyzing, whether actual improvements in companies' solvency occurs over the investment period. If it truly does, a conclusion could be made that private equity funds seek firms with a decent track record of debt repayment with the further potential to increase their solvency and, consequently, access to a broader market of debt capital.

3.3.2. Investment Tenure Relation to the Performance of Target Companies

The following part is devoted to the results regarding the main research of private equity investment tenure relation to the performance of European companies. In order to test the suggested hypotheses 2 and 3, an initial choice of model has been made. The pooled regression, using data for both model (2) and model (3) across all companies and all years without identifying such, has shown that overall choice of variables is adequate. The following tests have been conducted to determine which model specifications are adequate:

- Breusch and Pagan Lagrangian multiplier test for random effects to determine, whether the pooled regression or random effects regression is adequate (p-values of 0.440 and 0.000 for models (2) and (3) correspondingly).
- Hausman test to determine, whether fixed or random effects model is adequate (p-values of 0.000 and 0.000 correspondingly).
- Wald test to determine, whether pooled regression or fixed effects regression is adequate (p-values of 0.000 and 0.000 correspondingly).

For both models fixed effects regression is adequate. Thus, further analysis will be conducted using fixed effects specification. The regression results for **model (2)** and **model (3)** are presented in the following table:

Regression results: investment tenure

Variable	Model (2)	Model (3)
	CF_{growth}	NFD_{EBITDA}
<i>Tenure</i>	0.024**	-0.106*
$\delta\delta$	0.102**	-0.227
<i>Risk</i>	0.063***	-0.246**
<i>Profitability</i>	0.868***	-5.648***
<i>Debt</i>	-0.300	–
<i>CF</i>	–	-0.859
<i>Constant</i>	-2.171***	8.187
R^2	0.049	0.058
<i>p - value</i>	0.000	0.000

Note: symbols *, **, and *** represent significance at $\alpha = 10$, $\alpha = 5$, and $\alpha = 1$ respectively

Both models were significant even at $\alpha = 1$. Interpretation of the obtained coefficients is as follows:

- An additional year of PIPE investor's tenure increased the cash flow growth, on average, by 2.4% (*ceteris paribus*).
- An additional year of PIPE investor's tenure reduced the NFD / EBITDA ratio, on average, by 0.106 (*ceteris paribus*).

Before focusing on analyzing the implications of the results, an additional research has been conducted in order to determine *a kind of* marginal effects for different tenures. This would allow to expand the managerial implications of the obtained results. Within the modified models, the *Tenure* variable has been substituted by a set of dummy variables, which represent different intervals of investment tenure: zero (omitted), below 2 years, 2 to 4 years, 4 to 6 years, and above 6 years. Division by broader intervals of 2 years or more is conducted to ensure sufficient observations are present for each of the intervals. The regression results for the modified **models (2) and (3)** are presented in the following table¹:

Table 12

Regression results: investment tenure marginal effects

Variable	Model (2)	Model (3)
	CF_{growth}	NFD_{EBITDA}
<i>Tenure : below 2 years</i>	0.109**	-0.507*
<i>Tenure : 2 – 4 years</i>	0.128***	-0.289

¹All specification tests have been also conducted upon the substitution of *Tenure* variable with a set of dummy variables. Tests had the following p-values for modified model (2) and (3) correspondingly: Breusch and Pagan test – 0.4559 and 0.000; Hausman test – 0.000 and 0.000; Wald test – 0.000 and 0.000. Thus, in both cases, fixed effects models remain adequate.

<i>Tenure: 4–6 years</i>	0.175***	-0.777**
<i>Tenure: above 6 years</i>	0.116	-0.588
<i>∩∩</i>	0.101**	-0.227
<i>Risk</i>	0.064***	-0.248**
<i>Profitability</i>	0.861***	-5.592***
<i>Debt</i>	-0.297	–
<i>CF</i>	–	-0.831
<i>Constant</i>	-2.160***	8.245
<i>R²</i>	0.052	0.057
<i>p - value</i>	0.000	0.000

Note: symbols *, **, and *** represent significance at $\alpha = 10$, $\alpha = 5$, and $\alpha = 1$ respectively

Again, both models are significant even at $\alpha = 1$, thus, we can proceed with making further conclusions. As it can be seen from the table above, there is statistically significant relation between investment tenure and cash flow growth rates for all tenure intervals below 6 years. In the same manner, tenure intervals from 2 to 4 years and above 6 years have also statistically significant relation to the companies' solvency as measured by NFD / EBITDA ratio. Since the rest of tenure variables are insignificant and are dummy, we can make a set of conclusions:

- There is no difference in cash flow growth rates for companies with private equity investment tenure above 6 years and other companies, including those with no private equity investors at all (*ceteris paribus*).
- There is no difference in NFD / EBITDA ratios for companies with private equity investment tenure below 2 years and above 6 years and other companies, including those with no private equity investors at all (*ceteris paribus*).

The statistically significant coefficients tend to increase towards longer tenures for both models. These findings are especially important to form managerial implications of the paper, which are provided in the discussion part below.

As Kaplan and Strömberg (2009) have previously defined, private equity funds increase the target company's value by realizing different strategies of value creation. Badunenko, Baum and Schäfer (2010) have found an empirical evidence of increases in companies' performance over longer tenures of private equity investors in general. The authors have identified that for the tenure of 6 years, the presence of private equity investors in a company's shareholders structure was positively related to such company's performance. However, lower tenures had a negative relation to the performance, which has been addressed as the time needed for internal restructuring. Nevertheless, the analysis had a number of limitations regarding: lack of identification of particular private equity fund's tenure; rather short observation period as the

sample is constructed for 6 years. Similar positive relation over the course of PIPE tenure was expected and achieved, though was observed during earlier tenures. Moreover, the research extends both the observation period and identifies particular transactions for the purposes of the analysis.

The suggested **hypothesis 2** regarding the positive relation of private equity investment tenure to the performance of target companies in terms of their cash flow growth is accepted. The estimated coefficient is both statistically significant and positive. By granting capital that is crucial for the development of small and financially distressed businesses provides opportunities for growth, which is reflected by the positive relation of tenure to the growth of cash flow. This result is similar to the main goals of a private equity fund emphasized by current practitioners: to improve the performance of a target firm, achieve higher cash flows, and upgrade the target's valuation even further (Gatti et al., 2015). As Gompers, Kaplan and Mukharlyamov (2015) have identified in their survey, private equity funds often rely on intrinsic valuation and estimate their exit value based on the DCF based growing perpetuity to avoid market uncertainties. Such valuation is extremely sensitive to the changes in growth rates of cash flows (CFA Institute, 2015, p. 249-250).

The obtained positive relation indicates that private equity funds do, indeed, choose targets, for which the PIPE funding would potentially grant new growth opportunities for the company. The research also identifies "time to build" effects, similar to the ones described by Badunenko, Baum and Schäfer (2010). As it can be seen from the marginal effects of tenure, coefficients gradually increase for longer tenures. Nevertheless, on the contrary to the authors' research, PIPE investments do differ in a number of ways. Apart from the minority shares being purchased within a PIPE transaction, and, consequently, lack of control over target firms, the increases in the performance measure are achieved even for tenures lower than 6 years. This may be attributed to the fact that PIPE timing is essential, as described by Särve (2013, p. 18) and Fraser-Sampson (2007, p. 49). By infusing external capital into companies, which have shown to operate at comparatively lower risks than their peers, private equity funds exploit an opportunity of increasing the target company's growth rates. What is more importantly, no statistically significant relation between the tenure and cash flow growth is present for longer tenure over 6 years. In practice, these findings imply that immediate effects of a capital infusion through a PIPE is achieved and is spread over the medium-term investment horizon. However, longer tenures lack such effects. This means that capital sourced from private equity has already exhausted its potential to provoke company's growth. At the same time, companies might be willing to seek new opportunities for financing their activities. The findings regarding

companies' solvency (as described below) reveal that such opportunities might be also related not only to new PIPE investments but also to debt financing.

The suggested **hypothesis 3** regarding the positive relation of the investment tenure to the performance of target companies in terms of their solvency is also accepted. The estimated coefficient is both statistically significant and positive. In the same manner as conclusions on hypothesis 1a, the result may seem misleading as the estimated coefficient is negative. Note that solvency is measured by NFD / EBITDA ratio (net financial debt to earnings before interest, taxes, depreciation, and amortization), thus, decreasing ratio would imply improvements in a company's solvency. This measure for solvency reflects two out of three main considerations in credit analysis: its leverage and debt coverage (CFA Institute, 2013, pp. 628-631). Another consideration would be company's profitability and cash flow, which has already been covered. Improvements in solvency as measured by the ratio can be achieved either through increasing operational earnings (i.e. EBITDA), through debt reductions (i.e. reducing interest bearing liabilities, which are a part of NFD), or through creating cash reserves for possible shortages of liquidity (i.e. increasing cash, which is subtracted from interest bearing liabilities in NFD calculation). The measure is also known to be widely used by credit agencies as one of the core ratios for determining credit ratings of companies within bond issues (Standard & Poor's Financial Services, 2013), as well as banks as a basis for loan maintenance covenants (CFA Institute, 2013, pp. 650-653).

A common PIPE target, a small and financially distressed enterprise (Särve, 2013, p. 29; Dai, 2011), has been thought of as being unable to borrow neither from debt capital markets nor from banks. This assumption has also been backed both by academic research and market news coverage (Badunenko, Barasinska and Schäfer, 2009; The Economist Newspaper, 2009). This assumption seems to be even more realistic since it has been found that leverage is rather low across all companies that have been subjects to PIPE investments (22% as measured by total debt to total assets). Thus, such companies, which are used to running the business under comparatively higher financial leverage, tend to fund their operations and investments through PIPE transactions. More importantly, private equity investments have shown the potential to increase companies' solvency over time, thus, expanding such companies' opportunities to raise debt capital in the future. In practice, these findings imply that there are almost immediate increases in companies' solvency from the capital achieved from private equity investors. Thus, over the tenure, solvency does improve, but no evidence of a positive effect exists for tenures above 6 years. This implies that private equity investments for a period over 6 years have questionable benefits in terms of solvency improvements. From the company's perspective, it would be essential to seek alternative sources of financing 6 years after the initial investment.

Were the company's solvency improvements not sufficient to receive access to debt markets, additional PIPE capital might be used. The practice of recurring funding with PIPE proceeds is common and observable in both the presented sample and other papers (Brown and Floros, 2012).

Managerial implications have been defined over the course of the results discussion. The following table summarizes the results for the suggested research hypotheses:

Table 13

Obtained results in respect of research hypotheses

	Research hypothesis	Expected relation	Discovered relation
1a	Companies' risk is negatively related to the likelihood of attracting a private equity investor.	-	-
1b	Companies' profitability is negatively related to the likelihood of attracting a private equity investor.	-	X
1c	Companies' financial leverage positively related to the likelihood of attracting a private equity investor.	+	+
2	Private equity investment tenure is positively related to the performance of target companies in terms of their cash flow growth.	+	+
3	Private equity investment tenure is positively related to the performance of target companies in terms of their solvency.	+	+

Note: symbols +, -, and X represent positive, negative, and the relation without conclusions respectively

Conclusions

The paper addressed the issue of the relationship between private equity investment tenure and companies' performance by the successive achievement of the research goals. First of all, a study of private equity funds' activities and their investment strategies has been conducted. Over the course of the study, a wide range of private equity peculiarities has been reviewed, such as strategies for entry and exit, sources of value creation, and industry-specific risks. Moreover, the concept of PIPE transactions has been reviewed, highlighting strengths and weaknesses of such, as compared to other sources of financing.

Second, possible causes of different investment strategies used by private equity funds, including different tenures, have been analyzed. In respect of investment tenures, type of transaction and target investee characteristics might matter the most. For PIPE transactions, a predominant group of issuers has been identified as high-tech companies that are comparably small in size and that experience difficulties with access to other sources of capital, such as debt (Brown and Floros, 2012; Särve, 2013, p. 31). The failure to raise capital elsewhere could also be attributed to inability to meet the imposed bank loan maintenance covenants, such as Debt / EBITDA, which is also used by rating agencies as one of *core* ratios to determine the credit rating of a bond issue on debt capital markets (Standard & Poor's Financial Services, 2013). Most of PIPE transactions have also been discovered to involve minority investments with lack of control over investees (Fraser-Sampson, 2007, p. 49; Särve, 2013, p. 32) and that targets of such investments are frequently financially distressed enterprises (Dai, 2011). The above-mentioned findings imply that private equity tenure, on average, might be equal to the time needed for companies to exit the distressed state and improve their financial performance to be able to raise capital from other sources. In case such improvements are not likely to take place, a fund might choose to exit immediately.

Third, an empirical study has been conducted in order to examine the relationship between private equity investments' tenure and companies' performance. The sample of 91 PIPE transactions corresponding to 79 European target companies that occurred from the year 2005 to 2014 has been used. The sample has revealed findings, similar to those discussed before: prevailing targets of PIPEs are small- and medium-sized enterprises, many of which are financially distressed. Also, a supplementary study associated with the determinants of private equity investments has been conducted.

Fourth, the obtained results have been analyzed and conclusions have been formulated based on the research. The study regarding the determinants of private equity investments revealed that less risky companies with comparatively higher financial leverage are more likely

to attract private equity investors (*ceteris paribus*). No conclusions on the relation between the companies' profitability and the likelihood of becoming a target of PIPE investment could have been made. In respect of the investment tenure, positive relation to the companies' performance has been discovered, both in terms of their cash flow growth and solvency (as measured by net financial debt to EBITDA ratio).

The fact that companies with comparatively higher financial leverage are more likely to attract PIPE investors implies that targets with a greater track record of debt repayments are chosen for the transaction. Thus, improvements in their solvency might be desirable. Nevertheless, such companies, still, are mostly equity-financed, which is also in line with the assumption that those are unable to attract other sources of capital. Over the private equity tenure, however, either debt or other forms of equity markets should become more reachable for the companies as the solvency improves.

What is more, the paper provides practical recommendations based on the research. Even though there are almost immediate increases in companies' capability to repay debt and growth rates of their cash flows, such are not observable for the tenures beyond 6 years. The exhausted potential to improve solvency and cash flow growth implies that private equity funds, on average, should consider either providing additional capital to the company or sell its share. From the company's perspective, the recommendations are similar: were the solvency improvements not sufficient to increase access to debt markets, raising additional capital through a PIPE should be considered. This recommendation is in line with current practice of recurring PIPE investments in the same target companies.

Thus, the goal of the paper has been achieved: the relationship between the tenure of private equity investments and the performance European companies has been determined. The research, however, might be expanded in certain ways. First, the investment tenure relation to other practice-oriented characteristics might be considered. Especially, this is the case for various multiples used in the comparable company and transaction valuation, which are also applied by private equity funds to estimate their exit price. Second, the research might be extended for other types of private equity transactions as long as the tenures of specific investors are analyzed.

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Appendix 1. List of Companies Used

#	Company	Country	Sector (GICS)	Industry (GICS)	Peer	Peer Country	Peer Sector (GICS)	Peer Industry (GICS)
1	Abertis Infraestructuras SA	Spain	Industrials	Transportation Infrastructure	Obrascon Huarte Lain SA	Spain	Industrials	Construction & Engineering
2	Accor SA	France	Consumer Discretionary	Hotels, Restaurants & Leisure	Sodexo SA	France	Consumer Discretionary	Hotels, Restaurants & Leisure
3	Alexanderwerk AG	Germany	Industrials	Machinery	Firefly AB	Sweden	Industrials	Machinery
4	Altran Technologies SA	France	Information Technology	IT Services	Alten SA	France	Information Technology	IT Services
5	Altran Technologies SA	France	Information Technology	IT Services	Sopra Steria Group SA	France	Information Technology	IT Services
6	Atos SE	France	Information Technology	IT Services	Dassault Systemes SA	France	Information Technology	Software
7	Ausy SA	France	Information Technology	IT Services	Neurones SA	France	Information Technology	IT Services
8	Ausy SA	France	Information Technology	IT Services	Tecocom Telecomunicaciones y Energia SA	Spain	Information Technology	IT Services
9	Baccarat SA	France	Consumer Discretionary	Household Durables	Guy Degrenne SA	France	Consumer Discretionary	Household Durables
10	Britvic PLC	United Kingdom	Consumer Staples	Beverages	Remy Cointreau SA	France	Consumer Staples	Beverages
11	Camaieu SA	France	Consumer Discretionary	Specialty Retail	Macintosh Retail Group NV	Netherlands	Consumer Discretionary	Specialty Retail
12	Carrefour SA	France	Consumer Staples	Food & Staples Retailing	Casino Guichard Perrachon SA	France	Consumer Staples	Food & Staples Retailing
13	Club Mediterranee SA	France	Consumer Discretionary	Hotels, Restaurants & Leisure	Pierre et Vacances SA	France	Consumer Discretionary	Hotels, Restaurants & Leisure
14	Compagnie de Saint Gobain SA	France	Industrials	Building Products	Lafargeholcim Ltd	Switzerland	Materials	Construction Materials
15	Corep Lighting SA	France	Consumer Discretionary	Household Durables	MG International SA	France	Consumer Discretionary	Household Durables
16	Cybergun SA	France	Consumer Discretionary	Leisure Equipment & Products	Catana Group SA	France	Consumer Discretionary	Leisure Equipment & Products
#	Company	Country	Sector (GICS)	Industry (GICS)	Peer	Peer Country	Peer Sector (GICS)	Peer Industry (GICS)

17	Cybergun SA	France	Consumer Discretionary	Leisure Equipment & Products	C Bechstein Pianofortefabrik AG	Germany	Consumer Discretionary	Leisure Equipment & Products
18	Cybernetix SASU	France	Industrials	Machinery	Saipem SpA	Italy	Energy	Energy Equipment & Services
19	Delfingen Industry SA	France	Consumer Discretionary	Auto Components	Paragon AG	Germany	Consumer Discretionary	Auto Components
20	Delta Plus Group SA	France	Industrials	Commercial Services & Supplies	Fiducial Office Solutions SA	France	Industrials	Commercial Services & Supplies
21	Demos SA	France	Industrials	Professional Services	DRS Data and Research Services PLC	United Kingdom	Information Technology	Electronic Equipment, Instruments & Components
22	Deoleo SA	Spain	Consumer Staples	Food Products	Baron de Ley SA	Spain	Consumer Staples	Beverages
23	DGC One AB	Sweden	Telecommunication Services	Diversified Telecommunication Services	Bredband2 i Skandinavien AB	Sweden	Telecommunication Services	Diversified Telecommunication Services
24	Ducati Motor Holding SpA	Italy	Consumer Discretionary	Motorcycles	Bayerische Motoren Werke AG	Germany	Consumer Discretionary	Automobiles
25	Ebro Foods SA	Spain	Consumer Staples	Food Products	Unibel SA	France	Consumer Staples	Food Products
26	Ecotel Communication ag	Germany	Telecommunication Services	Diversified Telecommunication Services	3U Holding AG	Germany	Telecommunication Services	Diversified Telecommunication Services
27	Eiffage SA	France	Industrials	Construction & Engineering	Imerys SA	France	Materials	Construction Materials
28	Fagron NV	Belgium	Health Care	Health Care Providers & Services	PCB SA	Belgium	Health Care	Health Care Providers & Services
29	Firestone Diamonds PLC	United Kingdom	Materials	Metals & Mining	Lonmin PLC	United Kingdom	Materials	Metals & Mining
30	Floridienne SA	Belgium	Materials	Chemicals	Gurit Holding AG	Switzerland	Materials	Chemicals
31	General de Alquiler de Maquinaria SA	Spain	Industrials	Trading Companies & Distributors	Elton SA	Spain	Industrials	Trading Companies & Distributors
32	Greenyard Foods NV	Belgium	Consumer Staples	Food Products	Cranswick PLC	United Kingdom	Consumer Staples	Food Products
#	Company	Country	Sector (GICS)	Industry (GICS)	Peer	Peer Country	Peer Sector (GICS)	Peer Industry (GICS)

3 3	GW Pharmaceuticals PLC	United Kingdom	Health Care	Pharmaceuticals	Sanochemia Pharmazeutika AG	Austria	Health Care	Pharmaceuticals
3 4	Highfield Resources Ltd	Spain	Materials	Chemicals	Ercros SA	Spain	Materials	Chemicals
3 5	Highfield Resources Ltd	Spain	Materials	Chemicals	Suedwestdeutsche Salzwerke AG	Spain	Materials	Chemicals
3 6	HTI High Tech Industries AG	Austria	Industrials	Machinery	Molins PLC	United Kingdom	Industrials	Machinery
3 7	IMA Industria Macchine Automatiche SpA	Italy	Industrials	Machinery	Recordati Industria Chimica e Farmaceutica SpA	Italy	Health Care	Pharmaceuticals
3 8	Innate Pharma SA	France	Health Care	Biotechnology	Cellectis SA	France	Health Care	Biotechnology
3 9	Jazz Pharmaceuticals PLC	Ireland	Health Care	Pharmaceuticals	AstraZeneca PLC	United Kingdom	Health Care	Pharmaceuticals
4 0	Jenoptik AG	Germany	Information Technology	Electronic Equipment, Instruments & Components	Elmos Semiconductor AG	Germany	Information Technology	Semiconductors & Semiconductor Equipment
4 1	Kaufman & Broad SA	France	Consumer Discretionary	Household Durables	Redrow PLC	United Kingdom	Consumer Discretionary	Household Durables
4 2	Kontron AG	Germany	Information Technology	Semiconductors & Semiconductor Equipment	Aixtron SE	Germany	Information Technology	Semiconductors & Semiconductor Equipment
4 3	Kontron AG	Germany	Information Technology	Semiconductors & Semiconductor Equipment	Aixtron SE	Germany	Information Technology	Semiconductors & Semiconductor Equipment
4 4	Laboratorio Reig Jofre SA	Spain	Consumer Staples	Personal Goods	Ulric de Varens SA	France	Consumer Staples	Personal Goods
4 5	Lanson BCC SA	France	Consumer Staples	Beverages	Vranken Pommery Monopole SA	France	Consumer Staples	Beverages
4 6	Lexibook Linguistic Electronic System SA	France	Consumer Discretionary	Household Durables	Dantax A/S	Denmark	Consumer Discretionary	Household Durables
4 7	Linedata Services SA	France	Information Technology	Software	PSI Produkte und Systeme der IT AG	Germany	Information Technology	Software

#	Company	Country	Sector (GICS)	Industry (GICS)	Peer	Peer Country	Peer Sector (GICS)	Peer Industry (GICS)
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48	Logic Instrument SA	France	Information Technology	Technology Hardware, Storage & Peripherals	JLT Mobile Computers publ AB	Sweden	Information Technology	Technology Hardware, Storage & Peripherals
49	Logic Instrument SA	France	Information Technology	Technology Hardware, Storage & Peripherals	Cibox Inter@ctive SA	France	Information Technology	Technology Hardware, Storage & Peripherals
50	Lombard Medical Technologies Ltd	United Kingdom	Health Care	Health Care Equipment & Supplies	Aortech International PLC	United Kingdom	Health Care	Health Care Equipment & Supplies
51	Lombard Medical Technologies Ltd	United Kingdom	Health Care	Health Care Equipment & Supplies	Agfa Gevaert NV	Belgium	Health Care	Health Care Technology
52	Makheia Group SA	France	Consumer Discretionary	Media	Infas Holding Aktiengesellschaft	Germany	Consumer Discretionary	Media
53	Medasys SA	France	Health Care	Health Care Technology	ifa systems AG	Germany	Health Care	Health Care Technology
54	Mediacontech SpA	Italy	Consumer Discretionary	Media	Immaliance SA	France	Consumer Discretionary	Media
55	Mersen SA	France	Industrials	Electrical Equipment	Exel Industries SA	France	Industrials	Machinery
56	Metabolic Explorer SA	France	Materials	Chemicals	Sniace SA	Spain	Materials	Chemicals
57	Mood and Motion AG	Germany	Consumer Discretionary	Media	Vela Technologies PLC	United Kingdom	Consumer Discretionary	Media
58	Northbridge Industrial Services PLC	United Kingdom	Industrials	Machinery	Lewag Holding AG	Germany	Industrials	Machinery
59	Octo Technology SA	France	Information Technology	IT Services	Triad Group PLC	United Kingdom	Information Technology	IT Services
60	OctoPlus	Netherlands	Health Care	Biotechnology	Proteome Sciences PLC	United Kingdom	Health Care	Biotechnology
61	Onxeo SA	France	Health Care	Biotechnology	Biosearch SA	Spain	Health Care	Biotechnology
62	Orexo AB	Sweden	Health Care	Pharmaceuticals	Boiron SA	France	Health Care	Pharmaceuticals
63	Orpea SA	France	Health Care	Health Care Providers & Services	Eurofins Scientific SE	Luxembourg	Health Care	Health Care Providers & Services
#	Company	Country	Sector (GICS)	Industry (GICS)	Peer	Peer Country	Peer Sector (GICS)	Peer Industry (GICS)

6 4	Pescanova SA	Spain	Consumer Staples	Food Products	Anglo-Eastern Plantations PLC	United Kingdom	Consumer Staples	Food Products
6 5	Pharming Group NV	Netherlands	Health Care	Biotechnology	Probi AB	Sweden	Health Care	Biotechnology
6 6	Premier Foods PLC	United Kingdom	Consumer Staples	Food Products	Greencore Group PLC	Ireland	Consumer Staples	Food Products
6 7	Proservia SA	France	Information Technology	IT Services	Quotium Technologies SA	France	Information Technology	Software
6 8	Provexis PLC	United Kingdom	Consumer Staples	Personal Goods	Midsona AB	Sweden	Consumer Staples	Personal Goods
6 9	Santhera Pharmaceuticals Holding AG	Switzerland	Health Care	Biotechnology	Bioporto A/S	Denmark	Health Care	Biotechnology
7 0	Santhera Pharmaceuticals Holding AG	Switzerland	Health Care	Biotechnology	IDL Biotech AB	Sweden	Health Care	Biotechnology
7 1	SFC Energy AG	Germany	Industrials	Electrical Equipment	Phoenix Solar AG	Germany	Information Technology	Semiconductors & Semiconductor Equipment
7 2	Sidetrade SA	France	Information Technology	Software	Crimson Tide PLC	United Kingdom	Information Technology	Software
7 3	Sidetrade SA	France	Information Technology	Software	Solteq Plc	Finland	Information Technology	Software
7 4	Sidetrade SA	France	Information Technology	Software	AND International Publishers NV	Netherlands	Information Technology	Internet Software & Services
7 5	Sidetrade SA	France	Information Technology	Software	Keyware Technologies NV	Belgium	Information Technology	IT Services
7 6	Soitec SA	France	Information Technology	Semiconductors & Semiconductor Equipment	STMicroelectronics NV	Switzerland	Information Technology	Semiconductors & Semiconductor Equipment
7 7	Store Electronic Systems SA	France	Information Technology	Electronic Equipment, Instruments & Components	Basler AG	Germany	Information Technology	Electronic Equipment, Instruments & Components

#	Company	Country	Sector (GICS)	Industry (GICS)	Peer	Peer Country	Peer Sector (GICS)	Peer Industry (GICS)
7 8	Store Electronic Systems SA	France	Information Technology	Electronic Equipment, Instruments & Components	TT electronics PLC	United Kingdom	Information Technology	Electronic Equipment, Instruments & Components
7 9	Swedish Orphan Biovitrum publ AB	Sweden	Health Care	Biotechnology	Meda AB	Sweden	Health Care	Pharmaceuticals
8 0	ThyssenKrupp AG	Germany	Materials	Metals & Mining	Salzgitter AG	Germany	Materials	Metals & Mining
8 1	TradeDoubler AB	Sweden	Information Technology	Internet Software & Services	MCH Group AG	Switzerland	Consumer Discretionary	Media
8 2	Trans-Siberian Gold PLC	United Kingdom	Materials	Metals & Mining	Auriant Mining AB	Sweden	Materials	Metals & Mining
8 3	United Internet AG	Germany	Information Technology	Internet Software & Services	Drillisch AG	Germany	Telecommunication Services	Wireless Telecommunication Services
8 4	Valneva SE	France	Health Care	Biotechnology	Ipsen SA	France	Health Care	Pharmaceuticals
8 5	Vet'Affaires SA	France	Consumer Discretionary	Specialty Retail	Basic Net SpA	Italy	Consumer Discretionary	Specialty Retail
8 6	Vexim SA	France	Health Care	Health Care Equipment & Supplies	Geratherm Medical AG	Germany	Health Care	Health Care Equipment & Supplies
8 7	Vidrala SA	Spain	Materials	Containers & Packaging	Zardoya Otis SA	Spain	Industrials	Machinery
8 8	Viscofan SA	Spain	Consumer Staples	Food Products	Prosegur Compania de Seguridad SA	Spain	Industrials	Commercial & Professional Services
8 9	Wireless Group PLC (UTV Media PLC)	Ireland	Consumer Discretionary	Media	Constantin Medien AG	Germany	Consumer Discretionary	Media
9 0	Xilam Animation SA	France	Consumer Discretionary	Media	Mondo TV SpA	Italy	Consumer Discretionary	Media
9 1	Xing AG	Germany	Information Technology	Internet Software & Services	Wirecard AG	Germany	Information Technology	IT Services

