ISCTE Business School
Instituto Universitário de Lisboa

THE IMPACT OF PRIVATE EQUITY-BACKED FIRMS ON THEIR PEERS

Inês da Cunha Cabral

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Supervisor:
Prof. Daniel Bernardo S. Ferreira, PhD, Associate Professor,
London School of Economics, Department of Finance

Co-Supervisor:
Prof. Pedro Manuel S. Leite Inácio, PhD, Assistant Professor,
ISCTE-University Institute of Lisbon, Department of Finance

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Resumo

Reconhecendo a crescente importância do mercado de *private equity*, a presente tese tem como objectivo principal estudar a dimensão competitiva desta indústria.

Recorrendo a amostras de empresas americanas e canadianas, pretende-se saber se as transacções em *private equity* têm algum impacte ao nível das concorrentes das empresas participadas. Em particular, considera-se a compensação total do *CEO* e analisa-se de forma independente cada uma das suas componentes, a fixa e a variável. A estrutura de capital e as características do Conselho de Administração são também alvo de estudo.

De acordo com os resultados, a compensação total do *CEO* diminui perante a existência de investimentos em *private equity* na indústria. Analisando individualmente a componente fixa e a variável, conclui-se que, muito provavelmente, aquele decréscimo ocorre por via da parte variável da remuneração, já que esta, de acordo com os dados finais, é também reduzida. O salário não sofre alterações.

Relativamente à estrutura de capital, identifica-se uma relação entre a ocorrência de investimentos em *private equity* e um maior nível de endividamento das concorrentes.

Não existe evidência de que as variáveis do Conselho de Administração, isto é, a sua dimensão e estrutura, sejam afectadas pela presença de empresas participadas por *private equity*.

Palavras-chave: *Private Equity*, Compensação do *CEO*, Estrutura de Capital, Conselho de Administração

Classificação *JEL*:

G24- Investment Banking; Venture Capital; Brokerage; Ratings and Ratings Agencies

G32- Financing Policy; Financial Risk and Risk Management; Capital and Ownership Structure

Abstract

Given the growing importance of the private equity market, in this thesis we study the competitive dimension of this industry.

By using samples of American and Canadian companies we analyse whether private equity transactions have any effect on the competitors of the invested companies. In particular, we consider the total CEO compensation and its fixed and variable components. We are also interested in the capital structure and in board variables.

We provide evidence supporting a reduction in the total CEO compensation of competitors when an investment in private equity occurs. In order to better understand this result we run the model with the fixed component and the variable one. We then show that the variable compensation is very likely the main responsible for that reduction.

Concerning the capital structure, the findings suggest an association between private equity transactions and a higher debt level of competitors.

According to the results, the board variables, which consist of the size and the structure of the board of directors, are not affected by the presence of private equity investments.

Keywords: Private Equity, CEO Compensation, Capital Structure, Board of Directors.

JEL Classification:

G24- Investment Banking; Venture Capital; Brokerage; Ratings and Ratings Agencies

G32- Financing Policy; Financial Risk and Risk Management; Capital and Ownership Structure

I dedicate this thesis to those that I love.

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Table of Contents

List of Figures

List of Tables

List of Abbreviations

PE	Private Equity
CRSP	Center for Research in Security Prices
LPs	Limited partners
VC	Venture Capital
VCs	Venture Capitalists
i.e.	*Id Est*
GPs	General partners
LBO	Leveraged Buyout
RLBOs	Reverse Leveraged Buyouts
IPO	Initial Public Offering
R&D	Research and Development
S&P500	Standard & Poor's 500 Index
US	United States
UK	United Kingdom
NB	Non-Backed
NBER	National Bureau of Economic Research
CAR	Cumulative abnormal return
E-Index	Entrenchment Index
CEO	Chief executive officer
GICS	Global Industry Classification Standard
SIC	Standard Industrial Classification
CUSIP	Committee on Uniform Security Identification Procedures
NAICS	North American Industry Classification System
TICKER	Ticker Symbol

1. Sumário Executivo

A indústria de *private equity* (*PE*) surgiu, essencialmente, como um fenómeno americano. No entanto, actualmente, é já um mercado global com significativa expressão no continente europeu, totalizando, aproximadamente, 735 mil milhões de euros (de acordo com as estatísticas de 2008).

Apesar da recente crise económica e financeira, a qual se traduziu, também, num decréscimo da actividade de *private equity*, existem perspectivas favoráveis quanto à evolução desta indústria para os próximos anos.

No seu *core*, as instituições de *private equity* criam fundos de investimentos através de um grupo de investidores que adquire participações em pequenas e médias empresas. Na sua globalidade, aquelas instituições desenvolvem um papel determinante como intermediários financeiros, consultoras e decisoras ao acompanharem regularmente as empresas nas quais ocorre o investimento. Por norma, o fundo de *private equity* aliena a sua participação no momento em que a empresa alcança o seu maior nível de desenvolvimento, obtendo os retornos financeiros gerados por tal aplicação. Os investidores dos fundos de *private equity* são agentes que procuram um retorno acima da média do mercado accionista, estando, portanto, dispostos a assumir um nível de risco mais elevado.

Ao longo dos anos identificam-se vários autores que, reconhecendo a crescente importância do mercado de *private equity*, têm desenvolvido importantes estudos sobre o mesmo, focalizando-se em quatro temáticas: o impacte que as instituições de *private equity* têm ao nível daquelas que recebem os investimentos, a *performance* dos fundos, a estrutura de capital usada nestas transacções e as saídas estratégicas consideradas.

Há, no entanto, pouca informação publicada relativa aos efeitos competitivos destas transacções.

Hsu *et al.* (2010) analisa a reacção das concorrentes, verificando a evolução da variável preço por acção das mesmas e clarificando os canais através dos quais estes investimentos afectam a competitividade. Com base nos resultados, estes autores concluem que o preço por acção dos concorrentes diminui perante o anúncio de uma transacção e nos dias que antecedem e que se seguem à realização daquela. Por sua vez, a não ocorrência de um investimento anunciado traduz-se num aumento do preço por acção. Os autores referidos concluem, ainda, que as diferenças de *performance* entre os concorrentes aquando do investimento estão directamente associadas aos cinco factores que se constituem como fonte

de vantagem competitiva das empresas investidas. Os factores em causa são o grau de especialização das empresas de *private equity*, a estrutura governativa das concorrentes, o seu nível de inovação tecnológica, os seus incentivos administrativos e o efeito do custo de eficiência.

Considerando a relevância desta dimensão competitiva da indústria de *private equity*, a presente tese tem como principal objectivo estudar algumas das características mais relevantes das concorrentes de forma a verificar se os investimentos em causa têm algum efeito ao nível das mesmas. As variáveis analisadas são a compensação do *CEO* e cada uma das suas componentes fixa e variável, a estrutura de capital e a dimensão e estrutura do Conselho de Administração.

Para realizar este estudo são identificados alguns dos modelos existentes na literatura explicativos de cada uma das variáveis. No sentido de avaliar o impacte dos investimentos em *PE* é adicionada uma variável *dummy* que assume o valor 1 no ano e nos dois seguintes à ocorrência de uma transacção na indústria e 0 nos restantes anos.

A amostra estudada é obtida da base de dados *CapitalIQ* e compreende unicamente empresas americanas e canadianas.

Depois de aplicar os critérios de selecção[1] obtêm-se 247 transações de *PE*. Através do cruzamento de diversas bases de dados é possível identificar alguns dos principais concorrentes das empresas investidas. A amostra de maior dimensão, usada no estudo da estrutura de capital, é constituída por 5 295 empresas concorrentes pertencentes a 106 indústrias. As duas amostras obtidas para analisar as restantes variáveis são subamostras daquela.

A informação relativa aos concorrentes é obtida do *Compustat ExecuComp*, do *Center for Research in Security Prices (CRSP)/ Compustat Merged* e do *Compustat North America*.

No que se refere às principais conclusões, os resultados sugerem um decréscimo da compensação total do *CEO* dos concorrentes perante a existência de investimentos em *PE*, o que se deve, muito provavelmente, a uma redução da componente variável, já que o salário não sofre alterações.

[1] Como primeiro grupo de critérios consideram-se: todas as transacções anunciadas entre 1980 e 2007, o estado destes investimentos é "fechado" ou "efectivo", todas as transacções ocorrem nos EUA ou no Canadá, o valor da transacção é superior a 10 milhões de dólares e o tipo de investimento é categorizado como "Private Equity Investing". Para seleccionar os investimentos mais significativos, apenas se consideram aqueles cujo valor de transacção é igual ou superior a 10% do valor médio contabilístico do total de activos de cada indústria. Por fim, seleccionam-se os investimentos que não são precedidos por outros grandes investimentos na mesma indústria nos dois anos anteriores.

Identifica-se, também, a existência de uma relação significativa e positiva entre estes investimentos e o nível de dívida usado pelos concorrentes.

Estes resultados podem ser fundamentados por uma tendência de imitação, isto é, a tentativa dos concorrentes seguirem estratégias similares àquelas aplicadas pelas empresas que recebem o investimento.

Relativamente às variáveis do Conselho de Administração, não há qualquer evidência que suporte um efeito do *PE* nos concorrentes. Contudo, esta conclusão pode estar a ser condicionada pela reduzida dimensão da amostra conseguida.

2. Executive Summary

In its initial decades the industry of private equity (PE) was mainly an American phenomenon. Today, it is a global market with great expression in the European Continent, totalizing approximately 735 thousand million Euros (according to the statistics of 2008). Despite the economic and financial crisis of 2008, which also led to a decrease in the private equity activity, there is a common positive sentiment on the evolution of this industry for the next years.

Private equity involves not only investments in companies that are not listed on a regulated market, but also investments in publicly traded companies with the purpose of delisting. Private equity firms create funds that raise capital from investors and invest it on the limited partners' behalf in companies in which they believe they can help to create value. Overall, private equity firms play an increasingly important role as financial intermediaries in addition to their significant involvement as board members and advisors during the invested period.

Nowadays, there is a growing academic literature shedding light on the private equity industry. By reviewing the existent studies, it is possible to realise that the majority of them are focused on four main topics, which are the effects of private equity firms on the invested companies, the funds' performance, the capital structure used in these investments and the exit strategies.

Concerning the competitive effects of private equity transactions, there are few authors studying this topic.

Hsu *et al.* (2010) analyse the reaction of rivals of those firms that receive the private equity investments. The authors follow the stock's price evolution and clarify the channels through which these transactions affect competitiveness by studying the cross-sectional differences in competitors' performance. They then conclude that competitors experience a decrease in their stock price at and around the completion of PE investments in their industry and have a positive stock price response when PE investments are withdrawn. Furthermore, differences in performance among competitors at the time of the PE investment are closely linked to those five reasons that contribute to explain the competitive advantage of PE-backed companies over non invested firms. They are the specialization of the PE partnerships, corporate governance, technological innovations, managerial incentives, and the effect of the cost of efficiency.

Considering the relevance of this competitive dimension of the private equity industry, in this study we analyse important corporate variables of competitors so that we can realise whether these investments have impact on them. These variables are the CEO compensation and its fixed and variable components, the capital structure and the size and the structure of the board of directors.

In order to proceed with this survey, we identify existent models in the literature that were already tested to predict the variables mentioned above and we add, as another independent variable, a private equity dummy that assumes the value "1" in the year and in the two years after the occurrence of an investment in private equity in the industry and "0" in the all other years.

For this research we get an initial comprehensive sample of American and Canadian private equity transactions from the CapitalIQ database.

After applying the selection criteria[2] we obtain a total of 247 PE transactions. Through the matching of the different industry codes it is possible to identify some of the competitors of the invested companies. The biggest sample, which is used in the variable capital structure, is constituted by 5 295 competitors belonging to 106 industries. The samples used in the other two variables are subsamples of this one.

Data of competitors is obtained from Compustat ExecuComp, the Center for Research in Security Prices (CRSP)/ Compustat Merged and from **Compustat North America.**

Concerning the conclusions, we find evidence supporting the decrease of the total CEO compensation of competitors in the presence of private equity transactions, which is more likely explained by the reduction in the variable component. The results of the salary lead us to not reject the null hypothesis and, then, to conclude that the fixed component of the remuneration does not change with private equity investments.

Also, there is support for a significant relation between these investments and a higher level of debt used by competitors.

A plausible reason for these results is the imitative process, i.e., the trend that competitors usually have to follow similar strategies applied by the private equity-backed firms.

[2] The first group of criteria is: all transactions are announced between 1980 and 2007, the status of these investments is either "closed" or "effective", the transactions are in the United States or Canada, the value of the transaction must be greater than 10 million dollars and the investment type is categorize as "Private Equity Investing". To select the most significant investments we only consider those transactions whose value is equal to or higher than 10% of the average book value of assets of each industry. Finally, we select those investments that are not preceded by other large investment in the same industry in the previous two years.

Regarding the board variables, there is not any robust evidence for the effect of private equity on competitors. Nevertheless, this conclusion can be affected by the reduced size of the sample.

3. Introduction

The private equity is no longer primarily an American phenomenon. Having emerged in the 1980's it was in the past few decades that the private equity industry has grown both in terms of size and geographic reach. Nowadays, it is a global market with a significant expression in the European countries, totalizing approximately 735 thousand million Euros (according to the statistics of 2008).

Despite the economic and financial crisis started in 2008, which also led to a decrease in the private equity activity due to liquidity constraints, there is a general positive sentiment on the evolution of this industry for the coming years.

Private equity involves not only investments in private companies but also in public companies with the purpose of privatizing.

As their core, private equity firms establish funds that raise capital from investors and invest it on limited partners (LPs)' behalf in companies in which they believe they can help to create value. Overall, private equity firms play an increasingly important role as financial intermediaries in addition to their significant day-to-day involvement as board members and advisors during the invested period.

By recognising the growing relevance of this class of investments, many authors have been developing important studies in order to better understand the private equity market.

In fact, it is well documented the positive effect of private equity on individual firm performance, which suggests that, on a macroeconomic level, these transactions contribute to a better allocation of capital and to a more efficient economy. Also employment and innovation variables have caught the attention of some authors who evidence some controversy concerning the first topic and identify a positive link between private equity investment and innovation.

Moreover, there is an important academic literature shedding light on the other three main topics related to this industry, which are the funds' performance, the capital structure applied in these investments and the exit strategies considered.

Nevertheless, there are still many questions that can be the base for future research. For instance, Bernstein *et al.* (2010: 23) advance that "it is important to better understand the mechanisms by which the presence of private equity-backed firms affects their peers."

In a response to this question, Hsu *et al.* (2010) analyse the reaction of rivals to those firms that receive the private equity investments in terms of the stock's price evolution and

clarify the channels through which these transactions affect competitiveness by analysing the cross-sectional differences in competitors' performance. They then conclude that competitors experience a decrease in their stock price at and around the completion of PE investments in their industry and have a positive stock price response when PE investments are withdrawn. Furthermore, differences in performance among competitors at the time of the PE investment are closely associated to those five reasons that contribute to explain the competitive advantage of PE-backed companies. They are the specialization of the PE partnerships, corporate governance, technological innovations, managerial incentives, and the effect of the cost of efficiency.

With the main objective of studying this unexplored topic of the private equity investments, this work also pretends to address the Bernstein *et al.* (2010)' question about competitors and, therefore, to contribute with additional information to Hsu *et al.* (2010)' survey.

Thus, this dissertation also aims to understand what effects private equity investments have on competitors of the invested companies, but considering other firm dimensions, in particular, executive compensation, capital structure and characteristics of the board of directors.

In terms of the CEO compensation it is analysed the total compensation and its fixed and variable components, individually. Capital structure is assessed by the market leverage. Concerning the board of directors, we are particular interested in the size and in the independence of them.

As a matter of fact, there is not any prior study addressing this theme and it is not easy to predict the possible conclusions of this research since there is not significant information regarding the evolution of those three variables on the PE-backed companies as a result of PE investments. Due to the growing importance of this industry, we believe this can be an interesting study that may help us to better understand the interactions between PE-backed firms and their competitors and also to analyse some of the corporate theories.

Since private equity is not included in the majority of the master's and doctoral programs, this work begins with a brief presentation of its concept (chapter 4.1) and an overview of the PE market evolution all over the years (chapter 4.2). In chapter 4.3 it is identified some of the existent literature related to the PE industry, giving particular relevance to the main topics mentioned before: the effects of private equity firms on the invested companies, the funds' performance, the capital structure used in these investments and the exit choices. Besides, a

detailed description of the Hsu *et al.* (2010)' survey is presented, given its important contribute to the development of this dissertation. In chapter 4.4 we point out the main existent models statistically tested to explain the executive compensation, the capital structure and the CEO compensation variables in study. The hypotheses considered as well as the methodology applied and the sample selection are developed in chapters 5, 6 and 7 respectively. The results and the main conclusions can be found in the last two chapters.

As mentioned by many authors, the difficult access to the private information usually puts at risk some studies. Being aware of this possible problem, we will try to be realistic while criticizing our final results.

4. Literature Review

4.1. The concept

"Private equity is a model of ownership for investors based on specific investment strategies and contractual agreements between fund managers and investors" (Strömberg, 2009: 4). These are investments of equity capital not only in companies that are not listed on a regulated market, but also investments in publicly traded companies with the purpose of delisting. Private equity is a term standing for long-term (typically holding periods of between three and seven years), from very young businesses to more mature companies.

According to the characteristics of these operations, the private equity market can be split up into its main types, which are Venture Capital (VC), Mezzanine Capital, Buyouts and Distressed investments as evident in figure 1. Hedge funds[3] constitute another category of alternative investments.

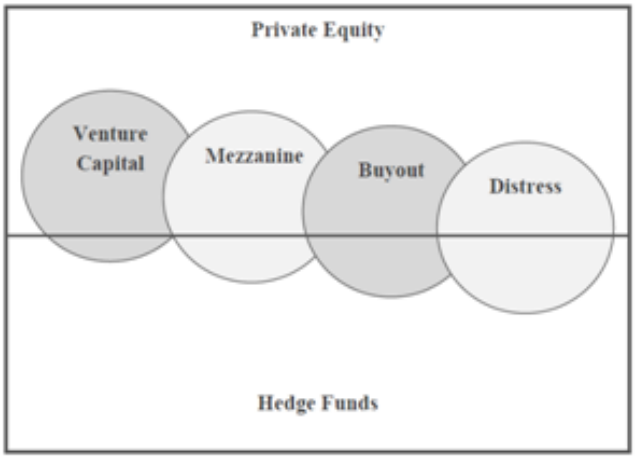

Figure 1: Alternative investments.

Source: Metrick, A. (2007), *Venture capital and the finance of innovation*, John Wiley & Sons.

In the case of **venture capital** money is provided to start-up firms and small businesses with perceived long-term growth potential. This is an important source of funding for young

[3] Hedge funds constitute another alternative asset class growing in importance. This class also addresses institutional investors for fundraising, it is typically organized as limited partnerships and the compensation systems are also quite similar to PE. Nevertheless, a hedge fund commonly invests in a highly liquid asset class, namely publicly traded stocks, bonds and commodities in addition to currencies, derivatives and equity securities because of their potential for quick returns. In this way, hedge funds are more focused on short term scenarios rather than on long term periods as PE do.

companies that do not have access to capital markets. It typically entails high risk for the investor, but it has the potential for above-average returns.

The **mezzanine** capital is a mixture of debt and equity financing that is typically used to finance the expansion of existing companies. This financing is basically debt capital that gives the lender the right to convert to an equity interest in the company if the loan is not paid back in time and in full. Because the subordinated debt in mezzanine investing will be attached to some equity participation, mezzanine investing can also intersect the total equity investing done in buyouts, the next category, in figure 1.

Buyout investors pursue a variety of strategies, but the key feature is that they almost always take majority control of their portfolio companies in contrast to venture capitalists (VCs) that usually take minority stakes in their portfolios. Usually, buyouts include leverage, i.e., a significant amount of borrowed money (bonds or loans) to meet the costs of acquisition.

Distress investing is related to a higher complexity. Special situation partnerships make investments with a wider range to include categories which embody both venture and buyout characteristics, as well as companies in financial distress.

In terms of the weight that each type has in the whole, two thirds of the capital committed to private equity is invested in buyouts and one third is invested in venture capital.

With these investments the main objective of private equity organizations is to increase the value of their portfolios through strategies that improve the operations, governance, capital structure, and strategic position of those companies in which the investment occurs. These measures should be implemented by actively monitoring the decisions that the management team made and establishing defined lines of responsibility as well as the corresponding incentives. In fact, these institutions finance high-risk, potentially high-reward projects, but, in return, they protect the value of their equity stakes by undertaking careful diligence before making the investments and by retaining powerful oversight rights afterwards.

Typically these institutional and professional investors, also called general partners (GPs), do not primarily invest their own capital, but rather they work on the behalf of large institutional investors and wealthy individuals, who provide the bulk of the capital as limited partners. Actually these ones commit capital to the funds which are managed by the general partners.

The vast majority of the limited partners are banks and pension funds, as it is shown in figure 2.

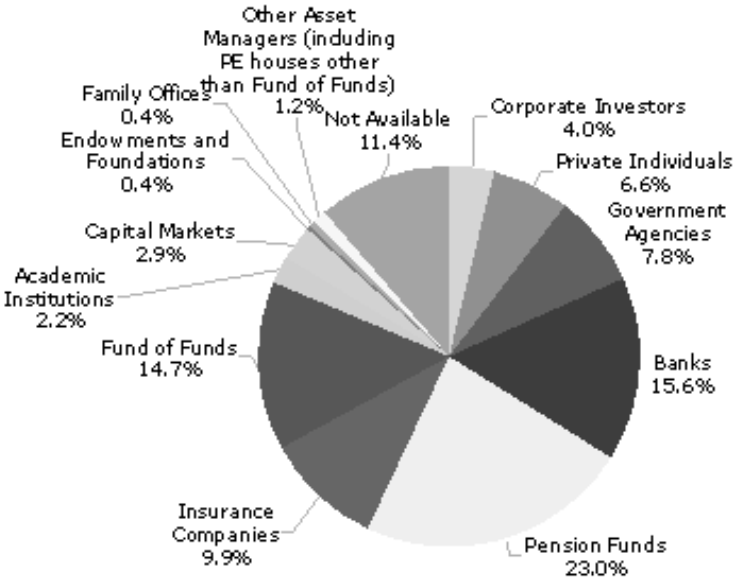

Figure 2: Types of investors.

Source: European Private Equity and Venture Capital Association (EVCA).

Often these groups do not have neither the staff nor the expertise to make such investments themselves. Nevertheless, they regularly assess the quality of the investments made by industry professionals.

At the end of the fund's life, all capital should have been returned to investors.

Gains are recorded mainly through the realisation of investments: Private equity GPs typically hold companies for three to five years and then sell them, hoping to realise a gain on the sale as a result of the increased value they have created during their period of ownership.

When successful and once deducting the initial commitment capitalized at an agreed rate of return for investors (the "hurdle rate"), fund managers receive a portion of the realised capital gains ("carried interest").

4.2. Past, Present and Future

In its initial decades (the last decades of the nineteenth century and the first decades of the twentieth century) the industry of private equity was mainly an American phenomenon. Today, it is a global market with great expression in the European continent, especially in the United Kingdom and Ireland as can be seen in figure 3.

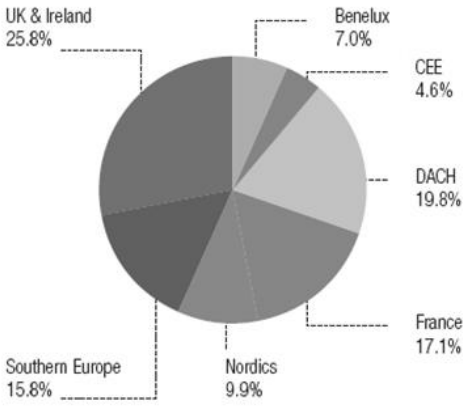

Figure 3: Regional market share in terms of the invested amounts in 2008 (market statistics).
Source: *2009 European Private Equity & Venture Capital Association – EVCA Yearbook.*

Worldwide, in 2008, "private equity funds manage approximately $1 trillion of capital" (Metrick and Yasuda, 2009: 2), which represents, in Euros, approximately € 735 thousand million (using the exchange rate on 31st. December 2001). Nevertheless, the private equity market was also affected by the economic and financial crisis that started in 2008 with the collapse of Leman Brothers.

The 2009 *European Private Equity & Venture Capital Association – EVCA Yearbook* documents the evolution of the European activity from 2007 to 2008: investment decreased approximately 27%, driven entirely by the drop in buyouts and the exit opportunities, consisting mainly in trade sales, shrank considerably. The amount raised by European private equity firms was also less than in 2007. *Associação Portuguesa de Capital de Risco e de Desenvolvimento- APCRI Annual Report* also adds that between 2008 and 2009 the European private equity investment decreased approximately 61%, being around €21 thousand million.

Concerning the American market, the research firm Preqin writes that "In 2009, 228 North America focused private equity funds reached a final close raising an aggregate $144,7bn, a decrease from the $366,1bn committed to 519 funds in 2008. In spite of this,

North America focused funds accounted for over 58% of all private equity capital raised globally during 2009."

In its *Barometer*, European Private Equity & Venture Capital Association states that this reduction in the private equity activity is explained by "the extremely challenging fundraising environment". The survey applied by this association suggests that the main reason for the largely depressed fundraising levels is related to the liquidity constrains that limited partners may find in a more unfavourable financial situation: "in the context of overall economic uncertainty, some investors may not be that willing to bind themselves for 10 years or may be facing the need for immediate liquidity in order to be able to meet prior commitments."

When asked about how the future of this industry will be, respondents demonstrate a "positive sentiment on the potential of the European private equity market in 2011", based on the slow recovery in the public markets occurred in 2010 that leads them to anticipate better macroeconomic and financial conditions for this year.

Moreover, as Pedro Falcão suggested in *Aspectos*, private equity can play a critical role in a recovery period by providing companies financial aid as well as strategic advice and networking support in order to improve their competitiveness.

4.3. Related literature

Today, there is a growing academic literature shedding light on the private equity industry. By reviewing the existent studies, it is possible to realise that the majority of them are focused on four main topics, which are the effects of private equity firms on the invested companies, the funds' performance, the capital structure used in these investments and the exit strategies.

4.3.1. The effects of private equity firms on the invested companies

There are some findings suggesting that private equity-backed firms tend to have superior **performance** when compared with their peers, regardless of the economic conditions.

Jensen (1989) argues that among other new organizations, leveraged buyouts (LBOs) "are making remarkable gains in operating efficiency, employee productivity, and shareholder value." By closely monitoring managers, restricting free cash flows through the use of leverage and by incentivizing managers with equity, private equity improves the operations of firms.

Cao and Lerner (2006) suggest that reverse leveraged buyouts (RLBOs) outperform other Initial Public Offerings (IPOs) and the stock market as a whole.

Based on US-based manufacturing establishments Davis *et al.* (2008) show that private equity-backed firms experience a significant productivity growth advantage (approximately two percentage points) in the two years following the transaction.

Bernstein *et al.* (2010) look across nations and industries to assess the impact of private equity on industry's aggregate growth and cyclicality. In particular, they focus on the relationship between the presence of PE investments and the growth rates of productivity, employment and capital formation. The main conclusions are that "industries where PE funds have been active in the past five years grow more rapidly than other sectors, whether measured using total production, value added, total wages, or employment". Besides, "in industries with PE investments, there are few significant differences between industries with a low and high level of PE activity." Another consequence is that "activity in industries with PE backing appears to be no more volatile in the face of industry cycles than in other industries,

and sometimes less so." This reduction is particularly apparent in total wages and employment.

In terms of **employment**, there is a considerable debate about the question of whether private equity firms help to create or to reduce it.

Overall, the academic findings are not consistent with concerns over job destruction, but neither are they consistent with the opposite position that buyouts are associated with considerable employment growth.

According to Davis *et al.* (2008) employment increases before and immediately after a private equity transaction at a lower rate than at a group of similar control establishments. Strömberg (2009) presents that this fact can be explained by the higher productivity per worker registered after the buyout transaction at buyout-backed companies when compared with non-buyout-backed firms.

There are also some studies focused on the changes in **innovative** investments around the time of the private equity transaction.

Among other authors, Lichtenberg and Siegel (1990) look at 43 LBOs, examining the research activities prior to and after the transaction. They find that these firms increase research spending after the leveraged buyout on an absolute basis when compared with their peers.

More recently, an extensive body of work related to this topic has been using patenting activity rather than merely research and development expenditures (R&D), which are more difficult to interpret, as a measure of the quality and extent of firm's innovation.

Lerner, Sorensen and Strömberg' (2008) main finding is that private equity-backed firms pursue more influential innovations in the years following the investments, since patents are more cited.

Ferreira *et al.* (2010) realise that private equity-backed companies are more likely to opt for more complex and riskier projects. They also tend to apply more organizational and management restructures. On the contrary, public firms opt for more "conventional projects", because they care too much about market reactions.

Nevertheless, it is important to mention that some of these authors recognise that their studies have a certain number of limitations, which can be explained, in part, by the lack of available data related to the private equity industry. Moreover, there are also some critics who have been pointing out the deleterious effects of private equity on firms and industries. For

instance, the buyout of Britain's Automobile Association implied large-scale layoffs and service disruptions, as mentioned Rasmussen (2008).

4.3.2. Funds´ performance

Gompers and Lerner (1998) look at the American private equity market and examine the aggregate performance and capital flows. The analysis shows that inflows into venture capital funds have a significant and positive impact on the pricing of private equity investments. This effect is greatest in states with the most venture capital activity and segments with the biggest growth in capital inflows.

Ljungqvist and Richardson (2003) study the returns of investments in 19 venture capital funds and 54 buyout funds, finding that they outperform the equity market and have positive alphas.

Kaplan and Schoar (2003) investigate the performance of private equity partnerships making use of a data set of individual fund returns collected by Venture Economics. By examining the characteristics of fund performance in the private equity industry they conclude that, on average, LBO and VC returns exceed those of the Standard & Poor's 500 Index (S&P500) gross of fees. They also realise considerable persistence in fund performance in the private equity industry for both types of funds, i.e., private equity firms whose funds outperform the industry in one fund are likely to repeat this performance in the next as well as private equity firms that underperform are likely to underperform again. Moreover, they document that performance increases with fund size and with partnership's experience. Finally, they suggest that this is a cyclical market in which positive market-adjusted returns encourage new entries that lead to negative market-adjusted returns.

4.3.3. Capital Structure

Private equity firms raise equity capital from limited partners and then supplement it with additional deal-level financing, which is debt when the investment is classified as a buyout and syndicated equity in a venture deal.

Understanding this financial structure is relevant since private equity firms have become increasingly important as a source of capital and governance for many companies in the economy. As Jensen (1989) suggested, the publicly held company is being eclipsed, and, among others, leveraged buyouts "are the most visible manifestations of a massive organizational change in the economy".

Considering the growing importance of LBOs, there are some authors documenting the manner in which they are financially structured.

Axelson *et al.* (2007) use a sample containing detailed information of 153 large buyouts from United States (US) and Europe. They firstly find that there is no relationship between the financing of buyouts and the matched public firms. Besides, the factors that predict capital structure in public firms have no explanatory power for capital structure in buyout firms, i.e., none of the firm-specific characteristics (profitability, cash flow, volatility and growth opportunities) are consistently related to leverage in buyouts. However, the results suggest that debt market conditions have a strong influence on private equity activity. In fact, "the higher the interest cost of leveraged loans, measured as the local real interest rate plus the market leveraged loan spread, the lower the leverage. (…) One explanation is that when rates are lower, firms can pay interest on a higher principal with the same cash flows."

Kaplan and Strömberg (2008) mention various reasons for why the public firms' borrowing do not follow the same credit market cycles: One is that these companies are not willing to take on additional debt, either because managers do not like debt or because public market investors worry about high debt levels; A second explanation is related to the better access to credit markets that private equity firms have because they are repeated borrowers in the market; Another one is that private equity funds have compensation structures that provide more incentives to take more debt than it is optimal for individual firms.

Axelson *et al.* (2010) construct a new dataset containing detailed information of 1 157 buyouts mainly from North America and Western Europe. They realise that buyout capital structures seem to be "inverted" when compared with public companies. On average, in buyouts, the proportion of debt is about 70%, which is the percentage of equity in public

companies. The syndicated bank loan market provides the majority of the debt (divided into tranches) to fund transactions and there are often diverse "layers of subordinated debt" as well as "different classes of corporate bonds".

Once again, they find that the factors that predict capital structure in public companies have no explanatory power for buyouts. The main factors that affect the capital structure of the last ones are the price and the availability of debt, indeed, i.e., buyouts are more leveraged when credit is abundant and cheap. Besides, they document that prices private equity funds are willing to pay increase with the leverage they employ, which can be explained by the fact that when credit conditions are favourable (interest rates and the cost of capital low) valuations and leverage could be high.

4.3.4. Exit Choice

The cycle of the private equity investments can be divided into fundraising, investment, value-adding and divestment. Although all these phases are important for the success of an investment, the divestment process is regarded as the key component. According to Lerner (1997), "the need to ultimately exit investments shapes every aspect of the venture capital cycle" (...), since "successful exits are critical to insuring attractive returns for investors", their main goal.

Taking a firm public via an **initial public offering (IPO)** and **selling the firm to a third party (Acquisition)** are the main alternative ways mentioned in the literature for entrepreneurs and venture capitalists achieve the liquidity of their investments.

It is important to highlight the differences among types of third party sales, as referred by Cumming and MacIntosh (2003): in an acquisition, the VC sells the entire firm to a third party that is typically a strategic acquirer (a larger entity in the same or similar business) or another VC; A secondary sale differs from an acquisition in the point that only the shares of the VC are sold to the third party, i.e., the entrepreneur and other investors will retain their investments. In a buyback exit, the VC will sell its shares to the entrepreneur and/or to the company. The same authors say that "secondary sale and buyback exit strategies are used for lower quality firms", and "the highest quality entrepreneurial firms are either taken public or are acquired."

Ball *et al.* (2008) examine a sample of 7 082 observations of the choice between IPO and acquisition from 1978 to 2006 in order to understand if information asymmetry, capital demand, relative costs of IPOs and acquisitions and market timing affect the exit decision, as it is supported by other authors in prior works.

They find evidence for the view that IPO activity is higher when **capital demand** is high, because when aggregate demand for capital is high interest rates increase, which means that high potential acquirers are likely to face higher costs of funds for financing acquisitions. IPO market is also better suited for firms that are easy to value, whereas the acquisition market is preferred for transactions where **informational asymmetry** concerns are more severe, implying high adverse selection costs. Since high market values can reduce the **relative cost** of a public issue due to the effects of scale, it is expected that IPO will be higher when market valuations are higher. However, they did not find consistent evidence for the hypothesis that IPO issuers can **time the market** and issue in advance of market declines. But they do find that market returns decline after acquisition activity peaks.

Moreover, they realise that when demand for capital is down IPO and acquisition markets' answers are different: In the IPO market the primary response is a significant reduction in the number of IPOs, while in the acquisition market the number of transactions remains fairly stable. This is consistent with the fact that IPO volume of venture-backed firms fluctuates dramatically over time in opposition to the acquisition volume.

Also Bayar and Chemmanur (2010: 5) analyse a private firm's choice of exit mechanism between IPOs and acquisitions, having realised that the competition in the product market is a critical factor for this decision: "while a stand-alone firm has to fend for itself after going public, an acquirer is able to provide considerable support to the firm in product market competition". Therefore, "later stage firms with business models more viable against product market competition are more likely to go public, while earlier stage firms, less viable against product market competition, will more likely choose to be acquired."

The exit choice also depends on the information asymmetry, since, unlike investors in the IPO market, who are in informational disadvantage when compared with firm insiders, potential acquirers will be able to better value the firm due to their industry expertise that allows them to realise the availability of alternative business models in the product market.

Concerning IPOs, there are also some papers investigating the aftermarket performance of private equity-backed initial public offerings. The weight of international evidence on IPOs in general suggests that aftermarket performance differs across types of IPOs and performance

estimation methodologies. There is a certain disagreement about the performance of VC-backed IPOs in US and other countries, but consistent evidence, at least in US, about the positive excess returns for IPOs-backed by private equity investors[4].

Brav and Gompers (1997) investigate a sample of 934 US VC-backed IPOs during the period 1972-1992 and find that venture-backed IPOs outperform nonventure-backed IPOs using equal weighted returns. Krishnan *et al.* (2009) provide further evidence to this view by showing that more reputable VCs select stronger portfolio firms and have a significant and positive association with their superior long-term performance. This is due to their continued involvement through shareholdings and directorships for up to three years after an IPO.

However, for instance, based on a sample of United Kingdom (UK) IPOs, Coakley *et al.* (2004) find no evidence of significant differences in the long run performance between VC-backed and other IPOs during that period.

Also Levis (2010) examine the performance of UK private equity-backed IPOs, using a hand-collected sample of private equity-backed, venture capital-backed and other non-backed (NB) IPOs. Among other conclusions, he shows that PE-backed IPOs achieve positive and significant performance in equal and value weighted terms in the aftermarket, contrary to VC-backed IPOs that "emerge as poor performers during the same time period".

[4] According to Levis (2010), "a PE-backed IPO is defined as a company where the private equity investor(s) has a controlling interest acquired at the stage of a management buyout or a management buy in"; "VC-backed IPOs are companies that have received venture capital funding at some point before going public as a start-up, development or expansion or for a secondary purchase."

4.3.5. Competitors

Based on the existent literature it is possible to realise that the growth of the private equity industry has caught the attention of many authors who have been recognising the impact of these transactions on the economies. Despite the significant number of academic studies related to this topic, there is still a wide range of questions for future research, many of them addressed in some papers. For instance, Bernstein *et al.* (2010) suggest that "it is important to better understand the mechanisms by which the presence of private equity-backed firms affects their peers."

Hsu *et al.* (2010) analyse this topic by considering the reaction of rivals to those firms that receive the PE investments with particular focus on the stock's price evolution. Their initially expectation is that these transactions have a negative effect on competitors' market values and on their operating performance, since private equity investments help target companies to be more competitive.

Their second goal is to clarify the channels through which private equity investments affect competitiveness by analysing the cross-sectional differences in competitors' performance. To accomplish this objective they test the five possible determinants of PE-backed firms' competitive advantage.

One of the variables considered is the **specialization of the PE partnerships** with the aim of understanding if a higher degree of specialization implies more negative consequences on competitors. For example, Gompers *et al.* (2006) find a strong positive relationship between the degree of specialization by individual venture capitalists and target firms' performance.

Second, they test if changes in the **corporate governance** in PE-backed companies contribute to the cross-sectional reaction of rivals. Kaplan and Strömberg (2008) state that, among others, private equity firms apply governance engineering to their portfolio companies and, in so doing, improve companies operations and create economic value.

Third, they analyse the relevance of **technological innovations**. As cited before, Lerner *et al.* (2008) main finding is that private equity-backed firms pursue more influential innovations in the years following the investment, since the number of patents increases.

Another determinant is the existence of **managerial incentives**, which are stronger on PE-backed firms, as supported, for instance, by Leslie and Oyer. (2009). So, Hsu *et al.* (2010) also test the relevance of managerial incentives in explaining the cross-sectional performance of competitors.

Finally, they study the effect of **cost efficiency** of private equity-backed companies on competitors' performance, based on the observation made by Strömberg (2008) in which PE-backed companies become more cost-efficient after PE investments.

To sum up, the hypotheses studied are the following:

1. The completion of a PE investment has a negative price impact on publicly traded competitors;
2. The withdrawal of a PE investment has a positive price impact on publicly traded competitors;
3. The announcement of a PE investment has a negative price impact on publicly traded competitors;
4. The operating performance of rival companies will deteriorate after a PE investment;
5. Rivals perform worse if target firms are backed by more specialized PE investors;
6. Better governed rivals perform better after PE events;
7. Rivals with better managerial incentives perform better after PE events;
8. More innovative rivals perform better after PE events;
9. Less cost efficient rivals perform worse after PE events.

Concerning the sample, Hsu *et al.* (2010) use the CapitalIQ Database to have access to the PE transactions announced between 1980 and 2008.

They investigate how PE investments affect industry competitors by conducting short term analyses of the industry competitors' stock price reactions around announcements, completions and the withdrawal of PE investments, and long term analyses of industry competitors' performance in the three years after the PE investments.

Thus, for the short term they get 13 087 completed and 212 withdrawn PE investments. For the long term they use 178 PE investment events. They then obtain the accounting information related to 14 288 competitors from Compustat, Lucian Bebchuk's, Execucomp, NBER Patents and Citations Database.

In order to study the competitors' short-term price reactions to PE investments, Hsu *et al.* (2010) analyse the cumulative abnormal return (CAR)[5] of industry competitor firms around

[5] Abnormal returns are computed as the difference between the actual stock price return and the expected market model return over each indicated window.

the announcement, completion and withdrawal dates of the PE investments for the different event windows, which start five days before the event date up to twenty days after the completion date.

They then realise that competitors see a variation in their stock prices around these transactions indeed. More specifically, competitors experience a decrease in their stock price at and around the completion of PE investments in their industry, but have positive stock price responses when PE investments are withdrawn. According to the authors these results provide further evidence that the stock price reactions capture, in fact, the effect that PE firms have on the competitive advantage of the target companies.

The announcement of a PE investment is expected to have a similar result as its completion because it significantly increases the probability that companies in a given industry have to deal with a higher level of competition due to the PE transaction.

In a first approach, they analyse the development of the operating performance by studying key performance variables (Return on Assets, asset growth, sales growth, operating income growth, R&D growth, market-to-book ratio, Kaplan and Zingales financial constraint index and leverage ratio) eight quarters before and eight quarters after the PE investment. The negative trend of these ratios after the PE investment suggests that competitors are also negatively affected in their operating performance after the transaction.

Going through this study, in order to determine whether there are other factors explaining the competitors' performance, the authors model performance as a function of firm size, firm age, industry valuation and past results by estimating the following panel regression:

$$\text{Performance}_{i,t} = \alpha + \beta \times \text{PE event}_{i,t} + \gamma \times \text{controls}_{i,t} + \varepsilon_{i,t} \quad \textbf{(1)}$$

Based on the results, overall, competitors also experience a decrease in their operating performance around PE investments after controlling for factors that affect performance every year.

To investigate whether cross-sectional differences in PE period competitors' performance can be explained by the five factors that influence the PE performance (specialization, corporate governance, managerial incentives, technological innovation and operating efficiency), Hsu *et al.* (2010) run the following cross sectional regression:

$$\text{Performance}_{i,e} = \alpha + \beta \times \text{Specialization}_{i,e} + \gamma \times \text{Governance}_{i,e} + \delta \times \text{Incentives}_{i,e} + \theta \times \text{Innovation}_{i,e} + \vartheta \times \text{Efficiency}_{i,e} + \varphi \times \text{Controls}_{i,e} + \varepsilon_{i,e} \quad \textbf{(2)}$$

Concerning the first determinant, there is a negative and statistically significant coefficient on the **PE Specialization**, which means that competitors have weaker performance when PE transactions in their industry are announced by specialized PE firms. This is consistent with Gompers *et al*. (2006) who argues that the specialization of PE investors will lead to greater expertise and better investments within an industry with competitive advantages for the target companies.

To investigate whether **corporate governance** plays a role in the performance of competitors, the authors use the entrenchment index (E-Index) of competitors, which is, according to Bebchuk *et al.* (2009), inversely related to the firm performance. The statistically negative and significant coefficient estimated indicates that competitors with better system of corporate governance have a higher performance than other firms.

To test if **manager compensation** is an important determinant of the differences among competitors' performance, the authors use the sensitivity of executive's stock and option values to changes in stock prices at the year of the PE investment. They then realise that "competitors with compensation packages that are more sensitive to share prices perform better than other firms". This is in agreement with Leslie and Oyer (2009) who find that PE-owned companies use much stronger incentives for their top executives relative to public companies and that the variable component is often cited as one of the key drivers of value creation in companies taken private.

In order to see if more **technological innovations** contribute to better performances, Hsu *et al.* (2010) measure the cumulative number of citations received from the patents granted to companies before the PE transaction. The positive and statistically significant coefficient indicates that competitors with more patent citations have higher levels of performance around the time of the PE investment.

The ratio of cost of goods sold to sales is used to investigate whether **operational efficiency** plays a role in the performance of competitors. The positive and statistically significant coefficient indicates that competitors perform better if they are more cost-efficient.

These results indicate that PE investments have competitive effects in their industries, indeed.

As a matter of fact, differences in performance among competitors at the time of the PE investment are closely associated to those five reasons (specialization of the PE partnership, corporate governance, technological innovations, managerial incentives and cost efficiency) that contribute to explain the competitive advantage of PE-backed firms, which gives support to the hypothesis that performance differences are driven by the advantages given to target firms by PE investors.

Therefore, the main objective of Hsu *et al.* (2010)' paper is achieved: this analysis "shows that rivals performance is closely linked to the presence of these five channels, and our analysis shows that these five channels provide an answer to the Bernstein, Lerner, Sorensen, and Strömberg (2010) question of how PE investments affect performance of their peers."

4.4. Existent Models

4.4.1. CEO Compensation

The factors that affect the top executive compensation have been examined in many empirical papers, with mixed findings.

For instance, Core *et al.* (1998) examine the relation between executive pay and a comprehensive set of economic, ownership and board variables.

To do so, these authors constitute a sample of 205 publicly traded US companies, operating in different industries and followed over a period of three years.

The association between the level of CEO compensation and firm's demand for high quality CEO is examined by using a cross-sectional multiple regression that includes, as dependent variable, one of the three measures of CEO compensation (total compensation, cash compensation and salary) and, as independent variables, those proxies for the economic determinants of CEO compensation, the board and ownership structure variables besides year and industry variables.

For **economic determinants**, these authors consider firm sales as a proxy for the size and complexity of firms and the market-to-book ratio to measure investment opportunities. Return on assets and the annual stock market return assess firm performance and both, the standard deviation of return on assets and the standard deviation of common stock returns, measure firm risk.

For the effectiveness of monitoring by the **board of directors**, they use eight measures that characterize the structure of the board and that are supposed to be associated to the level of CEO compensation: the independence between the board chair and the CEO; the size of the board of directors; the percentage of the total directors who are insiders; the percentage of total directors who are outside directors appointed by the CEO; the percentage of total directors who are "gray"[6] outside; the percentage of total directors who are interlocked [7]; the percentage of outside directors who are busy[8]; the percentage of outside directors who are over age 69.

[6] A director is "gray" if he or his employer received payments from the company in excess of his board pay.
[7] A director is "interlocked" if an inside officer of the firm serves on the board of that outside director's company.
[8] A director who is "busy" serves on three or more other corporate boards (six or more for retired outside directors).

To assess the **ownership structure**, they employ four measures: the percentage of outstanding shares owned by the CEO and his direct family; if there is a non-CEO internal board member that owns at least 5% of the outstanding shares; the percentage ownership per outside director; the existence of a blockholder that owns at least 5% of outstanding shares.

The regression results demonstrate that the level of total CEO compensation is cross sectionally related to the firm size and complexity, investment opportunities, prior performance and risk: higher size and more investments opportunities are associated with higher levels of CEO compensation; stock return seems to have a positive and significant association with compensation; risk affects negatively CEO compensation.

With respect to the structure of the board of directors, there is evidence that CEO compensation decreases with the percentage of the board composed by inside directors. Nevertheless, it is an increasing function of the board size, the percentage of the board that are outside directors appointed by the CEO, who are "gray" outside directors and who are interlocked outside directors. Moreover, it depends positively on the percentage of outside directors who serve on three or more other boards, who are over 69 and whether CEO is also board chair. This is consistent with the fact that when corporate governance is weak, the CEO can extract additional compensation from the firm.

Ownership has also a substantive cross-sectional association with the level of the CEO compensation: this is a decreasing function of the CEO's ownership stake, it is lower when there is an external blockholder who owns at least 5% of the shares and when there is a non-CEO internal board member. However, there is no statistical relation between CEO compensation and the percentage of ownership per outside director. Overall, the same conclusions are taken with cash compensation and salary.

Among other questions, Chalmers *et al.* (2003) also try to examine the determinants of the level of Australian firms' CEO compensation.

In addition to the economic variables mentioned in prior works, these authors also take into account various proxies for governance and ownership attributes that have been used to examine the executive compensation.

So, to test the determinants of the CEO compensation, they use a sample of the Top 200 Australian Stock Exchange listed firms, whose information was collected for each of the years from 1999 to 2002.

Concerning the dependent variable, it is considered each of the CEO compensation components, which are: fixed components of pay such as base salary, superannuation

contributions and non-cash benefits; bonuses; the value of options granted; shares issued; and the total CEO compensation that is the sum of all these four components.

Firm **economic** attributes related to the CEO compensation includes size (SIZE, natural logarithm of total assets), investment opportunities (MBV, market-to-book value of equity), past market and firm performance (RET, annual stock return, and ROA, return on assets) and firm risk (SDRET, standard deviation of one-year daily stock returns).

Board governance structures variables are: whether the CEO also serves as the chair of the board of directors (CEOBOD); board size (BODSIZE); the percentage of board members who are non-executive directors (OUTDIR); the number of non-executive directors with related party dealings expressed as a percentage of board size (GRAYDIR); an indicator variable to measure both the existence and independence of a compensation committee (CC).

Ownership attributes associated with executive pay includes: the CEO's share (CEOOWN) and option holdings (CEOOPT); non-executive directors share ownership (OUTOWN); and the number of substantial shareholders (SUBSH).[9]

To sum up, CEO compensation is regressed on the previously identified economic, governance and ownership attribute variables as well as on industry (SfkIND) and year (SgkYR) dummy variables, as the following model:

$$\begin{aligned}\text{Compensation}_{i,t} = a + \beta_1 \times \text{SIZE}_{i,t-1} + \beta_2 \times \text{MBV}_{i,t-1} + \beta_3 \times \text{RET}_{i,t-1} + \beta_4 \times \text{ROA}_{i,t-1} + \beta_5 \\ \times \text{SDRET}_{i,t-1} + \beta_6 \times \text{CEOBOD}_{i,t-1} + \beta_7 \times \text{BODSIZE}_{i,t-1} + \beta_8 \times \text{OUTDIR}_{i,t-1} + \beta_9 \\ \times \text{GRAYDIR}_{i,t-1} + \beta_{10} \times \text{CC}_{i,t-1} + \beta_{11} \times \text{CEOOWN}_{i,t-1} + \beta_{12} \times \text{CEOOPT}_{i,t-1} + \beta_{13} \\ \times \text{OUTOWN}_{i,t-1} + \beta_{14} \times \text{SUBSH}_{i,t-1} + \text{SfkIND}_i + \text{SgkYR}_i + \varepsilon_i \end{aligned} \quad \textbf{(3)}$$

Results demonstrate that economic attributes are significant drivers of CEO compensation in Australia and that after these variables have been controlled, governance and ownership attributes also have a role in determining the CEO compensation.

Recently, Conyon and He (2008) have also investigated the determinants of executive compensation and CEO equity incentives in China's listed firms, based on the economic, ownership and corporate governance factors mentioned in the literature.

Therefore, the executive compensation is modelled as follows (variables' description is presented in APPENDIX I):

[9] A substantial shareholder is defined as a shareholder with a 5% or greater shareholding, details of which are required to be disclosed in the annual report.

$$\begin{aligned}\mathrm{EXEC_{PAY}} = {} & \beta_0 + \beta_1 \times \mathrm{SALES_{i,t-1}} + \beta_2 \times \mathrm{SHR_{i,t-1}} + \beta_3 \times \mathrm{ROA_{i,t-1}} + \beta_4 \times \mathrm{MK_{BK_{i,t-1}}} + \beta_5 \times \mathrm{VOL_{i,t-1}} \\ & + \beta_6 \times \mathrm{PRIVATE_{i,t-1}} + \beta_7 \times \mathrm{OWN_{HERF_{i,t-1}}} + \beta_8 \times \mathrm{IND_{DIR_{i,t-1}}} + \beta_9 \times \mathrm{BOARD\_SIZE_{i,t-1}} \\ & + \beta_{10} \times \mathrm{COMBINE_{i,t-1}} + \beta_{11} \times \mathrm{COMP\_COMM_{i,t-1}} + \beta_{12} \times \mathrm{CONTROLS_{i,t-1}} + \varepsilon_{i,t}\end{aligned}$$

(4)

$$\begin{aligned}\mathrm{CEO_{EQUITY}} = {} & \gamma_0 + \gamma_1 \times \mathrm{SALES_{i,t-1}} + \gamma_2 \times \mathrm{SHR_{i,t-1}} + \gamma_3 \times \mathrm{ROA_{i,t-1}} + \gamma_4 \times \mathrm{MK_{BK_{i,t-1}}} + \gamma_5 \times \mathrm{VOL_{i,t-1}} \\ & + \gamma_6 \times \mathrm{PRIVATE_{i,t-1}} + \gamma_7 \times \mathrm{OWN_{HERF_{i,t-1}}} + \gamma_8 \times \mathrm{IND_{DIR_{i,t-1}}} + \gamma_9 \times \mathrm{BOARD_{SIZE_{i,t-1}}} \\ & + \gamma_{10} \times \mathrm{COMBINE_{i,t-1}} + \gamma\beta_{11} \times \mathrm{COMP_{COMM_{i,t-1}}} + \gamma_{12} \times \mathrm{CONTROLS_{i,t-1}} + \vartheta_{i,t}\end{aligned}$$

(5)

By using a sample of 1 481 firms from 2001 to 2005 these authors find that executive compensation is positively associated with firm size, performance and growth opportunities. Executive pay and incentives are negatively affected by firm risk. Boardroom governance is also important, since firms with compensation committees, where the posts of CEO and chairperson are combined or with a greater fraction of independent directors on the board have higher payments and incentives. In what concerns the ownership, compensation is higher in companies that are privately owned and is lower when firm ownership is more concentrated.

Despite some potential limitations, this study provides the first evidence on the determinants of CEO incentives and compensation in China's listed firms and corroborates that economic, ownership and board governance factors are also determinants of the executive compensation in China.

4.4.2. Capital Structure

The corporate finance literature contains various papers examining the nature and determinants of corporate financial structure. Nevertheless, it is common agreed that the choice of appropriate explanatory variables is not easy.

Bevan and Danbolt (2000) concentrate their study on the four key variables identified in prior literature, which are the level of growth opportunities, firm size, profitability and collateral value.

Titman and Wessels (1988) and Barclay *et al.* (1995) state that there is a negative relation between growth opportunities and the level of gearing, since future investment opportunities may generate conflicts between shareholders and debtholders, like underinvestment or diversion of resources. Nevertheless, Stohs and Mauer (1996) and Michaelas *et al*. (1999) find evidence for a different relationship depending on the use of short or long term forms of debt, because the agency problem can be solved once the company issues short term debt instead of long one.

In terms of size, Bevan and Danbolt (2000) mention that it is expected small companies have less long term debt – but possibly more short term debt – than larger companies, because debtholders tend to limit length of maturity offered to them (Stohs and Mauer (1996)).

Concerning profitability, due to information asymmetry, and consistent with the pecking order theory, companies will prefer internal to external capital sources of financing as it is supported by Titman and Wessels (1988) and Michaelas *et al*. (1999).

Bevan and Danbolt (2000) also present prior evidence for a positive correlation between tangibility and long term forms of debt and a negative correlation for short term debt elements.

To study these four determinants of the capital structure, Bevan and Danbolt (2000) use a sample composed by 1 054 non-financial UK companies followed over the time period from 1991 to 1997.

As dependent variables these authors consider a variety of long and short term debt components rather than the more aggregate gearing measures. Market-to-book, logarithm of sales, profitability and tangibility are the independent variables. Therefore, the estimated model is the following one:

$$\text{Gearing}_{i,t} = \beta_1 + \beta_2 \times \text{Market} - \text{to} - \text{Book}_{i,t-3} + \beta_3 \times \text{LogSales}_{i,t-3} + \beta_4 \times \text{Profitability}_{i,t-3} + \beta_5 \times \text{Tangibility}_{i,t-3} + \varepsilon_{i,t} \quad \textbf{(6)}$$

The results of this analysis reveal that, contrary to what was expected, companies with high levels of growth opportunities tend to use more long and short term debt. Additionally, larger companies have traditionally been more reliant on long term debt, while smaller companies compensate their difficulty in being financed with long term debt with short term debt. Moreover, there is evidence for an increase in the positive correlation between debt and profitability throughout the horizon of the study. Tangibility is positively correlated with long term debt forms and negatively related to short term debt.

Huang and Song (2002) employ a new database containing the market and accounting data from more than 1000 Chinese listed companies up to the year 2000 to document the characteristics of these firms in terms of capital structure.

According to them, theoretical and empirical studies have shown that profitability, tangibility, tax, size, non-debt tax shields, growth opportunities and volatility affect capital structure.

Based on prior works, Huang and Song (2002) use different measures of leverage and consider, as explanatory variables, profitability (ROA), tangibility (fixed assets scaled by total assets), tax (effective tax rate), size (natural logarithm of sales and total assets), non-debt tax shields (depreciation scaled by total assets), growth opportunities (quick sales growth rate), volatility (standard deviation of earnings before interest and tax to measure volatility), ownership structure (institutional shareholdings) and managerial shareholders (total percentage of directors and top managers).

They then realise factors that affect firms' leverage in other countries also affect Chinese companies' leverage in a similar way. Specifically, leverage decreases with profitability and non-debt tax shields and increases with firm size and volatility. Tangibility has a positive effect on long-term debt ratio and companies that have experienced quick sales growth rate tend to have higher leverage. The ownership structure has also impact on capital structure. There is evidence that firms with higher state shareholding and lower institutional shareholding tend to have lower total liabilities ratio and lower total debt ratio. Tax and management shareholding have no significant effect on leverage, although it is widely believed that tax affects the capital structure.

4.4.3. Board of Directors

The size and the structure of corporate boards of directors have been studied by some authors in order to improve firms' corporate governance.

Adopting the view that companies choose board sizes and structures that are suitable for their situations, Lenh *et al.* (2003) examine a unique sample of 81 publicly traded US firms that survived from 1935 to 2000.

They argue that "board size is governed by the tradeoff between the aggregate information that large board posses and the increased costs of decision-making associated with large boards". So, in their work they analyse two attributes of firms that will probably affect this tradeoff and consequently the optimal size of the board.

One of the variables is the **firm size**: it is expected a direct relation between the size of the firms and the size of their boards, since higher volume and greater diversity of activities imply more demand for information.

The other factor is related to the **growth opportunities**, being expected an inverse relation between them and board size for two reasons: costs of monitoring managers increase with firm's growth opportunities; firms that experience higher growth opportunities are generally younger and operate in a more volatile environment, which requires governance structures that allow them to make rapid decisions.

Concerning board composition, Lenh *et al.* (2003) define it as the mix of inside and outside directors [10] and assume two hypotheses regarding the determinants of board composition based on the same firm characteristics suggested as determinants of board size.

So, in terms of firm size, they expect a direct relation with the independence of the boards as a way to mitigate the agency problems associated with firm size: in general, due to the inverse relation between the percentage of equity held by top managers and firm size, the potential for agency conflicts between managers and shareholders is expected to increase in firm size. Moreover, larger firms may have less transparency with respect to their performance and have higher agency costs of free cash flow.

It is also expected an inverse relation between growth opportunities and the proportion of boards composed by independent directors. This is explained by the information asymmetries

[10] Without sufficient data for other standard definitions of composition, these authors consider insiders as "directors who are officers of the firm" and outsiders the all other directors.

that will hamper the advisory function of outside directors. Furthermore, since directors also have a monitoring function, the CEO may omit certain types of information.

To test these hypotheses the authors estimate a series of fixed effects regression models, in which the dependent variables are the board size (log Board Size) and the percentage of insiders (% Insiders). For both dependent variables, it was used, as explanatory variables, the market value of equity (Mkt Cap) as the proxy for firm size (replicate the regression with sales and book value of assets), and the ratio of market to book value of assets (MTB Assets) and the ratio of property plant and equipment to total assets (PPE ratio) to measure growth opportunities. There is also a Dummy variable that equals to 1 if the data is post 1980 or equals to 0, otherwise.

$$\text{Log(Board Size)} = \beta_1 + \beta_2 \text{Log(Mkt Cap)} + \beta_3 \text{Log(MTB Assets)} + \beta_4 \text{Log(PPE ratio)} + \beta_5 \text{Dummy} \quad \textbf{(7)}$$

$$\%\ \text{Insiders} = \beta_1 + \beta_2 \text{Log(Mkt Cap)} + \beta_3 \text{Log(MTB Assets)} + \beta_4 \text{Log(PPE ratio)} + \beta_5 \text{Dummy} \quad \textbf{(8)}$$

After running the regressions, Lenh *et al.* (2003) find that "firm size and growth opportunities explain a large amount of the cross-sectional and intemporal variation in the size and structures of boards." There is evidence that board size increases with firm size and decreases in growth opportunities, whereas the insider representation evolves in a symmetric way, i.e., decreases in firm size and increases with growth opportunities.

By using a comprehensive sample of nearly 7 000 American firms from 1990 to 2004, Linck *et al.* (2007) examine, among others, the determinants of corporate board structure.

Based on theoretical prior works these authors classify the board's activities into two major functions, which are monitoring and advising. According to them, firm's optimal board structure depends on the costs and benefits of these two functions given the firm's characteristics.

Therefore, they test how firm characteristics are related to the three measures of board structure: board size, board independence and board leadership.[11]

[11] They define board size as the number of directors on the board, board independence as the proportion of the board composed by non-executive directors (outsiders), and board leadership as whether the CEO is also the COB.

Monitoring and advising functions are expected to be related to firm complexity, being predicted that board size and independence increase in **firm complexity**. As explained in this study, although monitoring costs increase with firm's complexity, the benefits from the effective monitoring and from the variety of expertise brought by outsiders should outweigh the costs. Therefore, to proxy for a firm's complexity and advising benefits they use firm size given by the market value of equity (MVE), the proportion of debt in the capital structure (Debt) and the number of business segments (Segments). Although it is not clear whether complexity increases with firm age, they also consider this variable (Firm_Age).

Additionally, as supported by Linck *et al.* (2007) it is not optimal for firms with high information asymmetry to invite monitoring from outsiders because it is costly for the firms to transfer firm-specific information to them, i.e., it is more costly for large boards to monitor growth companies that have associated a higher volatility.

Thus, to proxy for **monitoring and advising costs**, they use the market-to-book ratio (Market to book value of equity, MTB), the level of R&D spending (R&D), and the standard deviation of stock returns (RETSTD). Since they expect the cost of monitoring and advising to increase with these characteristics, they predict them to be negatively related to board size and its independence.

Raheja (2005) also highlights the importance of **ownership** as determinants of the size and composition of the board, suggesting that when insider interests are aligned with shareholders, insiders are less likely to take inferior projects, and there is less need for outside monitors, which leads to smaller and less independent boards. She also notes that higher ownership by outside directors means more benefits of verification and, therefore, lower verification costs.

So, Linck *et al.* (2007) use the percentage of shares held by the CEO to measure insider incentive alignment (CEO_Own) and the percentage of shares held by outside directors to proxy for outsider incentive alignment (Director_Own). Based on prior works, they expect board size and independence to be negatively related to CEO ownership and positively associated to outside director ownership.

Linck *et al.* (2007) also present some authors who mention that the **CEO characteristics** are critical factors for the board composition: board independence should decrease in the CEO's perceived ability and the nearness of the CEO to retirement and increases with CEO influence and with private benefits. Therefore, they proxy for the CEO's perceived ability using past performance, which is measured by using average industry-adjusted return on

assets over the two years preceding the proxy date (Performance). They use CEO age (CEO_Age) to proxy for a CEO nearing retirement and Free Cash Flow (FCF) to proxy for the magnitude of private benefits. For CEO influence they use a dummy variable that equals to one when the CEO is also the Chairman of the Board (CEO_Chair). They then estimate the following board size and independence regressions via OLS, considering lagged values of the dependent variables (three years earlier) as well as industry and year dummy variables:

$$\begin{aligned}\text{Board Size} = \alpha + \beta_1 \text{Log(MVE)} + \beta_2 \text{Debt} + \beta_3 \text{Log(Segments)} + \beta_4 \text{Firm}_{\text{Age}} + \beta_5 \text{Firm}_{\text{Age}}{}^2 + \beta_6 \text{MTB} \\ + \beta_7 \text{R\&}D + \beta_8 \text{RETSTD} + \beta_9 \text{CEO\_Own} + \beta_{10} \text{Director\_Own} + \text{Industry Dummies} \\ + \text{Year Dummies} + \varepsilon\end{aligned} \quad \textbf{(9)}$$

$$\begin{aligned}\text{Board Ind} = \alpha + \beta_1 \text{Log(MVE)} + \beta_2 \text{Debt} + \beta_3 \text{Log(Segments)} + \beta_4 \text{Firm}_{\text{Age}} + \beta_5 \text{Firm}_{\text{Age}}{}^2 + \beta_6 \text{MTB} \\ + \beta_7 \text{R\&}D + \beta_8 \text{RETSTD} + \beta_9 \text{CEO}_{\text{Own}} + \beta_{10} \text{Director}_{\text{Own}} + \beta_{11} \text{FCF} + \beta_{12} \text{Performance} \\ + \beta_{13} \text{CEO\_Age} + \beta_{14} \times \text{lag(CEO\_Chair)} + \text{Industry Dummies} + \text{Year Dummies} + \varepsilon\end{aligned} \quad \textbf{(10)}$$

The results of these regressions show a strong relation between board structure and firm characteristics. Overall, board size and independence are increasing in firm complexity and advising benefits, since the coefficients of firm size, debt, the number of business segments and firm age are all positive and statistically significant. Besides, firms with high growth opportunities, high R&D expenditures and high stock return volatility tend to have smaller and less independent boards when compared with large firms. High managerial ownership is associated with smaller and less independent boards. Furthermore, firms have more independent boards when insiders have a greater opportunity to extract private benefits and when the CEO has greater influence over the board.

Performance is negatively related to board independence, consistent with the hypothesis that firms add outsiders to the board following poor performance. Also, firms with older CEOs have more insiders on the board, consistent with the hypothesis that firms add insiders to the board as the CEO approaches retirement as part of the succession planning process.

5. Hypotheses Development

In order to know whether a PE investment in a target company has an impact on the CEO compensation, capital structure, board size and board independence of **competing** companies in the same industry some models are estimated under the following hypotheses:

Hypothesis 1a): Total CEO compensation of rivals is not affected by the occurrence of an investment in PE;

Hypothesis 1b): CEO salary of competitors is not affected by the occurrence of an investment in PE;

Hypothesis 1c): Variable component of the CEO compensation of rivals is not affected by the occurrence of an investment in PE;

Hypothesis 2): Rivals' capital structure is not affected by the occurrence of an investment in PE;

Hypothesis 3a): Competitors' board size is not affected by the occurrence of an investment in PE;

Hypothesis 3b): Rivals' board structure is not affected by the occurrence of an investment in PE.

6. Methodology

6.1. CEO Compensation

To test hypotheses one, which assess the impact of PE investments on the CEO compensation of competitors, we estimate the following panel regressions after controlling for some factors that are known to predict the executive compensation:

$$\text{T. Comp.}_{i,t} = \beta_1 + \beta_2 \text{Assets}_{i,t-1} + \beta_3 \text{MkBk}_{i,t-1} + \beta_4 \text{DebtRatio}_{i,t-1} + \beta_5 \text{ROA}_{i,t-1} + \beta_6 \text{Vol}_{i,t-1} + \beta_7 \text{PEdummy}_{i,t-1} + \beta_8 \text{Yrdummy}_{i,t-1} + \beta_9 \text{Indummy}_{i,t-1} + \varepsilon_{i,t} \quad \textbf{(11)}$$

$$\text{Var. Comp.}_{i,t} = \beta_1 + \beta_2 \text{Assets}_{i,t-1} + \beta_3 \text{MkBk}_{i,t-1} + \beta_4 \text{DebtRatio}_{i,t-1} + \beta_5 \text{ROA}_{i,t-1} + \beta_6 \text{Vol}_{i,t-1} + \beta_7 \text{PEdummy}_{i,t-1} + \beta_8 \text{Yrdummy}_{i,t-1} + \beta_9 \text{Indummy}_{i,t-1} + \varepsilon_{i,t} \quad \textbf{(12)}$$

$$\text{Salary}_{i,t} = \beta_1 + \beta_2 \text{Assets}_{i,t-1} + \beta_3 \text{MkBk}_{i,t-1} + \beta_4 \text{DebtRatio}_{i,t-1} + \beta_5 \text{ROA}_{i,t-1} + \beta_6 \text{Vol}_{i,t-1} + \beta_7 \text{PEdummy}_{i,t-1} + \beta_8 \text{Yrdummy}_{i,t-1} + \beta_9 \text{Indummy}_{i,t-1} + \varepsilon_{i,t} \quad \textbf{(13)}$$

The **dependent variables** of these three regressions are, respectively, the total compensation of CEO of firm *i* in year *t* (T.Comp.), the variable component of that compensation (Var.Comp.) and the fixed one (Salary).

Based on the determinants of executive compensation described in chapter 4.4.1, we just consider economic attributes, since the aim of this study is not to test models or to propose a new one, but to realise whether the private equity event is or is not statistically significant.

Therefore, this study includes the total assets (Assets), the market-to-book value of assets (MkBk), the debt ratio (DebtRatio), the return on assets (ROA) and the volatility (VOL) as **independent variables.**

Moreover, the PE indicator variable assumes the value 1 in the year and in the two years after the occurrence of an investment in private equity in the industry and 0 in the all other years. The model also comprises year (Yrdummy) and industry (Indummy) variables.

A detailed description of these variables can be found in Appendix II.

6.2. Capital structure

To conclude about the effect of PE investments on the competitors' capital structure, we run the following regression:

$$\begin{aligned}\text{DebtRatio}_{i,t} = {} & \beta_1 + \beta_2 \text{Assets}_{i,t-1} + \beta_3 \text{MkBk}_{i,t-1} + \beta_4 \text{EbitdA}_{i,t-1} + \beta_5 \text{Tang}_{i,t-1} + \beta_6 \text{Vol}_{i,t-1} \\ & + \beta_7 \text{Tax}_{i,t-1} + \beta_8 \text{Dvdummy}_{i,t-1} + \beta_9 \text{PEdummy}_{i,t-1} + \beta_{10} \text{Yrdummy}_{i,t-1} \\ & + \beta_{11} \text{Indummy}_{i,t-1} + \varepsilon_{i,t}\end{aligned} \quad \textbf{(14)}$$

The **dependent variable** of this regression is the market leverage (DebtRatio) of firm *i*, in year *t*.

Taking into special account the mentioned studies and results of Bevan and Danbolt (2000) and Huang and Song (2002) about the determinants of capital structure, it is also considered size (Assets), profitability (EbitdA), tangibility (Tang), tax (Tax), dividends (Dvdummy), growth opportunities (MkBk) and risk (Vol) measures as **independent variables** in addition to the year and industry variables.

Dvdummy is an indicator variable that equals to 1 if in year *t-1* there is dividends' distribution in firm *i* and 0 otherwise. Year (Yrdummy) and Industry (Indummy) dummy variables assume the same values as explained in the CEO compensation model: 1 in the year and in the two years after the existence of an investment in private equity in the industry and 0 in the all other years.

In Appendix II, it is presented a better description of how to compute each of these variables.

6.3. Board of Directors

By using the models developed by Lenh *et al.* (2003) and Linck *et al.* (2007) to explain the size and the independence of boards of directors, we estimate the following regressions in order to test whether the presence of private equity investments affects the board characteristics:

$$\begin{aligned}\text{BoardSize}_{i,t} = {} & \beta_1 + \beta_2 \text{Assets}_{i,t-1} + \beta_3 \text{MVE}_{i,t-1} + \beta_4 \text{MkBk}_{i,t-1} + \beta_5 \text{Segments}_{i,t-1} + \beta_6 \text{Vol}_{i,t-1} \\ & + \beta_7 \text{FirmAge}_{i,t} + \beta_8 \text{PEdummy}_{i,t-1} + \beta_9 \text{Yrdummy}_{i,t-1} + \beta_{10} \text{Indummy}_{i,t-1} + \varepsilon_{i,t}\end{aligned} \quad \textbf{(15)}$$

$$\begin{aligned}\text{BoardIndep}_{i,t} = {} & \beta_1 + \beta_2 \text{Assets}_{i,t-1} + \beta_3 \text{MVE}_{i,t-1} + \beta_4 \text{MkBk}_{i,t-1} + \beta_5 \text{Segments}_{i,t-1} + \beta_6 \text{Vol}_{i,t-1} \\ & + \beta_7 \text{FirmAge}_{i,t} + \beta_8 \text{PEdummy}_{i,t-1} + \beta_9 \text{Yrdummy}_{i,t-1} + \beta_{10} \text{Indummy}_{i,t-1} + \varepsilon_{i,t}\end{aligned} \quad \textbf{(16)}$$

The **dependent variables** are, respectively, board size (BoardSize) and the percentage of outsiders (BoardIndep). Concerning this last variable, according to RiskMetrics, directors are classified as "independent", "linked" and "employee/ insider". Without any other information, we consider "outsiders" the "independent" directors in RiskMetrics and "insiders" the other two classes.

Firms' complexity is measured with the variables total assets (Assets), market value of equity (MVE), firm age (FirmAge) and number of business segments (Segments). To proxy for growth opportunities it is used market-to-book value of assets (MkBk) and volatility (Vol), this last one as a risk measure. Besides these **independent variables**, it is also add the PE dummy variable as well as year and industry variables.

A detailed information about these variables is shown in Appendix II.

It is important to highlight that for all these models, we should consider as many years as possible for each firm and that these regressions are estimated by using "clusters per firm" to address time-series dependence in data.

7. Sample selection and Data

To analyse the effects that PE investments have on competitors, it is selected an initial comprehensive sample of these transactions from the CapitalIQ database considering the following criteria: (1) All transactions are announced between 1980 and 2007, (2) the status of these investments is either "closed" or "effective", (3) the transactions are in the United States or Canada, (4) the value of the transaction must be greater than 10 million dollars and (5) the investment type is categorize as "Private Equity Investing". With these conditions, we get **13 939 PE investments** covering **154 industries** by using the Global Industry Classification Standard (GICS).

In order to select the most significant investments in each industry we only consider those transactions whose value is equal to or higher than 10% of the average book value of each industry. This reduces the sample for a total of **1 127 PE investments** spread over **115 industries** (GICS).

Nevertheless, in a given year, more than one investment can occur in a certain industry, which implies that PE transactions are not isolated in time. Therefore, in order to analyse whether there are differences between the years before and the years after one or a series of PE transactions, we only consider those investments that are not preceded by other large investment in the same industry in the previous two years. Hsu *et al.* (2010) also take this contamination effect into consideration to select isolated PE events.

Finally, by using the correspondence among GICS, Standard Industrial Classification (SIC), Committee on Uniform Security Identification Procedures (CUSIP), North American Industry Classification System (NAICS) and Ticker Symbol (TICKER) codes it is possible to identify the publicly listed competitors of those firms that received the private equity investments. The selected companies have at least two years of public information available.

Since the diverse accounting data related to competitors is obtained from different platforms, it is not possible to consider exactly the same samples of PE investments and competitors for the three variables in study, because the availability of information is different from platform to platform.

Therefore, concerning the **CEO compensation** variable, data is collected from Compustat ExecuComp (namely, executive compensation values, volatility and return on assets) and from CRSP/Compustat Merged (the all other accounting information), in the accessible period from 1992 to 2009. So, by matching all these databases it is only possible to study those PE

investments that occur in the period 1994-2007. The number of PE transactions is, thus, 247 and the total of firms' observations is 16 718, corresponding to 107 industries (GICS) and 1 910 competitors.

For the **capital structure**, the information is also got from Compustat ExecuComp database (mainly the risk information) and from CRSP/Compustat Merged Database (the all other accounting information), from 1992-2009. Therefore, the period followed of PE investments is, once again, 1994 –2007. From this we analyse 247 PE transactions and a total of 51 101 competitors' observations that corresponds to 5 295 companies and 106 industries (GICS).

Due to the required matching of more databases, it is used a subsample to study the **board size and its structure**: RiskMetrics to get board information, Compustat ExecuComp database to obtain volatility values, CRSP/Compustat Merged Database that provides accounting information and Compustat North America that gives us the total number of business segments. Besides, the period considered is smaller (from 1996 to 2007), implying that the transactions considered occur in the period 1998-2006. With these constraints, it is only possible to analyse a total of 136 transactions and 2 274 of competitors' observations, corresponding to 541 companies and a total of 69 industries (GICS).

Concerning the descriptive statistics of the biggest sample (those 247 PE transactions), the mean transaction value is 1 210,19 million dollars, i.e., they are significant investments, and, by looking at the type of investment, it is possible to realise that most of them (87,04%) are classified as mergers and acquisitions and the remaining 12,96% as private placements. Analysing the geographic distribution, 95,14% of the transactions took place in the United States of America and the others 4,86% in Canada. Moreover, considering the selection criteria described before, the industries with a higher number of investments in the period considered are Biotechnology, Catalog Retail, Healthcare Facilities, Hotels, Resorts and Cruise Lines, Housewares and Specialties, Life Sciences Tools and Services, Marine, Specialized REITs, Textiles and Trading Companies and Distributors, as evident in graph 1, APPENDIX III. Nevertheless, it is important to mention that this does not correspond to the real distribution of PE investments per industry during the period 1994-2007. Actually, the most representative industry is the Application Software followed by Building Products, Healthcare Services and Office Services and Supplies. This is due to the difficulty in isolating one investment or a series of investments occurred in each of those industries that have a distance equal to or higher than two years from the previous transaction.

8. Results

8.1. CEO Compensation

Model	Dependent variable	PE dummy variable			
		Coef.	Std. Err.	t	p>t
1	Log (Total Compensation)	-.04633	.01746	-2.65	.008
2	Log (Total Compensation)	-.03514	.01931	-1.82	.069
3	Log (Total Compensation)	-.03297	.01930	-1.71	.088
4	Log (Total Compensation)	-.04205	.01776	-2.37	.018
5	Log (Total Compensation)	-.02982	.01976	-1.51	0.131
6	Log (Total Compensation)	-.02779	.01973	-1.41	0.159

Table 1: Stata outputs of the CEO compensation.

By running the test used to assess whether private equity transactions affect or not the **total CEO compensation** of competitors, it is possible to conclude that there is a negative and statistically significant coefficient (at the 5% significance level) in the PE dummy, as can be seen in **model 1,** table 1. This indicates that, assuming all other variables constant, executive compensation of competitors is reduced by approximately 4,6% per year, which corresponds, annually and in absolute terms, to 183,869 thousand dollars, in the year and in the two years after the occurrence of an investment in the same industry.

If we also consider the variable volatility, the coefficient changes being statistically insignificant at the 5% significance level but still significant at the 10%, as evident in **model 2**. In this last case it is assumed that in the presence of private equity investments there is a reduction in the total CEO compensation of about 3,5%.

In order to realise whether the increase in the p-value is due to a marked reduction in the size of the sample or to the consideration of this new variable, we also run the regression by using the same sample of model 2, but now ignoring volatility. **Model 3** shows that the p-value also increases when compared with model 2. Taking all these facts into account there is evidence supporting that the increase in the p-value from model 1 to model 2 is probably explained by the reduction in the size of the sample (less 2 891 observations considered) rather than by the consideration of the volatility.

The same conclusions are taken if we replace total assets by total revenue as a measure of firms' size. These results are presented in **models 4, 5 and 6**.

Moreover, the lower value of the robust standard error of the estimate PE dummy in each of these six models supports that the null hypothesis should be rejected.

To better understand this reduction, the total compensation is decomposed on its main components. The fixed one corresponds to the salary and the variable component is computed by subtracting salary from the total compensation.

Fixed Component

Model	Dependent variable	PE dummy variable			
		Coef.	Std. Err.	t	p>t
7	Log (Salary)	-.01609	.01621	-.99	.321
8	Log (Salary)	-.00114	.01499	-.08	.939
9	Log (Salary)	-.00139	.01501	-.09	.926

Table 2: Stata outputs of the fixed compensation.

Taking into account the **salary** results, we can realise that the coefficient associated to the dummy variable is negative and statistically insignificant even at the 10% level according to **model 7** (table 2)**,** where the p-value is 32,1% . Based on this, it is wise to assume that the fixed component is not the reason for the reduction in the total executive compensation.

Once again, the inclusion of the variable volatility, which leads to a reduction in the total number of observations available, worsens the statistic *t* **(model 8),** rising the p-value to approximately 93,9%.

If we analyse the same sample without considering that variable there is a slight decline on the p-value, which remains statistically insignificant no matter whether the level of significance is 5% or 10% **(model 9)**.

Based on this result the null hypothesis is not rejected, i.e., the CEO salary of competitors is not affected by the occurrence of an investment in PE.

Variable Component

Model	Dependent variable	PE dummy variable			
		Coef.	Std. Err.	t	p>t
10	Log (Variable Component)	-.07748	.03120	-2.48	.013
11	Log (Variable Component)	-.05808	.03487	-1.67	.096
12	Log (Variable Component)	-.05517	.03488	-1.58	.114
13	Variable Component	-305.87	143.82	-2.13	.034
14	Variable Component	-282.14	169.95	-1.66	.097
15	Variable Component	-267.51	170.13	-1.57	.116

Table 3: Stata outputs of the variable compensation.

So, in order to understand if this fluctuation in the executive retribution is due to a decline in the natural logarithm of the variable component, it is run **model 10** (table 3). The coefficient of the PE dummy is negative and statistically significant at 5%, implying a reduction in the variable component of approximately 7,7%. In absolute terms and annually, it corresponds to approximately less 255,413 thousand dollars per year of private equity effect.

If we consider the volatility that coefficient is considered zero at the 5% significance level, but it is still significant at 10%, being around -191,53 thousand dollars **(model 11)**.

Once again, this higher value of the p-value is probably explained by the large reduction in the sample size. In fact, from models 11 and 12, which were tested with smaller samples, it is possible to infer that the p-value is higher in **model 12**. This means that the introduction of volatility is not responsible for the higher p-value.

In **model 13** it is analysed the variable component without applying the log adjustment. This also allows us to consider the observations with "zero" pay. The statistically significant coefficient of the PE dummy implies that in the years of private equity transactions the annual value of the variable component of compensation decreases by approximately 305,87 thousand dollars.

The introduction of the volatility raises the value of the p-value as presented in **model 14**. PE dummy is now zero at the 5% significance level, but it is still negative and statistically significant at the 10%. In this last situation, the variable component decreases by 282,14 thousand dollars.

Considering the same sample and by running the regression without the volatility data, the PE coefficient is also zero at the 10% significant level. Nevertheless, the p-value associated to this model (**model 15**) is close to 10% (it is 11,6%).

Further details of the results of these models can be found in APPENDIX IV.

From all these tests, there is evidence to reject the null hypothesis and, thus, to conclude that the total CEO compensation of competitors is negatively affected by the existence of PE transactions, likely due to changes in the variable component.

To better understand these results it would be interesting to realise what happens to the CEO compensation of those firms that receive the PE investment.

Strömberg (2009: 8) states that "firms owned by private equity funds have more robust corporate governance practices than other firms": Among other differences, PE firms tend to introduce more long-term performance-based managerial compensation and PE-backed companies have a significantly larger equity interest in the company. Assuming that this higher control over the executive compensation also implies an initial adjustment on it, this reaction of competitors can be explained by their trend to imitate the invested firms and, then, to follow the similar strategy of controlling the variable component of compensation.

Nevertheless, it is important to highlight this is a mere assumption. As a matter of fact, a deeper study of PE-backed firms in order to validate this possibility is required.

8.2. Capital Structure

Model	Dependent variable	PE dummy variable			
		Coef.	Std. Err.	t	p>t
16	Log (Market Leverage)	.11864	.01706	6.96	.000
17	Log (Market Leverage)	.01291	.02583	.50	.617
18	Log (Market Leverage)	.02108	.02607	.81	.419
19	Log (Market Leverage)	.11097	.01645	6.74	.000
20	Log (Market Leverage)	.01765	.02567	.69	.492
21	Log (Market Leverage)	.02506	.02582	.97	.332
22	Log (Market Leverage)	.11959	.01706	7.01	.000
23	Log (Market Leverage)	.01319	.02583	.51	.610
24	Log (Market Leverage)	.02155	.0261	0.83	0.41
25	Log (Market Leverage)	.11424	.01664	6.86	.000
26	Log (Market Leverage)	.01626	.02577	.63	.528
27	Log (Market Leverage)	.02349	.02595	.91	.365
28	Log (Market Leverage)	.11860	.01706	6.95	.000
29	Log (Market Leverage)	.01283	.02583	.50	.620
30	Log (Market Leverage)	.02101	.02607	.81	.420
31	Log (Market Leverage)	.11956	.01706	7.01	.000
32	Log (Market Leverage)	.01311	.02583	.51	.612
33	Log (Market Leverage)	.02148	.02608	.82	.410

Table 4: Stata outputs of the capital structure.

In order to conclude whether the occurrence of private equity investments affects the capital structure of competitors, the same procedure presented before is used, which consists on the analysis of the PE dummy coefficient.

So, **model 16,** in table 4, indicates that, assuming all other variables constant, the market leveraged of those peers increases by approximately 11, 9 percentage points in the year and in the two years after the occurrence of a PE investment in the industry. In fact, the PE dummy coefficient is statistically significant at 5%, since the significance level associated to the statistic *t* is zero.

It is important to highlight that, for each firm, tax rates vary considerably all over years. Therefore, to conclude about whether these changes affect, or not, the final results, the regression is also run now using the natural logarithm of tax rate, the average of the three years tax rate per firm and the natural logarithm of that average, as **models 19, 22** and **25** show. Comparing all these models we can realise that the final results are the same, i.e., PE

dummy is still different from zero, implying a rise of debt in the capital structure by around 11% in the presence of private equity transactions.

When volatility is introduced the PE coefficient changes, being statistically insignificant even at 10%. The p-value increases to approximately 61,7%, as evident in **model 17**. These results do not depend on the tax rate variable used, as **models 20, 23 and 26** prove.

By using the same sample of these last models without considering volatility, we can take the same conclusion as before (**models 18, 21, 24 and 27**). From this there is support for the assumption that p-values worsened due to the greatly reduction in the sample size.

Nevertheless, despite this rise in the p-value, the robust standard deviation is still low.

Those conclusions are not different from the ones that we get from **models 28 to 33,** in which the total assets variable is replaced by the total revenue.

Additional information related to these models can be found in APPENDIX V.

Although the biggest sample is more conclusive than the smallest one, there is evidence to reject the null hypothesis and, therefore, to consider that the capital structure of competitors is positively affected by the existence of PE transactions.

There are many authors arguing that, among other measures applied to create value, PE firms improve the capital structure of the invested companies, considering the particular importance of leverage.

Axelson *et al.* (2007) present a rationale for why private equity firms raise additional capital from an outsider at the deal level after the formation of the fund: outside financing helps to discipline general partners leading them to opt for more promising deals. In this last case the financial structure of private equity funds can mitigate the agency problems[12] between limited partners and general partners.

Also, Liu (2009) presents a model for capital structure of private equity-backed firms and provides a possible explanation for why private equity investment needs to involve outside debt. Among other motivations, this author states that the financial structure of the private equity investment can solve the agency problem between management and general partners.

What happens with PE-backed firms may help us to understand those changes in the capital structure of competitors. By recognizing the effect of debt as a way to mitigate the

[12] The atomicity of the actual companies has been leading to a separation between ownership and management through the establishment of agency relationships. According to Jensen and Meckling (1976), these relations consist on contracts in which the principal(s) contracts other people (agents) to work for them. According to the agency theory, some problems may arise when there is a conflict of interests of the principal and the agent and the main cause for this is the existence of asymmetric information between these two parties.

Therefore, to reduce the effects of this asymmetric information, the owners of a company try to incorporate monitoring so that they can control the agents' activities

agency problems between managers and shareholders, competitors may tend to follow the example of the invested companies. Once again, the imitation process is a plausible reason.

8.3. Board of Directors

Model	Dependent variable	PE dummy variable			
		Coef.	Std. Err.	t	p>t
34	Log(BoardSize)	.01074	.011292	.95	.342
35	Log(BoardSize)	.01743	.01156	1.51	.132
36	Log(BoardSize)	.01750	.01159	1.51	.132
37	Log(BoardSize)	.01085	.01133	.96	.339
38	Log(BoardSize)	.01704	.01161	1.47	.143
39	Log(BoardSize)	.01712	.01164	1.47	.142

Table 5: Stata outputs of the size of the board of directors.

As it was already mentioned, the size and the structure of the board of directors are the board variables in study.

Concerning the size, it is evident that the PE dummy is considered statistically insignificant even at the 10% significance level, which implies that there is not any effect of the PE investments on it, as evident in **model 34**, in table 5.

Nevertheless, if we consider volatility, the total number of observations decreases as well as the p-value that is 13,2%. Once again, this result leads us to not reject the null hypothesis and, therefore, to consider that the PE dummy is not statistically significant according to **model 35**.

By using the same sample of model 35 without considering the volatility variable, it is possible to conclude that the introduction of volatility does not change the p-value, since the significance level associated to the statistic test is the same, as shown in **model 36**.

The same conclusions are taken if we replace total assets by total revenue (**models 37, 38 and 39**).

Based on these results, there is evidence to not reject the null hypothesis and, thus, to assume that the size of the board of directors remains constant in the presence of PE investments in the industry.

Additional information related to the results of the board variables can be found in APPENDIX VI.

Model	Dependent variable	PE dummy variable			
		Coef.	Std. Err.	t	p>t
40	Perc_Indep	-.00494	.00750	-.66	.510
41	Perc_Indep	-.00402	.00739	-.54	.587
42	Perc_Indep	-.00394	.00740	-.53	.595
43	Perc_Indep	-.00568	.00751	-.76	.450
44	Perc_Indep	-.00445	.00738	-.60	.547
45	Perc_Indep	-.00436	.00739	-.59	.555

Table 6: Stata outputs of the dimension of the board of directors.

With respect to the structure variable, defined as the percentage of "independent" in the boards, the PE dummy is also zero considering the high p-value associated to this estimate (51%), as demonstrated in **model 40** (table 6).

By introducing the variable volatility, the size of the sample is reduced, implying the rise of the p-value. Thus, from this result it is possible to infer that PE transactions do not affect the structure of the board (**model 41**).

If we consider the same reduced sample and run the regression without the volatility, there is a slight decrease in the p-value that is still statistically insignificant (**model 42**).

Once again, the final conclusions do not depend on whether we consider total assets or total revenue as a measure of firm size (**models 43, 44 and 45**).

However, as the reduction of the sample size implies a higher level of the p-value, it should be used a larger sample in order to realise whether a higher dimension reduces the significance level of the statistic *t* in such a way that makes us reject the null hypothesis.

In fact, Strömberg (2009) states that "boards of private equity-backed companies are smaller, meet more frequently, and have a smaller fraction of insider (management) board members than boards of other companies." So, following the previous imitation process used as a possible explanation for the evolution of the CEO compensation and the capital structure of competitors, we should also expect a similar trend with these board variables.

Nevertheless, these results can also be justified if we consider that the decrease in the CEO compensation is enough to reduce the total costs of competitors in such a way that also a change in the board of directors is not required.

9. Conclusion

The main objective of the present dissertation is to understand the competitive effects of private equity transactions. Based on the question addressed by Strömberg *et al.* (2010) and the posterior Hsu *et al.* (2010)' survey, it aims to realise whether CEO compensation, capital structure and board of directors are somehow affected by the existence of private equity investments.

In order to study these variables we use American and Canadian companies, due to the difficulty in obtaining private information of firms from other countries.

Concerning the executive remuneration, there is evidence for a reduction in the CEO compensation of competitors in the presence of a PE investment in the industry. By decomposing the total CEO compensation in its fixed and variable components, we find that the salary is hardly affected by these transactions and that the cause for the variation in the total value is more likely the variable component.

Some authors argue that PE-backed firms have more strict corporate governance practices than other firms. Assuming that this higher control also implies an initial adjustment on the executive compensation, the results of this corporate variable lead us to infer a certain imitation reaction of competitors. Nevertheless, to take a more reliable comparison it would be interesting to analyse what really happens to the CEO compensation of the invested companies.

Also, this study supports a change in the capital structure of competitors. In fact, the biggest sample used to test the market leveraged suggests that there is an increase in the debt level.

By recognising that private equity firms also raise additional capital from an outsider at the deal level after the formation of the fund, Strömberg *et al.* (2007) and Liu (2009) present a rationale explanation for this, arguing that a higher level of debt can help to mitigate agency problems in the invested companies. Once again, the imitative trend can be a plausible explanation for this reaction of competitors that raise the weight of debt as a way to solve the agency problems between their managers and the shareholders.

In what concerns the size and the structure of the board of directors, there is not any robust evidence that PE transactions affect these variables. Assuming the same imitative process, it would be expected that the board variables of competitors were also affected as the invested firms are: Strömberg (2009) states that "boards of private equity-backed companies

are smaller, meet more frequently, and have a smaller fraction of insider (management) board members than boards of other companies." However, further research is required, since the sample used to study this variable is significantly smaller than those used in the CEO compensation and capital structure surveys.

Actually, the biggest limitation of this dissertation is the difficult access to data, because there is little information concerning the private equity market. In addition, much of the data available had to be eliminated through the matching of different databases.

Despite this problem, we believe this research contributes to a better knowledge of the private equity market, especially of its competitive dimension. This is an academic study with also practical utility for competitors that need to know how to respond strategically to the PE investments occurred in their industry.

Nevertheless, by doing this study it was possible to realise that there are many questions concerning the private equity phenomenon still unaddressed. Given the growing importance of this industry, more studies can be made, for instance, in terms of the competitors' reaction.

It would be interesting to test the variables return, CEO compensation, capital structure and board of directors by using samples from other countries. Another avenue for future research is to make a direct comparison of these variables between private equity-backed companies and competitors. Besides, we can always analyse other critical variables, namely plant closings and openings and innovation processes of competitors.

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APPENDIX

APPENDIX I- Variables' description in Conyon and He (2008)

Dependent variable: Compensation

EXEC_PAY is the natural logarithm of executive compensation;

CEO_EQUITY is the natural logarithm of CEO equity incentives.

Independent variable: Economic determinants

SALES is the natural logarithm of firm sales;

SHR is the annualized stock return over the twelve months to December;

ROA is the return on assets, defined as the net profits divided by the book value of assets;

MKT_BK is defined as the market value of the firm divided by the book value of assets;

VOL is the natural logarithm of the standard deviation of stock returns over the year.

Independent variable: Board of directors

IND_DIR is the fraction of the board comprised of independent directors;

BOARD_SIZE is measured as the number of individuals on the main board;

COMBINE is the leadership structure of the firm, which is a dummy variable equals to one if the posts of CEO and chairman are combined, and zero otherwise;

COMP_COMM, the presence of a compensation committee is a dummy variable equals to one if the firm has a compensation committee and zero otherwise.

Independent variables: Ownership

PRIVATE, private ownership is an indicator variable set equals to one if the ultimate owner is a private entity and zero otherwise;

OWN_HERF measures the ownership concentration that is equal to the Herfindahl index based on the five largest owners.

Independent variables: Ownership

CONTROLS correspond to industry and year dummy variables.

ε and ϑ are the equation errors.

APPENDIX II- Description of the variables used

CEO Compensation

T.Comp. is the natural logarithm of the total CEO compensation in year;

Var.Comp. is the difference between the total compensation and the salary;

Salary is the natural logarithm of the fixed component of the CEO compensation;

Assets is the natural logarithm of total assets;

MkBk is the natural logarithm of the market to book value of assets, which is given by the firm market value divided by the book value of assets;

DebtRatio is the ratio of total liabilities to total assets;

ROA is the return on assets, which is given by the ratio of EBIT to total assets;

Vol is the natural logarithm of the standard deviation of stock returns over the last 60 months that is used to calculate the Black-Scholes model;

PEdummy is an indicator variable equals to 1 if year *t-1* is within a three year period starting with a large PE investment in industry *j* and 0 otherwise;

Yrdummy is a year dummy;

Indummy is an industry dummy;

FirmCode is a numeric variable per firm *i*.

Capital Structure

DebtRatio is the natural logarithm of the ratio of total liabilities to market value of total assets;

Assets is the natural logarithm of total assets;

MkBk is the natural logarithm of market to book value of assets, which is given by the firm market value divided by the book value of assets;

EbitdA is the ratio of earnings before interest, taxes, depreciation and amortization to total assets;

Tang is the natural logarithm of the ratio tangible assets to total assets;

Vol is the natural logarithm of the standard deviation of stock returns over the last 60 months that is used to calculate the Black-Scholes model;

Tax is the ratio of income taxes to pretax income;

Dvdummy is an indicator variable equals to 1 if in year *t-1* there is dividends' distribution in firm *i* and 0 otherwise;

PEdummy is an indicator variable equals to 1 if year *t-1* is within a three year period starting with a large PE investment in industry *j* and 0 otherwise;

Yrdummy is a year dummy variable;

Indummy is an industry dummy variable;

FirmCode is a numeric variable per firm *i.*

Board of Directors

BoardSize is the natural logarithm of the number of directors on the board;

BoardIndep is the proportion of the board composed by non-executive directors (outsiders);

Assets is the natural logarithm of total assets;

MVE is the natural logarithm of market value of equity;

MkBk is the natural logarithm of market to book value of assets, which is given by the firm market value divided by the book value of assets;

Segments is the natural logarithm of the number of business segments;

Vol is the natural logarithm of the standard deviation of stock returns over the last 60 months that is used to calculate the Black-Scholes model;

Tax is the ratio of income taxes to pretax income;

FirmAge is the natural logarithm of the number of years since the firm was first listed on CRSP;

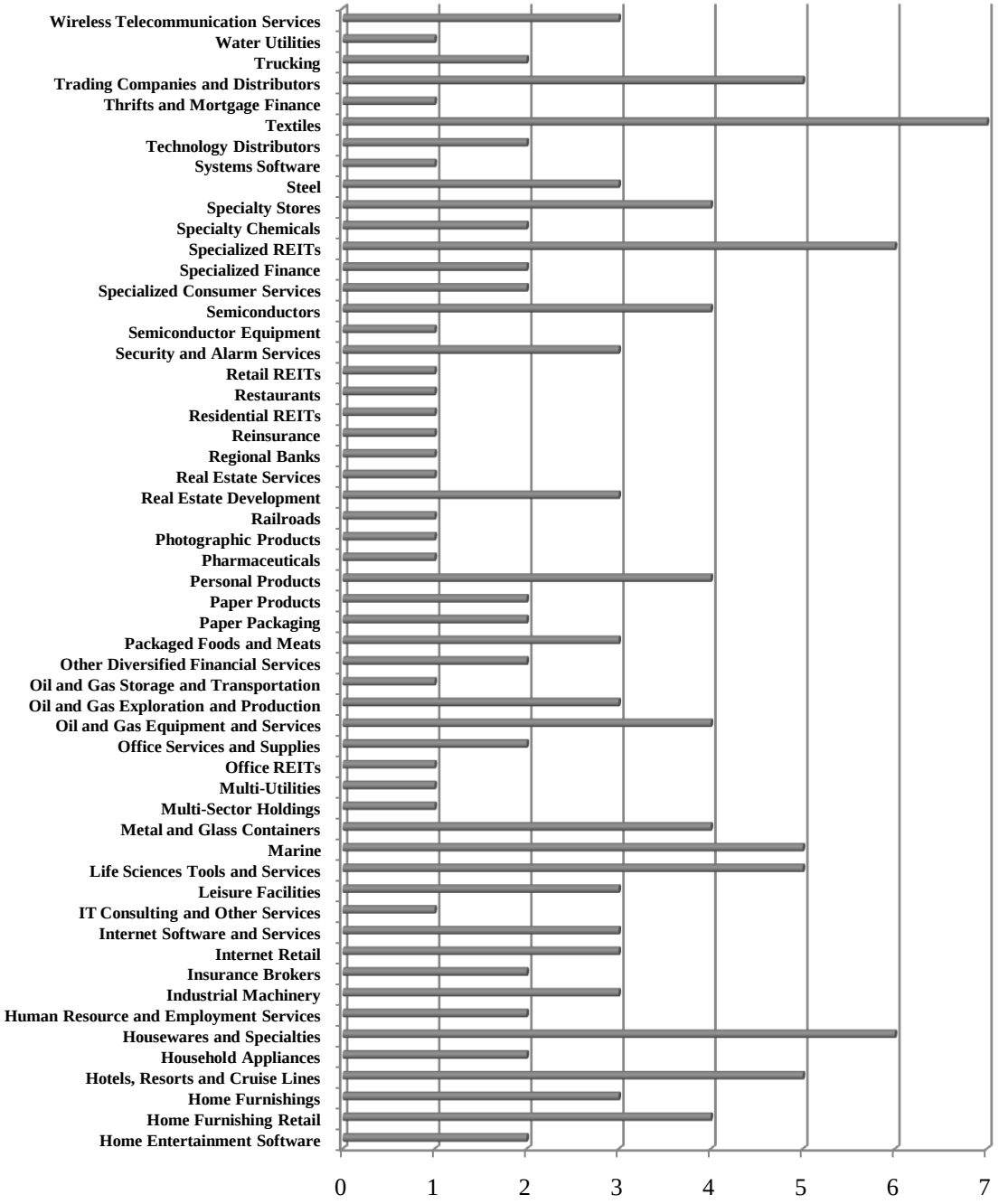
PEdummy is the indicator variable equals to 1 if year *t-1* is within a three year period starting with a large PE investment in industry *j* and 0 otherwise;

Yrdummy is a year dummy variable;

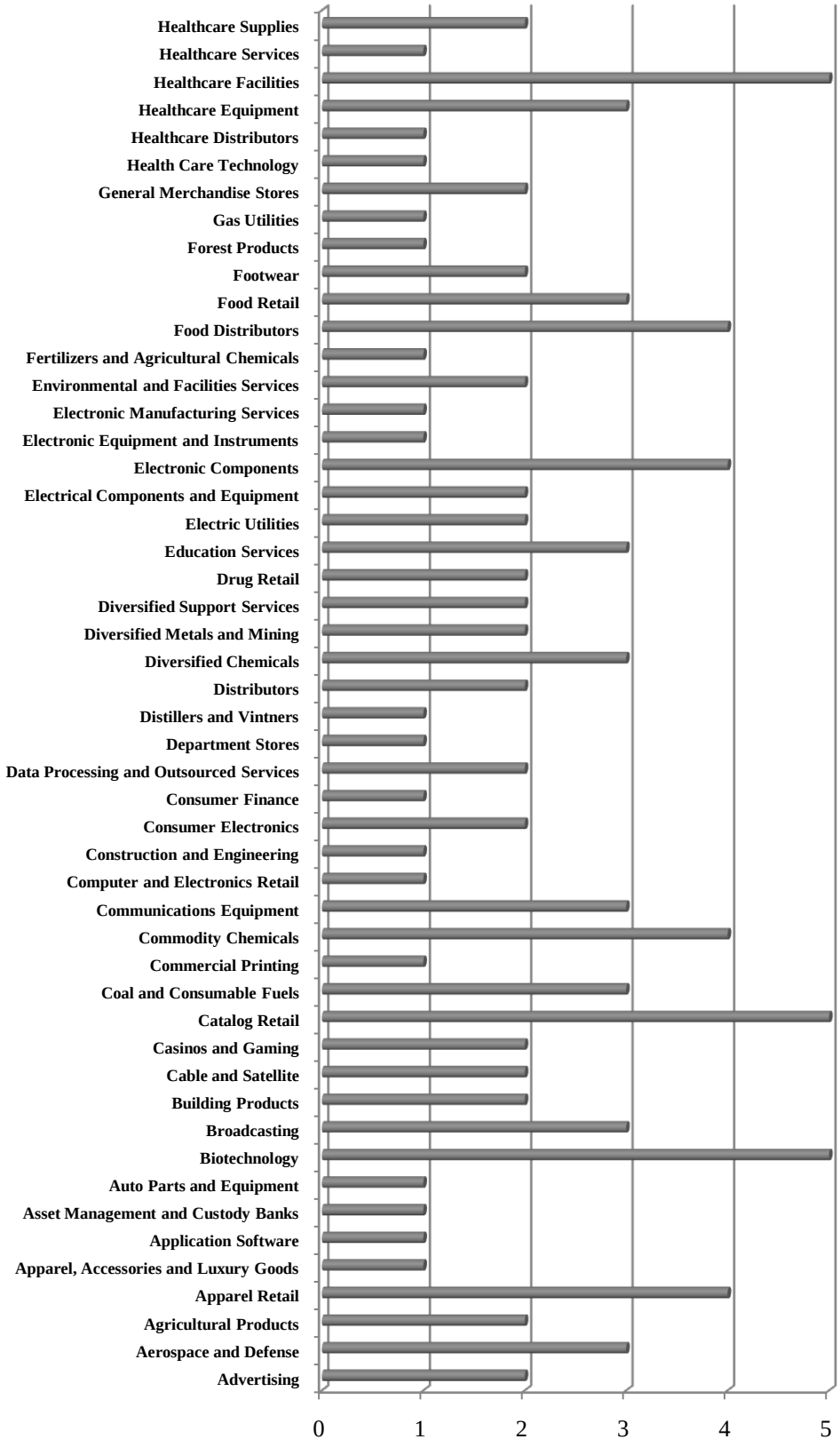
Indummy is an industry dummy variable;

FirmCode is a numeric variable per firm *i.*

APPENDIX III- Graphs presenting the total number of PE investments per industry in the period 1992-2007. The abscissa is the industry name and the orderly is the number of PE investments.



Graph 1



Graph 1 (continued)

APPENDIX IV- STATA Outputs: CEO Compensation

CEO Compensation

	Log (Total Compensation)											
	Model 1				**Model 2**				**Model 3**			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.20472	.03829	5.35	.000	-	-	-	-
Mkt-Bk Ratio	-.00067	.00093	-.71	.476	-.00053	.00070	-.75	.452	-.00054	.00070	-.78	434
Log (DebtRatio)	.01941	.02920	.66	.506	.00657	.03119	.21	.833	.01356	.03138	.43	.666
Log (Assets)	.44572	.01213	36.74	.000	.46384	.01259	36.83	.000	.44368	.01215	36.51	.000
ROA	.00230	.00055	4.19	.000	.00297	.00061	4.83	.000	.00245	.00058	4.23	.000
PE dummy	-.04633	.01746	-2.65	.008	-.03514	.01931	-1.82	.069	-.03297	.01930	-1.71	.088
N	16 461				13 570				13 570			
R^2	0.4472				0.4524				0.4495			

	Log (Total Compensation)											
	Model 4				**Model 5**				**Model 6**			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	-	-	-	-	-	-	-	-
Mkt-Bk Ratio	-.00076	.00104	-.72	.469	-.00113	.00071	-1.57	.116	-.00112	.00070	-1.60	.109
Log (DebtRatio)	-.03287	.03220	-1.02	-307	-.05177	.03438	-1.51	.132	-.04004	.03452	-1.16	.246
Log (Revenue)	.43333	.01309	33.10	.000	.45294	.01370	33.06	.000	.43129	.01314	32.83	.000
ROA	-.00016	.00063	-.26	.795	.00020	.0007	.29	.775	-.00016	.00070	-.23	.815
PE dummy	-.04205	.01776	-2.37	.018	-.02982	.01976	-1.51	0.131	-.02779	.01973	-1.41	0.159
N	16 454				13 566				13 566			
R^2	0.4244				0.4314				0.4284			

	Log (Salary)											
	Model 7				**Model 8**				**Model 9**			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	-.02362	.02434	-.97	.332	-	-	-	-
Mkt-Bk Ratio	-.00098	.00080	-1.23	.219	-.00042	.00060	-.70	.483	-.00042	.00060	-.70	.484
Log (DebtRatio)	.09305	.03265	2.85	.004	.09559	.02623	3.64	.000	.09478	.02620	3.62	.000
Log (Assets)	.19978	.01455	13.73	.000	.20008	.01360	14.71	.000	.20240	.01304	15.52	.000
ROA	.00070	.00059	1.19	.234	.00090	.00057	1.57	.117	.00096	.00057	1.67	.095
PE dummy	-.01609	.01621	-.99	.321	-.00114	.01499	-.08	.939	-.00139	.01501	-.09	.926
N	16 461				13 570				13 570			
R^2	0.2589				0.2851				0.2850			

	Log (Variable Component)											
	Model 10				Model 11				Model 12			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.27561	.06530	4.22	.000	-	-	-	-
Mkt-Bk Ratio	-.00036	.00155	-.23	.819	-.00051	.00112	-.46	.647	-.00053	.00111	-.48	.629
Log (DebtRatio)	.03597	.05128	.70	.483	.01439	.05480	.26	.793	.02380	.05516	.43	.666
Log (Assets)	.58137	.01799	32.31	.000	.60432	.01966	30.73	.000	.57718	.01845	31.28	.000
ROA	.00400	.00107	3.75	.000	.00451	.00118	3.82	.000	.00383	.00114	3.36	.001
PE dummy	-.07748	.03120	-2.48	.013	-.05808	.03487	-1.67	.096	-.05517	.03488	-1.58	.114
N	16 461				13 570				13 570			
R^2	0.3212				0.3258				0.3237			

	Variable Component											
	Model 13				Model 14				Model 15			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	1372.0	322.31	4.26	.000	-	-	-	-
Mkt-Bk Ratio	-8.4062	10.345	-.81	.417	-.94406	5.4250	-.17	.862	-1.0338	5.4128	-.19	.849
Log (DebtRatio)	-503.32	190.33	-2.64	.008	-573.53	238.24	-2.41	.016	-527.09	237.57	-2.22	.027
Log (Assets)	1929.6	125.12	15.42	.000	2073.1	146.30	14.17	.000	1937.9	138.01	14.04	.000
ROA	12.974	4.8324	2.68	.007	20.375	6.0786	3.35	.001	16.848	5.8725	2.87	.004
PE dummy	-305.87	143.82	-2.13	.034	-282.14	169.95	-1.66	.097	-267.51	170.13	-1.57	.116
N	16 718				13 779				13 779			
R^2	0.1090				0.1046				0.1031			

APPENDIX V- STATA Outputs: Capital Structure

Capital Structure

	Log (Market Leverage)											
	Model 16				**Model 17**				**Model 18**			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.45413	.06483	7.00	.000	-	-	-	-
Log (Assets)	.07053	.00850	8.29	.000	.29258	.01642	17.82	.000	.25981	.01581	16.43	.000
EbitdA	-.01365	.00720	-1.90	.058	-3.4641	.37539	-9.23	.000	-3.7200	.39247	-9.48	.000
Dividend dummy	-.09151	.03083	-2.97	.003	.04561	.04359	1.05	.296	-.04527	.04284	-1.06	.291
Log (Tangibility)	-.61556	.05928	10.38	.000	-.39213	.08565	-4.58	.000	-.39383	.08686	-4.53	.000
Log(MktBkRatio)	.18623	.01731	10.76	.000	.25598	.04610	5.55	.000	.25520	.04679	5.45	.000
Tax Rate	-.02889	.01229	-2.35	.019	.00471	.01041	.45	.651	.00161	.01185	.14	.892
PE dummy	.11864	.01706	6.96	.000	.01291	.02583	.50	.617	.02108	.02607	.81	.419
N	51101				14173				14173			
R^2	0.4337				0.5483				0.5407			

	Log (Market Leverage)											
	Model 19				**Model 20**				**Model 21**			
	Coef.	Std.Err	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.37427	.05666	6.61	.000	-	-	-	-
Log (Assets)	.13524	.00837	16.15	.000	.29236	.01630	17.94	.000	.26640	.01576	16.90	.000
EbitdA	-.00982	.00545	-1.80	.072	-3.0004	.37236	-8.06	.000	-3.1130	.38462	-8.09	.000
Dividend dummy	-.05540	.02904	-1.91	.056	.04551	.04296	1.06	.290	-.02627	.04190	-.63	.531
Log (Tangibility)	-.59955	.05600	-10.71	.000	-.40472	.08566	-4.72	.000	-.40838	.08655	-4.72	.000
Log(MktBkRatio)	.26369	.01750	15.07	.000	.25353	.04504	5.63	.000	.25239	.04534	5.57	.000
Log (TaxRate)	-.13449	.00489	-27.49	.000	-.06119	.00946	-6.47	.000	-.07318	.01046	-6.99	.000
PE dummy	.11097	.01645	6.74	.000	.01765	.02567	.69	.492	.02506	.02582	.97	.332
N	51101				14173				14173			
R^2	0.4627				0.5536				0.5487			

	Log (Market Leverage)											
	Model 22				**Model 23**				**Model 24**			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.45302	.06460	7.01	.000	-	-	-	-
Log (Assets)	.07250	.00857	8.46	.000	.29276	.01643	17.82	.000	.26017	.01582	16.45	.000
EbitdA	-.01360	.00717	-1.90	.058	-3.4562	.37548	-9.20	.000	-3.7088	.39255	-9.45	.000
Dividend dummy	-.09090	.03079	-2.95	.003	.04521	.04355	1.04	.299	-.04554	.04283	-1.06	.288
Log (Tangibility)	-.61748	.05924	-10.4	.000	-.39355	.08563	-4.60	.000	-.39585	.08688	-4.56	.000
Log(MktBkRatio)	.18835	.01736	10.85	.000	.25629	.04607	5.56	.000	.25562	.04674	5.47	.000
Average Tax Rate	-.08738	.03968	-2.20	.028	-.01843	0.2975	-.62	.536	-.02952	.03372	-.88	.381
PE dummy	.11959	.01706	7.01	.000	.01319	.02583	.51	.610	0.02155	0.0261	0.83	0.41
N	51101				14173				14173			
R^2	0.4342				0.5483				0.5408			

	Log (Market Leverage)											
	Model 25				Model 26				Model 27			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std.Err	t	p>t
Log (Volatility)	-	-	-	-	.37751	.05645	6.69	. 000	-	-	-	-
Log (Assets)	.14053	.00866	16.23	.000	.29778	.01654	18.01	.000	.27270	.01607	16.97	.000
EbitdA	-.00876	.00520	-1.68	.092	-3.0343	.37697	-8.05	.000	-3.1519	.39039	-8.07	.000
Dividend dummy	-.08406	.02940	-2.86	.004	.03855	.04323	.89	.373	-.03530	.04242	-.83	.405
Log (Tangibility)	-.60944	.05677	-10.74	.000	-.42542	.08667	-4.91	.000	-.43343	.08793	-4.93	.000
Log(MktBkRatio)	.27728	.01788	15.51	.000	.26751	.04501	5.94	.000	.26919	.04538	5.93	.000
Ln(AverageTax Rate)	-.14540	.00705	-20.63	.000	-.08504	.01628	-5.22	.000	-.10239	.01759	-5.82	.000
PE dummy	.11424	.01664	6.86	.000	.01626	.02577	.63	.528	.02349	.02595	.91	.365
N	51101				14173				14173			
R^2	0.4570				0.5532				0.5482			

	Log (Market Leverage)											
	Model 28				Model 29				Model 30			
	Coef.	Std.Err	t	p>t	Coef.	Std.Err.	t	p>t	Coef.	Std.Err.	t	p>t
Log (Volatility)	-	-	-	-	.45410	.06484	7.00	.000	-	-	-	-
Log (Revenue)	.07102	.00856	8.29	.000	.29272	.01644	17.80	.000	.25993	.01583	16.42	.000
EbitdA	-.01363	.00719	-1.89	.058	-3.4625	.37540	-9.22	.000	-3.7185	.39246	-9.47	.000
Dividend dummy	-.09212	.03084	-2.99	.003	.04538	.04360	1.04	.298	-.04546	.04285	-1.06	.289
Log (Tangibility)	-.61130	.05938	-10.3	.000	-.39152	.08566	-4.57	.000	-.39330	.08688	-4.53	.000
Log(MktBkRatio)	.11711	.01916	6.11	.000	-.03608	.04627	-0,78	.436	-.00415	.04618	-.09	.928
TaxRate	-.02890	.01229	-2.35	.019	.00470	.01042	0.45	.652	.00160	.01186	.14	.893
PE dummy	.11860	.01706	6.95	.000	.01283	.02583	.50	.620	.02101	.02607	.81	.420
N	51101				14173				14173			
R^2	0.4337				0.5483				0.5407			

	Log (Market Leverage)											
	Model 31				Model 32				Model 33			
	Coef.	Std.Err	t	p>t	Coef.	Std.Err	t	p>t	Coef.	Std.Err	t	p>t
Log (Volatility)	-	-	-	-	.45299	.06461	7.01	.000	-	-	-	-
Log (Revenue)	.07250	.00857	8.46	.000	.29290	.01645	17.8	.000	.26028	.01584	16.4	.000
EbitdA	-.01360	.00717	-1.90	.058	-3.4546	.37549	-9.20	.000	-3.7073	.39255	-9.44	.000
Dividend dummy	-.09090	.03079	-2.95	.003	.04499	.04356	1.03	.302	-.04572	.04283	-1.07	.286
Log (Tangibility)	-.61748	.05924	-10.4	.000	-.39294	.08565	-4.59	.000	-.39532	.08690	-4.55	.000
Log(MktBkRatio)	.18835	.01736	10.9	.000	-.03596	.04625	-.78	.437	-.00409	.04616	-.09	.929
AverageTaxRate	-.08738	.03968	-2.20	.028	-.01844	.02975	-.62	.536	-.02953	.03373	-.88	.381
PE dummy	.11956	.01706	7.01	.000	.01311	.02583	.51	.612	.02148	.02608	.82	.410
N	51101				14173				14173			
R^2	0.4342				0.5483				0.5408			

APPENDIX VI- STATA Outputs: Board of Directors

Size of the Board of Directors

	Log(BoardSize)											
	Model 34				**Model 35**				**Model 36**			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.01642	-.02027	.81	.418	-	-	-	-
Log (Assets)	-.07230	.10419	-0.69	0.488	-.12299	.11396	-1.08	.281	-.11750	.11436	-1.03	.305
lnMVE	.15691	.10003	1.57	0.117	.20854	.10964	1.90	.058	.20195	.10998	1.84	.067
lnMkBk	-.13275	.09448	-1.40	0.161	-.17546	.10405	-1.69	.093	-.17083	.10451	-1.63	.103
lnFirmAge	.02806	.01713	1.64	0.102	.03108	.01810	1.72	.087	.02870	.01769	1.62	.105
lnSegments	.00776	.01522	0.51	0.611	.00400	.01524	.26	.793	.00373	.01518	.25	.806
PE dummy	.01074	.011292	.95	.342	.01743	.01156	1.51	.132	.01750	.01159	1.51	.132
N	2274				2102				2102			
R^2	.3494				.3500				.3500			

	Log(BoardSize)											
	Model 37				**Model 38**				**Model 39**			
	Coef.	Std. Err	t	p>t	Coef.	Std. Err	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.01584	.01952	.81	.418	-	-	-	-
Log (Revenue)	.04108	.02087	1.97	.050	.03274	.02098	1.56	.119	.03219	.02100	1.53	.126
lnMVE	.05058	.01972	2.57	.011	.06083	.02028	3.00	.003	.06007	.02025	2.97	.003
lnMkBk	-.03751	.01850	-2.03	.043	-.04168	.01972	-2.11	.035	-.04235	.01963	-2.16	.032
lnFirmAge	.02249	.01736	1.30	.196	.02628	.01813	1.45	.148	.02408	.01772	1.36	.175
lnSegments	.00450	.01512	.30	.776	.00157	.01536	.10	.919	.00136	.01532	.09	.929
PE dummy	.01085	.01133	.96	.339	.01704	.01161	1.47	.143	.01712	.01164	1.47	.142
N	2274				2102				2102			
R^2	.3524				.3513				.3509			

Structure of the Board of Directors

	Perc_Indep											
	Model 40				Model 41				Model 42			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.01805	.01575	1.15	.253	-	-	-	-
Log (Assets)	-.13672	.06765	-2.02	.044	-.12086	.07183	-1.68	.093	-.11482	-07218	-1.59	.112
lnMVE	.15284	.06582	2.32	.021	.14067	.06992	2.01	.045	.13342	.07023	1.90	.058
lnMkBk	-.15621	.06149	-2.54	.11	-.14913	.06527	-2.28	.026	-.14405	.06543	-2.20	.028
lnFirmAge	-.00728	.01172	-.62	.535	-.01397	.01249	-1.12	.264	-.01659	.01231	-1.35	.178
lnSegments	.01743	.00942	1.85	.065	.01235	.00973	1.27	.205	.01207	.00971	1.24	.215
PE dummy	-.00494	.00750	-.66	.510	-.00402	.00739	-.54	.587	-.00394	.00740	-.53	.595
N	2270				2099				2099			
R^2	.2512				.2382				.2365			

	Perc_Indep											
	Model 43				Model 44				Model 45			
	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t	Coef.	Std. Err.	t	p>t
Log (Volatility)	-	-	-	-	.01628	.01581	1.03	.304	-	-	-	-
Log (Revenue)	-.00282	.01532	-.18	.854	.00148	.01643	.09	.928	.00091	.01647	.06	.956
lnMVE	.02320	.01524	1.52	.126	.02262	.01615	1.40	.162	.02184	.01616	1.35	.177
lnMkBk	-.03625	.01605	-2.26	.024	-.0403	-.01695	-2.38	.018	-.04099	.01698	-2.41	.016
lnFirmAge	-.00702	.01196	-.59	.557	-.0148	.01271	-1.16	.246	-.01704	.01253	-1.36	.175
lnSegments	.01713	.00959	1.79	.075	.01196	.00988	1.21	.227	.01175	.00987	1.19	.234
PE dummy	-.00568	.00751	-.76	.450	-.0044	.00738	-.60	.547	-.00436	.00739	-.59	.555
N	2270				2099				2099			
R^2	.2467				.2348				.2335			