



Executives and Strategic Decisions

The Case of U.S. Public Pension Funds

Master Thesis

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Abstract

The main purpose of this research is to investigate the relationship between CEOs characteristics and allocation to risky assets, liability discount rates and performance of U.S. public pension funds for the period 2001 – 2013. The data for this study from the perspective of pension funds' were found in the Public Plan Database (PPD) of the Center for Retirement Research at Boston College. The number of funds comes to 123 and from the Comprehensive Annual Financial Reports (CAFRs) I create a list of 229 different CEOs for the examined period. Considering for the CEOs characteristics, a dataset of variables has been created where most of them are dummies. Thus, as independent variables, I include tenure, education and experience of a CEO. For the estimation of education the dummies are split in education level, field of studies and obtained certificates. To test for experience, two added variables are created; previous experience in privately held companies in finance positions and in other positions. Furthermore, the number of total retired members and the size of the fund are included. In order to describe these relationships, I use pooled panel regressions. The final results indicate that the longer tenure of a CEO plays a significant role and increases the percentage allocated to risky assets as well drops the returns. Previous experience in positions not related to finance in the private sector points out an adoption of less aggressive strategies and greater returns for the fund. Aside from these, education is able to affect discount rates through the dummy variables for certificates and degree in marketing or management.

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1. Introduction

The integrated United States pension system is considered to be the leading, most well-defined and established system in the world. Composed by a mixture of social insurance, private pensions and personal savings, the U.S. system is structured in a way that its operation could provide several services to citizens; from giving the opportunity to workers to minimize the risk-sifting from increases in unemployment rates, changes in interest rates and inflation to rebalancing in certain occasions between the high and low income employees (Aaron 2009). Nevertheless, the scheme behind the U.S. pension funds does not differ from other institutions and as a result could be affected by the U.S. unstable markets or other prevailing world economies.

In the last few years, a lot of debate is going on about public pension funds and their trillion-dollar underfunding problem. Going through a financial crisis, starting from the home mortgage market at the end of December 2007 and expanding across all the markets in U.S., public entities continued to promise pensions that they couldn't afford. The fact that the U.S. government failed to finance the public pension funds with the same amounts of money comparing to previous years, boosted the funding difficulties that they faced and left space for the private pension funds, which are employer-funded, to win ground against them. The overall picture of the economic recession of 2008 and 2009 was characterized by remarkable losses, which brought many institutions on the brink of collapse and consequently public pension funds suffered enormous amount of losses from stock investments. The economic environment was, and in some occasions still is, described by low returns on investments and low interest rates. This resulted in the deterioration of public pension funds. Low growth rates automatically led to a deeper underfunding problem which had its roots mostly in the strategic decisions and therefore in the investment policies that the executives, such as CEOs and CIOs, implemented.

The issue of how the CEOs or other executives take strategic decisions regarding the fund's policy has been recently gaining additional importance. According to Asset Liability Management (ALM approach), which must constitute a base for pension funds when determining their investment policies, a fund should follow those policies which will ensure that both present and future obligations (pensions) will be settled. The outcome of this will allow the funding ratio, also known as the fund's solvency ratio, to be positive and greater than one (Cannas, 2011). The higher the funding ratio, the less risk a pension fund will face and as a result it will not be necessary to discontinue any aggressive investment policy adopted in the past years.

The question that arises here is how to investigate that these choices (whether they have been determined under the ALM approach or not) are capable of influencing the asset allocation, liability

valuation and performance of a pension fund. Looking back to the existent literature, a number of researchers tried to explain the factors that contribute to the design of the asset allocation strategy and how risky it is, as well to the selection of the liability discount rates. For instance, according to Andonov et al. (2014), the U.S. public pension funds that follow riskier asset investment plans, tend to use higher liability discount rates and manage to develop further their funding situation. As the authors describe in their investigation, this phenomenon is enhanced when the public pension funds are consisted of a greater number of retired people and consequently they conclude that the public pension funds became the funds that take the largest risks even if this indicates much lower performance.

On the other hand, acknowledgements that an executive of a pension fund is the “key person” concerning the decisions taken are actually factual. There is no doubt that the human influence is one of the most considerate contributors in deciding critical aspects of the implemented policy. Decisions referring to which asset classes will be proven the most profitable, the adequate amount that the members need to contribute for their pension plans or how much of the returns will be invested next year, could be considered as of vital significance. Together with the Board of Trustees, CEOs need to make choices that will benefit the fund and most importantly the pension earners. Bearing in mind a deeper and detailed examination, someone could say that it is likely some cross-sectional changes on how the governance organization of a pension fund is designed would be able to bring fluctuations to the returns and thus to the annual performance rates. However, in the latest academic literature there is little evidence that the executives and their particular characteristics can affect variables such as the asset allocation, liability valuation and performance of pension funds. The effectiveness of the strategic decisions could be mainly built on the education background, tenure and prior career of the executives.

The present paper examines to what extend the CEO’s personal characteristics can influence the allocation of the asset classes, the discount rates used for the liabilities valuation and the performance of the U.S. public pension funds. Using the Public Plans Database (PPD) from the Center for Retirement Research at Boston College which allows for state and local plans, I intend to extensively research and identify the connections between the characteristics of the executives, specifically the CEOs, and how these could be used to change the already existing policies pointing for better approaches. To achieve the previous objectives and conclude some remarkable results it is critical to set a number of research questions to test whether these are able to stand in the real world or they could be applied only in theoretical strategies. To investigate all the above, I generate different research questions, one for each of the basic independent variables which are the tenure, education and experience of a CEO and

apply them on the dependent variables accordingly. The diverse cases are applied to all the main dependent variables individually and will be discussed in details in Chapter 4.

Furthermore, one more goal of this research is to provide with instructive results the academic literature as well to be the start from now on for a widely discussion on how important may be every individual CEO's characteristics and how much value they could supplement to the public pension funds in U.S. and not only. For instance, someone can think that managers with many years of tenure would have been more productive and based on their experience they will achieve greater returns and thus more profits for the funds. But could this stand in the reality?

Numerous factors are examined in order to capture the relationship between the CEOs personal characteristics and the strategic decisions which are related with the investments, the rates used to evaluate the liabilities and the returns gained. The results reveal some remarkable points for the executives. The tenure of a CEO proved to be definitely the variable that is able to push into different directions the tested variables. The percentage of risky assets increases, the returns decline while at the same time there is no effect in discount rates. The set of dummies linked to the education of a CEO influences the risky assets only by degree in field such of these in finance, accounting or economics. In addition, the discount rates are negatively affected by a CEO who own a degree in marketing or management and positively connected when a CEO owns a certificate. Controlling for experience factors, the results of this study indicate that the experience in a private company in a position not related to finance draws significant but negative effects on risky assets while allows for increases in the returns. However, a previous experience in a finance position can lower the rates used to evaluate the liabilities. Apart from these, findings related to the total number of retired members in a fund show an insignificant relationship with all the three dependent variables. Lastly, the control variable that refers to the size of a fund demonstrates that bigger funds invest in riskier assets instead of the smaller by assets funds that perform worse.

The remaining of the paper is organized as follows. Chapter 2 provides an overview at the existing relevant literature and analyzes previous research work. Chapter 3 and 4 elaborate on the data collection and the methodology used in order to analyze the dataset. Chapter 5 presents the results and Chapter 6 discusses the findings and proposes concepts for future research. Finally, Chapter 7 concludes and summarizes on the present investigation.

2. Literature Review

Executives and the strategic decisions they often take have not been widely studied compared to other concepts related to pension funds among academics, researchers and institutions. Due to the high attention given to issues connected with the recent crisis in U.S. markets, there is a vast amount of topics that discuss ways of allocating assets and measuring or evaluating the performance of a pension fund. Besides these topics, another investigated subjects are those that focus on how to choose the appropriate liability discount rates under the regulations of GASB (Governmental Accounting Standards Board) or both alongside a research by using the approach of the Asset Liability Management (ALM model). Thus, in this Chapter an overview of the existing theoretical considerations will be presented together with a description of the past relevant research field of executives and their strategic choices.

2.1. Asset Allocation

Before I discuss papers which document methods of allocating assets, it is worth paying attention to the fact that these researches considered in the current study have been published within the last two decades. In practice, this reveals that the majority of them concentrated on a period in which the U.S. recession is included and attempted to propose possible reasons for the behavior of the funds regarding the decisions taken. In 2005, a comparative study by Chemla on why the American and Canadian Pension Funds participate in private equity and venture capital had been completed. Fundamentally, the reason was to perceive the level of diversification of the asset distribution between the two countries taking into account the fact that the American funds own 20 times more private equity compared to the Canadian funds. The author prove the propositions set in the beginning of the paper, which allows the asset size, fund size and its location as well institutional and regulatory environment to stand as the determinants that can explain variation among international funds; in some cases there is evidence only for one of the two countries.

Another investigation which comes to explain how U.S. pension funds should invest uses the same database as in the current paper. Collecting data for state and local plans only for the year 2006 and adopting the idea that the existence of positively correlated stock returns and liabilities of pension funds can result in a self-made hedge to liabilities, Lucas et al. aim to define which is the ideal asset allocation plan when trying to reduce as much as possible the costs by targeting the taxes from distortions. To identify this hypothesis, the authors incorporate the outcomes based on risks and

returns. As the returns on equities increase, there is less need to raise the profits by distort taxes. Furthermore, the higher the risk added in equities, the greater will be the frequency of paying taxes. Two years later, Pennacchi and Rastad (2011) represented the same concept but this time the question was how to allocate the weights to the asset classes depending on the fluctuation of risk between assets and liabilities. This approach contributes to the assumption that the first concern of a pension fund should be to best hedge the risk involved in its liabilities. Therefore, pension funds tend to rebalance their portfolios by investing in riskier assets during low performance periods where discount rates tend to increase. In conjunction to this, they have noticed that Board of Trustees is consisting of members who usually vote towards riskier policies.

Lastly, Andonov (2014) in his recent paper for delegated investment management, investigates how institutional investors, mainly pension funds in U.S., Canada, Europe and Australia / New Zealand, allocate across alternative assets. Especially, the author emphasizes on real assets, private equity and hedge funds, intending to explore the performance of these investment strategies and the costs that may occur from spending on external management and specific choices of alternative assets. Using data from CEM Benchmarking Inc. for the period 1990-2011, the researcher reports that in general all institutional investors turn more to alternative assets as time passes and adds that this phenomenon is further noticeable in bigger funds. Moreover, it is possible to identify financial intermediary signs in smaller institutional investors rather than in larger. With that said, considering fund size as a substantial factor, U.S. institutions prefer to have internal management departments.

2.2. Liability Discount Rate

For several years great effort has been devoted to the analysis of how to set the appropriate discount rates. A general theoretical framework as well advantages and disadvantages of the various approaches are described by Brown and Wilcox in their paper *Discounting State and Local Pension Liabilities* (2009). The authors deal with the fact that most of the funds follow what the GASB proposes. Normally, pension funds prefer to discount their future obligations according to the expected returns earned by the assets held and factors such as the riskiness of an asset are able to determine the level of the discount rate.

Reviewing the paper of Novy-Marx and Rauh (2009), to some extent, serves as proof that the pension funds' underfunded trillion problem did not appear upon the crisis of 2008. Actually, in 2005 the real underfunded amount reached \$0.8 trillion. The authors show that not only the problematic and risky

markets of that period boosted the underfunding of the U.S. state pensions but also the high discount rates used to calculate the promised benefits. The implications indicate that rates such as those of the Treasury yields and municipal bonds should also be reported. As a consequence, in less than two years, in August 2011, the same academics came to examine what could happen in this case. At that time, the objective of their paper was to measure liabilities from U.S. public pension funds. The authors focus primarily on the methods used to measure the total value of the benefits in each fund separately and they consider as a secondary determining factor the variation in the discount rates and ways to define them. Nevertheless, two discount rates adopted for the purposes of the research; one is based on the rates used by the nation for its debts and the other on Treasury yields which include no risk. The results give liabilities that their value worth \$3.20 trillion and \$4.43 trillion respectively which are much greater than the ones reported by the pension funds.

In the meantime, another publication from Vittas (2010) on behalf of World Bank, supports that allowing for market valuation of assets and liabilities could be considered as an alternative method under the scheme of finding the appropriate discount rate. On top of that, he proposed “risk buffers” with the view to keep the market’s real value away from every kind of instabilities. The author analyzes the case of the Brazilian markets due to the World Banks’s concept to provide support in their pension funds. However, at the end the presented method suffers from external factors which need several assumptions to be made in order to stand. As observed in other studies, a noteworthy element is that the valuation should bear in mind changes in the development of the funds.

2.3. Performance

Looking back in the existing literature, it is challenging for someone to find numerous publications that address the issue of performance and costs of pension funds and this is due to the incomplete documentation of information. Even though thorough work had been done on mutual and trust funds, a report on what had been demonstrated in literature for pension funds will be showcased in this Chapter.

Despite the fact that literature on performance is mostly available for mutual and trust funds, investigations on pension funds’ performance could be easily found when focusing on the latest years. Back in 2002, Ferson and Khang, created the *conditional weight-based (CWB)* measurement, which is trying to avoid bias that could distort the outcomes but also take account of robustness. By a comparison made in theory, the new measurement seems to exceed the old methods. Taking for a

10-year period, from 1985 to 1994 and testing the CWB on a number of U.S. pension funds, the authors concluded that bias could not influence the performance. Nevertheless, a recent research on a behavioral issue by Bradley et al. (2015) proves the existence of home bias in the state pension funds' field, and especially bias which are caused by individuals or firms with political influence. Considering the fact that the state funds use to overweight firms located in the same area as the funds and although the local bias create a minor positive relationship with the performance, the political bias can affect the latter negatively. Nonetheless, it is impressive how the period of keeping holdings from companies with political connection can be extended longer if managers and members of the board of trustees are coming similarly from the political scene.

In 2010, Bauer et al. in their paper *Pension Fund Performance and Costs: Small is Beautiful* shed light on the side of pension funds' which deal with the performance and the costs related with each fund. In this case, cost structure is also linked with the fact that the majority of managers could be employed in more than one pension fund and as a result this affects the performance outcome. The authors use the CEM data for U.S. pension funds and conduct a cross-sectional analysis for both defined benefit and defined contribution funds. The results show that comparing to the mutual funds, pension funds report less costs and a reason for that may be the fund size, while returns greater than the intended take place after investing in local equities. Moreover, it seems that again the fund size along with the liquidity, are the main determinants of the performance which has a negative relation with the size.

To conclude, in a research for mutual funds, Babalos et al. (2015) examined a study wondering if U.S. no-load mutual funds achieve their targets. In a detailed paper, the authors record and compare the levels of efficiency across all the mutual funds as well after categorizing them in group. Asset size seems to play an important role as the relation with the efficiency is positive correlated. In addition, they referred to an interesting fact where risk sifting policies result in a less effective investing strategy for the fund.

2.4. Executives and Governance

There is a limited amount of papers and investigations that look into the dissimilar approaches in which to discuss how important is the governance of a pension fund and the major role that the executive members play within. Although, there has been relatively little literature published on pension funds, studies that have considered data from mutual funds is a proper guidance in order to review the investing behavior of managers in such funds.

Two decades earlier, Golec (1996) starts a research on how the personal aspects of each manager are able to affect mutual fund's performance, risk and fees at the same time. Younger managers with longer tenure in the fund contribute to greater levels of performance. In addition, individuals without MBA are unable to beat the efficiency of those who hold one. Conflict arises when lower administrative fees are able to improve the existing performance of the fund while the same can happen after high management costs are incurred. In 1998, Porter and Trifts focus mainly on the tenure that a manager might hold in a fund and its consequences for being long or short. The results imply that managers with long-term tenure (more than 10 years) do not surpass others with short-term tenure. Therefore, it is impossible that the performance of a 5-year period under the supervision of a manager will forecast outcomes for the next 5 years of the fund.

After a year, Chevalier and Ellison (1999) deal practically with the same subject as this research does. In their paper, the authors reveal the relationship between the performance and the managers' characteristics with the only difference being the testing field which is mutual funds. The main findings indicate that people who graduate from better ranked undergraduate institutions show better performance results and that younger funds' managers accomplish higher returns for the funds than the older ones. In general, the study demonstrates that managers who undertake courses from recognized universities and achieve high degrees (they measure this with SAT scores), always have better results to show for the mutual funds. Another similar analysis has been done back in 2003 from Gallagher. As in this research, the author who is interested in Australian funds, intends to investigate how the decisions taken by executives and managers could have a significant impact on the returns. Not only the examination presents the characteristics that contribute to the creation of the suitable investment strategy, but at the end reviews the outcomes. For instance, the fund's age does not play any role in improving the performance. However, the market risk is positively connected with the fund's age as well as changes in the managing team can worsen the performance for the next years.

A closer look at the investigation of Gottesman and Morey (2006), looks like they continued the analysis of Chevalier and Glenn as well of Golec by studying in detail the curriculum and quality of the MBAs attended by the managers of the investigated mutual funds. Factors such as the Business Week ranking list and the GMAT scores to enter the masters' program are also taken into account as measurements. And yes, they provide evidence that only managers that graduate from a high-ranked university or have high GMAT scores show positive and significant relation with the fund's performance. Furthermore, they test for other managers' features such as if they graduate from a non-management school or complete the Chartered Financial Analyst (CFA) certificate. On the other

hand, Karagiannidis (2012) explains what happened when managers, independently from their studies, collaborate. The paper focuses on how a team of managers within a mutual fund can affect the degree of risk in portfolios against that of an individual person. The author supports that the mutual funds with more aggressive approaches and decisions that allow for more risky investments are those with managers that cooperate and run at the same period more than one fund. In contrast, larger teams with longer tenure and managers with MBA education tend to choose less risky asset allocation. It seems that a key factor is the diversity which its existence in high levels tend to produce less risky portfolios.

Looking for deeper categorization of managers and directors, there is an examination from Ding and Wermers (2012), which studies the human characteristics that can affect the performance of mutual funds, in which level and if not how this situation can be fixed. They target on the part that indicates if the directors are internal or external (seasonal position) and thus in which degree the managers are ingrained (well-established) in their position. The authors support that the only case where the long-experienced managers are more familiar and are able to predict future returns is when they are part of big funds. On the other hand, managers with many years of experience who have been rooted in a position within a smaller fund, they fail to make such predictions and the reason according to the authors seems to be the “managerial entrenchment”. Last but not least, Dobra and Lubich (2013), in a similar research work, analyze the relationship that may occur between a pension fund’s governance and the allocation of the assets as well the level of risk that will be chosen from directors. They prove through a challenging process that the performance of the fund is determined by how the assets have been allocated and the risk taking is a subject straightly connected with it. In that point the governance and its various aspects play a significant role. The analysis that had been done relates the structure of governance in a pension fund with a number of assumptions that can explain the examined relation.

3. Data

As I have already mentioned in Chapter 1, subject of research in this study is the U.S. public pension funds which are examined for the period 2001-2013. During this period, countless adjustments which came from the crisis that the U.S. passed through, take place in the funds' industry. In order to draw some results, I look for a database that would be able to provide the investigation with the information needed to be analyzed and such a database was found in the well-known Center for Retirement Research at Boston College. Specifically, I borrow an amount of data for 123 public pension funds from the Public Plans Database (PPD) which has been created and improved year by year by the Center for Retirement Research at Boston College in cooperation with the Center for State and Local Government Excellence and the National Association of State Retirement Administrators. The hidden process behind the partnership of the three corporations is reviewing and evaluating the comprehensive annual financial reports (CAFRs), which are produced under the accounting standards of the Governmental Accounting Standards Board (GASB), as well subtracting the required data for the construction of the PPD. The database covers more than 150 U.S. state and local pension plans and presents material concerning a pension funds' general information, income statement, asset allocation, investment returns, costs and membership. Given that the PPD is an integrated list of detailed statistics for the majority of the state and local plans, it is considered as the most suitable database for this study.

However, the PPD covers only one part of the data adopted for this examination. The second and most challenging part remains the CEOs' personal information. The first step includes naming the CEOs and to record their tenure in each pension fund separately. Although I obtain palpable results after looking over the CAFRs one by one, these are not sufficient. Consequently, the solution comes from the web. Through a lengthy procedure and searching manually on various websites such as pension funds' websites and LinkedIn, I hand-collect and set up an almost complete database about the tenure, experience and education of 229 CEOs in total. Unfortunately, even though I try to generate a comprehensive set of data, I allow for a number of gaps in this hand-collected and formed database as it is impossible for instance to find available information for executives that started their tenure 20 years ago and in some cases even more.

3.1. Dependent Variables

3.1.1. Risky Assets

Giving most of the attention to the asset allocation, liability valuation and performance of each pension fund as a unit, this study attempts to explore the level in which these three variables are affected by the CEOs' distinctive features on top of factors such as the size and percentage of retirees of the fund. For the purposes of this research, it is crucial to find the value that would be representative enough to describe the strategic asset allocation. According to Andonov et al. (2014), one could measure the dependent variable asset allocation as of the proportion of the risky assets invested, compared to the less aggressive investments such as bonds, cash and other short term investments. Taking into account the fact that markets are subject to continuous changes over time, every pension fund modify their strategic asset allocation by rebalancing the weights of the various class of investments in their portfolios. Consequently, I find it optimal to calculate the risky assets of a fund i in the year t by extracting data from the PPD and using the following formula:

$$risky\ assets_{it} = \%equities_{it} + \%real\ estate_{it} + \%alternatives_{it} + \%others_{it}$$

Where i is the fund and t the year for which I conduct the percentage of the risky assets, $\%equities_t$ are the assets that are invested in both domestic and international equities in the year t $\%real\ estate_t$ are the assets invested in real estate in the year t and finally $\%alternatives_t$ and $\%others_t$ are the assets invested in alternatives and others in year t which could include investments in hedge funds, futures, commodities and derivatives contracts.

Considering as starting year 2001, there is evidence from the past that the percentages of risky assets have grown in the majority of the funds, reaching in some cases more than 80%. Figure 3.1 below presents the average allocation in risky assets for state and local pensions between the years 2001-2013. It is remarkable to say that during the recession the invested percentage in risky assets experienced a decline from 0.70 in 2007 to 0.68 and 0.69 in 2008 and 2009 respectively. This gave space to bonds and other less aggressive investments to scale on the board of the invested proportions.

Figure 3.1: Percentage of risky assets for the years 2001 – 2013

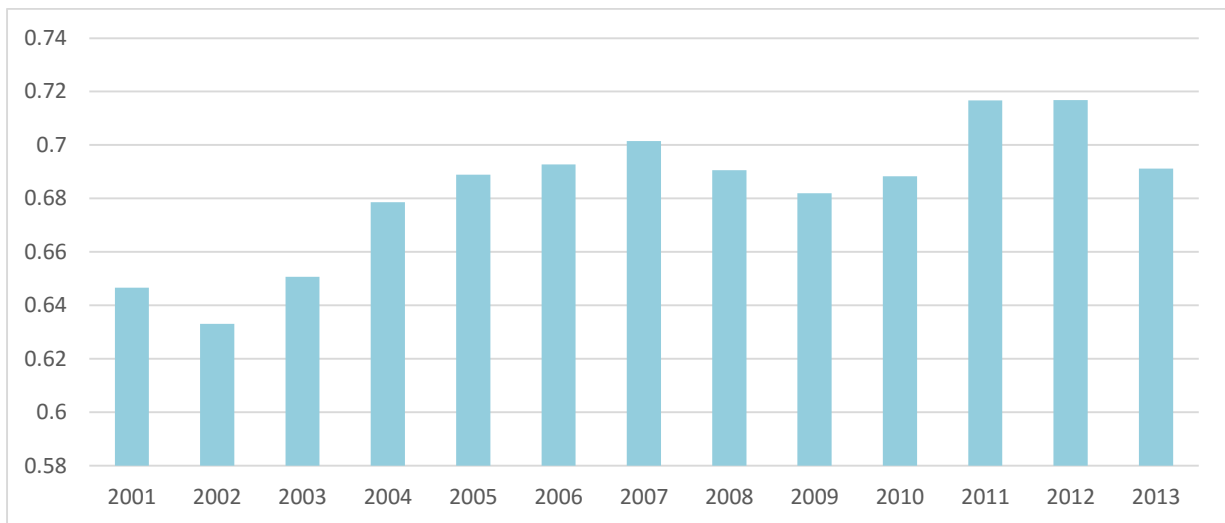
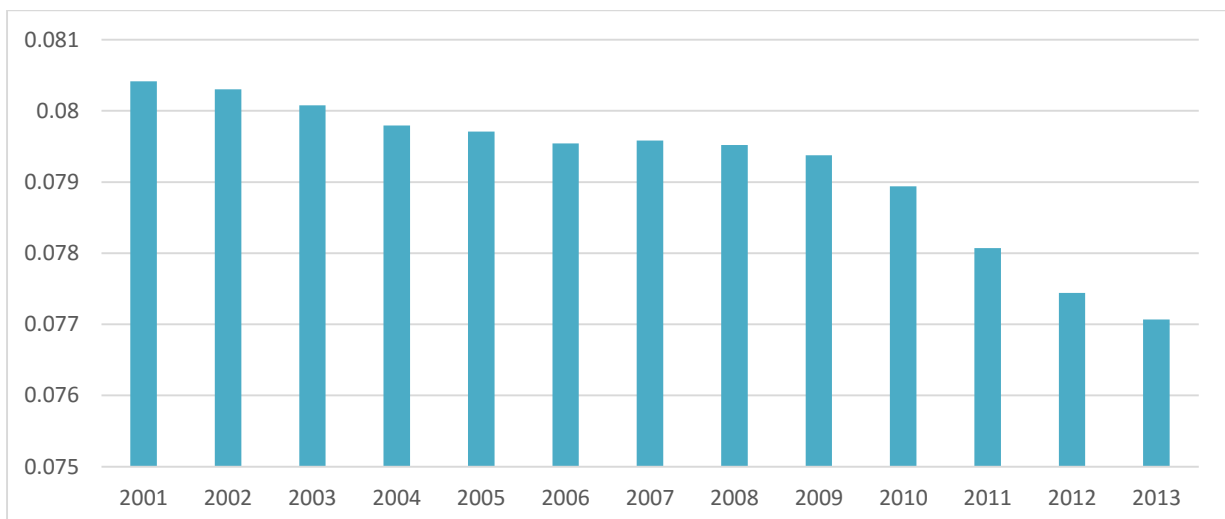


Figure 3.2: Percentage of discount rates for the years 2001 – 2013



3.1.2. Liability Discount Rates

On the other hand, looking at the liabilities side, the second dependent variable that is examined in this study is liabilities valuation. Components such as future insurance and salary increase as well as mortality and discount rates. However, the latter one, plays the most significant role in the determination and valuation of a pension fund's current liabilities and is the factor that this dissertation uses on behalf of how to measure the liabilities. Over the years, a lot of debate has been done regarding the appropriate level that the discount rate should fluctuate. In general, what most of the state and local plans adopt is a rate around 8% with slight variations above and below. Proponents

of this theoretical approach would find in PPD that the values for the discount rates are roughly 8%. Figure 3.2, which demonstrates the annual average discount rates for all funds, stands in line with what the theoretical methods believe.

3.1.3. Performance

Last but not least, performance is another dependent variable. In terms of how to quantify the last dependent variable, it is not considerably suitable to adopt the 1-year returns on the investments. For that reason and taking into account that the funds' portfolios are entirely diversified, the construction of a custom benchmark for each pension fund using a weighted average benchmark is vital. This method allows me to calculate what is called net benchmark-adjusted returns; returns that each fund separately would had achieved, if the weights that constituted the portfolio had been invested according to a benchmark, which must had been the appropriate for the different classes of investments. After this process, it is possible to calculate the performance of each pension fund for every year individually just by subtracting the adjusted returns we found from the 1-year real investment returns that the PPD provided. With the view to receive the best outcome, I choose for every single class of investments the most relevant U.S. index. The indices used are the S&P 500 Composite, Barclays US Aggregate, US Treasury Bill Rate (3 month), US Venture Capital Index, US NCREIF, HFRI Fund of Funds Composite for the equities, fixed income, cash and short term investment, real estate, alternatives and other investments respectively. The net benchmark-adjusted returns of a fund i the year t are determined considering the following formula:

$$\begin{aligned} & \text{net benchmark – adjusted returns}_{it} \\ &= \% \text{equities}_{it} \times r_{1t} + \% \text{fixed income}_{it} \times r_{2t} + \% \text{cash and short term}_{it} \times r_{3t} \\ & \quad + \% \text{real estate}_{it} \times r_{4t} + \% \text{alternatives}_{it} \times r_{5t} + \% \text{others}_{it} \times r_{6t} \end{aligned}$$

Where i is the fund and t the year, r_{1t} are the returns of S&P 500 Composite, r_{2t} are the returns of Barclays US Aggregate, r_{3t} are the returns of US Treasury Bill Rate, r_{4t} are the returns of US Venture Capital Index, r_{5t} are the returns of US NCREIF and r_{6t} are the returns of HFRI Fund of Funds Composite.

The last step is to compute the performance as the difference between the 1-year returns on the investments and the net benchmark-adjusted returns. For those calculations I express the above explanations by the following:

$$\text{performance}_{it} = (\text{returns on the investements}_{it}) - (\text{net benchmark – adjusted returns}_{it})$$

3.2. Independent Variables

To point out the initial and main purpose of this study, I try to examine the relationship between the features of the CEOs with the asset allocation, liability valuation and performance of each fund. Referring to the particular characteristics that one might possess, this research embodies the tenure, education and experience. Multiple dummy variables are used to define the last two in the best possible way. Nevertheless, the study considers also factors related with the size of a fund as well the percentage of retired people that benefit. Table 3.1 presents the total numbers of the independent variables, as I use them in the regressions and a description for each one.

Table 3.1: Independent Variables Specification

Variable	Description
Tenure	Total years held as a CEO
EduLevel	Level of education of a CEO (BSc, MSc/MA/MBA, PhD/Doctorate)
Certificates	Dummy variable for Certificates (CRC, CRA, CEBS, CPA, CFA, CIPM, CGFM)
FAE	Dummy variable for degree in finance/accounting/economics
LAW	Dummy variable for degree in law
MM	Dummy variable for degree in management/marketing
EPF	Dummy variable for experience in private sector in finance positions
EPO	Dummy variable for experience in private sector in other positions
FundSize	Logarithm of the total market assets of a fund
Retired	Percentage of retired people in a pension fund

3.2.1. Tenure

To begin with, tenure, as one of the independent variables is extracted by looking at the CARFs of all the pension funds for the years 2001-2013. However, it should not be forgotten that there is the possibility that the CEO of the first year (2001) was not appointed that year but he/she was already in that position for a couple of years. To overcome this problem, the solution come from the web by searching for sources that could prove the exact year of the beginning of the tenure.

3.2.2. Education

Moving to the next two independent variables, education and experience, the existence of dummy variables is necessary in order to describe them in an optimum way. To demonstrate the education, I assort into two subcategories; the type of education and the field that the degree was obtained. The

first one is described by the variables “EduLevel” and “Certificates”. The variable “EduLevel” describes the level of education of a CEO as this could be a bachelor degree, any kind of master degree even a PhD or a Doctorate. The higher price that the variable could take is 3 and means that a CEO holds a PhD or a Doctorate. Otherwise, it takes the value 2 or the minimum value of 1 if it’s a holder of a bachelor degree. The dummy variable “Certificates” takes the value one if the CEOs is a holder of any kind of certificate such as these described in Table 3.1 and takes a value of zero if he/she has no certificates. The second subcategory counts for the field of any type of degree that a CEO has. To capture the description of the field, I constructed three dummies, which take value of one if the CEO studied in that field and zero if otherwise. The reason for choosing them was how frequent compared to others is the field in general; finance, accounting and economics (“FAE”), law (“LAW”) and management and marketing (“MM”).

3.2.3. Experience

To proceed further, the second independent variable is the experience, which is also interpreted by dummy variables. My first thought was to include experience in both private and public sector. Nonetheless, the research is examined based on public pension funds and thus, in order to avoid correlations coming from a dummy variable related to the experience in the public sector I exclude such kind of variable and I count only for experience arising from the private sector. Therefore, two dummies were used to capture this variable; experience in the private sector in a finance position (or positions relevant to accounting and economics) and other position (“EPF” and “EPO”).

3.2.4. Percentage of retired

Another control variable is the percentage of the retired members in a fund. As can be seen from Table 3.2 below, the minimum price is 0.00 while the maximum price is 0.81 and these results indicate that there is variation across the fund concerning the number of the retirees in every year. With the view to calculate the percentage of the retirees, I clarify the ratio of the retired members to the total membership of a fund. Subtracting the statistics from me PPD, for the fund i the year t the ratio is given by the following formula:

$$\% \text{ of retired members}_{it} = \frac{\text{total number of service retirees}_{it}}{\text{total number of members}_{it}}$$

Table 3.2 provides summary of the statistics between state and local pension funds for both dependent and independent variables. Panel A shows the number of funds and the total number of observations which comes to 18586. Additionally, the study employs 229 CEOs. The average number of CEOs that a fund has for a period of 13 years is between two and three. I report funds that they had one CEOs for all the examined years and others that had up to eight. On average, the percentage invested in riskier assets seems to reach 0.68, leaving no space for investments in bonds and cash. The discount rates prove in practice and according to the GASB's standards, that an 8% rate is adopted by the funds. As can be seen from Table 3.2, an important subject to report is that the standard deviation of performance is 0.505 which is high compared to the mean which in this case is 0.135. The same theory can be applied for the size of the each fund but in this case the standard deviation can be considered as low. Looking from the perspective of the CEOs features, six out of the eight variables are dummies. Tenure takes prices from only a year to maximum of 41 year with the average to be 6.5 years.

Table 3.2: Summary Statistics

The Table provides summary statistics for all the examined variables. In Panel A, *#Funds*, *#CEOs* and *#Observations* present the total number of funds, CEOs and observations. In panel B, observations, mean, standard deviation, minimum and maximum are presented for the variables related to the funds. In Panel C, observations, mean, standard deviation, minimum and maximum are presented for the variables related to the CEOs.

<i>variable</i>	<i>obs</i>	<i>mean</i>	<i>sd</i>	<i>min</i>	<i>max</i>
<i>Panel A: Total number of funds, CEOs and observations</i>					
<i>#Funds</i>	123				
<i>#CEOs</i>	229	2.5	1.4	1	8
<i>#Observations</i>	18586				
<i>Panel B: Summary Statistics from Pension Funds perspective in 2001-2013</i>					
RiskyAsstes	1599	0.683	0.113	0.000	0.980
DiscountRate	1599	0.079	0.004	0.060	0.090
Performance	1599	0.135	0.505	-1.982	5.072
FundSize	1594	6.946	0.553	5.255	8.418
Retired	1563	0.255	0.094	0.000	0.810
<i>Panel C: Summary Statistics from CEOs perspective in 2001-2013</i>					
Tenure	1529	6.503	6.541	1	41
EduLevel	1522	1.967	0.764	1	3
Certificates	1240	0.299	0.458	0	1
FAE	1202	0.309	0.462	0	1
LAW	1201	0.292	0.455	0	1
MM	1200	0.421	0.494	0	1
EPF	1369	0.147	0.354	0	1
EPO	1369	0.160	0.367	0	1

3.2.5. Fund's size

Compared to the main independent variables, this study aims to produce a research which will be able to give thorough results. Thus, from the perspective of the pension fund, the additional variable "FundSize" contributes to the investigation by strengthening the results. The size of the pension fund is measured by the fund's total market assets and expressed in the database in a logarithmic form intending to improve the model fit and give more illustrative interpretation.

4. Methodology

This chapter explains the methodology applied in order to analyze the relationship between risky assets, discount rates and performance with the characteristics of CEOs. These could be described as tenure, experience and education of each one as well some additional factors such as size of the fund and percentage of retired people per fund. With the intension to achieve precise outcomes, I created a set of research questions which are tested thoroughly using the econometric regressions in STATA.

4.1. Research Questions

As mentioned in the introductory section, identifying a research question works as statement which could be helpful in guiding all the stages of the investigation and analyzing the results in order to prove the existence of a relationship between two parties. Due to the fact that this research employs more than one key explanatory variable, I assume three different research questions customized for each one of the dependent variables.

Research Question 1 consists of three parts and tests whether there is a relationship between tenure and risky assets, liability rates and performance of a public pension fund.

- *Question 1a:* How possible is that a longer tenure can affect positively the allocation to risky assets?
- *Question 1b:* Can a relationship between tenure and discount rates exist?
- *Question 1c:* In which extend the tenure can influence the performance?

Research Question 2 refers to the education background of CEOs' and involves two subcategories of education; level of education as this could be defined as bachelor degree, master degree or PhD and field of studies which states the education in finance, accounting or economics, law and marketing or management.

- *Question 2a:* Are CEOs with higher education and studies related to finance, accounting or economics investing a higher percentage in risky assets?
- *Question 2b:* How likely is a CEO with higher education and studies related to finance, accounting or economics tends to move the discount rates?
- *Question 2c:* In which level can a CEO with higher education and studies related to finance, accounting or economics affect the performance?

Research Question 3 examines whether all kinds of previous experience in the private sector could be connected with any of the three leading variables.

- *Question 3a:* Can a relationship between years of experience in the private sector in a finance related position and higher percentage allocated in risky assets exist?
- *Question 3b:* Do the years of experience in the private sector in a finance related position influence the discount rates?
- *Question 3c:* Are the years of experience of a CEO in the private sector in a finance related position able to raise the performance of a fund?

4.2. Regression Analysis

Before start explaining the methods used in this research, it is important to note that running a test for correlation was vital in order to ensure that the variables are not correlated with each other. Table 9.1 (appendix) presents the correlation matrix. As can be viewed, the dummy variables *EduLevel* and *LAW* are only slightly correlated (0.5631) and thus I will keep both of them.

With the intention to relate the three dependent variables; asset allocation to risky asset, discount rates and performance, to the features of CEOs, I have used pooled panel data regressions. This type of analysis brings various advantages which will benefit the research and provide the best outcomes. It allows the cross-sections to test for time and fund variation at the same time as well less collinearity among variables and more degrees of freedom. Additionally, a key motive for choosing panel data regressions is that I have the option to select between two methods of estimation; random effects and fixed effects model, depending on the level that the unobserved effect is correlated with the explanatory variable. Although the independent variables in this examination hardly vary over the years, I use the fixed effects technique in order to guarantee that none of the education, experience or tenure will be correlated with the error term in any of the equations. However, not all the factors that contribute to the analysis such as cultural differences, decision preferences and personal skills can be observed. Consequently, to figure out which of the two methods is the appropriate fit for this research, is to run the Hausman test which according to the theory tests if the error term is correlated with the explanatory variables. I run three different Hausman tests, one for each dependent variable. According to Tables 9.1, 9.2 and 9.3 (appendix), it is preferred to use fixed effects models in all of them.

The analysis is divided into three panel regressions; one for the risky assets, a second for the discount rates and a last one for the performance. The equations are the following:

$$RiskyAssets_{it} = \beta_0 + \beta_1 Tenure_{it} + \beta_2 EduLevel_{it} + \beta_3 Certificates_{it} + \beta_4 FAE_{it} + \beta_5 LAW_{it} + \beta_6 MM_{it} + \beta_7 EPF_{it} + \beta_8 EPO_{it} + \beta_9 Retired_{it} + \beta_{10} FundSize_{it} + \beta_{11} YD_t + \beta_{12} FE_i + u_{it} \quad (1)$$

$$DiscountRates_{it} = \beta_0 + \beta_1 Tenure_{it} + \beta_2 EduLevel_{it} + \beta_3 Certificates_{it} + \beta_4 FAE_{it} + \beta_5 LAW_{it} + \beta_6 MM_{it} + \beta_7 EPF_{it} + \beta_8 EPO_{it} + \beta_9 Retired_{it} + \beta_{10} FundSize_{it} + \beta_{11} YD_t + \beta_{12} FE_i + u_{it} \quad (2)$$

$$Performance_{it} = \beta_0 + \beta_1 Tenure_{it} + \beta_2 EduLevel_{it} + \beta_3 Certificates_{it} + \beta_4 FAE_{it} + \beta_5 LAW_{it} + \beta_6 MM_{it} + \beta_7 EPF_{it} + \beta_8 EPO_{it} + \beta_9 Retired_{it} + \beta_{10} FundSize_{it} + \beta_{11} YD_t + \beta_{12} FE_i + u_{it} \quad (3)$$

Where i is the fund and t the year, *RiskyAssets* is the percentage allocated in risky assets, *DiscountRates* is the rates used to evaluate the liabilities, *Performance* is the excess returns, *Tenure* is the years held as a CEO, *EduLevel* is the education level of a CEO, *Certificates* is the dummy variable and equals one if a CEO has any kind of certificate, *FAE* is the dummy variable for studies in fields such as finance, accounting or economics and equals one if a CEO has a degree in any of these fields, *LAW* is the dummy variable for studies in law and equals one if a CEO has degree in law, *MM* is the dummy variable for studies in fields such as marketing or management and equals one if a CEO has degree in any of these fields, *EPF* is the dummy variable for experience in private sector in finance positions and equals one if a CEO has this experience, *EPO* is the dummy variable for experience in private sector in other positions and equals one if a CEO has this experience, *Retired* is the percentage of retired people in each fund, *FundSize* is the logarithm for the size of a pension fund, *YD* are the year dummies, *FE* are the fixed effects by fund and u_{it} is the idiosyncratic error. Also, in all regressions I evaluate *clustered* standard errors by CEOs name and use the *robust variance estimator*.

In order to boost the analysis and check for serially correlated error terms, I added in every regression the robust variance estimator which also controls for heteroskedasticity. As Wooldridge (2008) explains in his book, is it always more efficient to use robust estimators in every analysis. Other than this, I cluster by CEO's name and the reason is that this research is looking for answers from the executives' perspective and not from the funds' side. By doing so, I try to capture all the unobserved effects coming from the CEO's characteristics (individuals that share the similar features) and let them act as significant factors in the regression analysis. On top of all these, I also include year fixed effects, expressed as year dummies in the regressions, to control over time specific effects in each fund. In line with the theoretical background, to double check that time fixed effects are needed in this study I run the Test Parm. The results indicate that the use of year dummies in this case is required and can be presented in Table 9.4 (appendix). The impact of the fund fixed effects and the year dummies are excluded from the results tables.

5. Results

In this Chapter the main findings of the study are described. With the intention to introduce in detail the results for all the dependent variable, an analysis of each one separately takes place. In all three regressions I use fund fixed effects as well cluster by name of CEO aiming to group by the various common characteristics that CEOs own.

5.1. Risky Assets

Table 5.1 presents the panel regression for the percentage allocated to risky assets. I analyze the results by creating four different models where I add every time a different independent variable in order to understand exactly the influence that each one might have. All of them have a common starting point which is the percentage of retired people and the size of the fund. As you can observe, even if the retired members don't play a significant role, the *FundSize* has a positive influence in the percentage of risky investments. This means that when a fund grows by 10 percent the total assets, the allocation to risky assets rises 1.17 percent in Model (1) and 1.55 percent in Model (4). Model (1) demonstrates that the *Tenure* of a CEO, meaning the years spent as CEO of a fund, allows estimating increasing differences in the risky invested assets. CEOs with more years in the position participate with 0.0025 percent more to riskier assets that to less aggressive. On the other hand, there is no relationship between the level of education that a CEO holds such as bachelor, master or PhD degree and the way they allocate to risky assets.

Model (2) indicates that the exact same results apply to any kind of *Certificates* that a CEO might hold. There is no relationship associated between the percentage that is allocated to risky assets and the educational *Certificates* of CEOs. As it appears from Table 5.1 *Tenure* is again positively related with risky assets with a percentage of 0.0026. Based on Model (3), adding a dummy for the field that a CEO has a degree, not many changes occur. The choice to take into account both *LAW* and *MM* appears to be irrelevant to the strategy of allocating in risky assets. On the contrary, a CEO who has a degree in finance, accounting or economic studies invests 4.7 percent more in risky assets. In Model (4), I add two dummy variables for experience that indicate whether there is previous experience in private sector in finance related position (*EPF*) or in other positions (*EPO*). The results point out that CEOs with finance experience in a private held company have no relationship with decisions regarding strategies that allocate more to risky assets. Adding to this, someone with experience in other positions lowers the investments to risky assets by 4.2 percent.

Table 5.1: Panel Regressions: Percentage allocated to risky assets

In this table, we estimate a panel model. The dependent variable is the percentage allocated to risky assets. As independent variables, I include Tenure, the tenure of a CEO, EduLevel, the education level of a CEO, Certificates, a dummy variable taking a value of one if a CEO has any kind of certificate, FAE a dummy variable taking a value of one if a CEO has a degree in finance, accounting or economics, LAW, a dummy variable taking the value of one if a CEO has a degree in law, MM a dummy variable taking a value of one if a CEO has a degree in marketing or management, EPF, a dummy variable taking a value of one if the CEO has experience in private sector in finance positions, EPO, a dummy variable taking the value of one if the CEO has experience in private sector in other positions. I also control for FundSize, the logarithm of total pension fund market assets and Retired, the percentage of retired people in a fund. Where indicated I include year dummies and fixed effects by fund. All regressions are evaluate by clustered standard errors by pension CEO's name and by robust variance estimator. I report standard errors in brackets. *, **, and *** indicate significance levels of 0.10, 0.05, and 0.01, respectively.

	Model (1)	Model (2)	Model (3)	Model (4)
<i>Dependent Variable: Percentage allocated to risky assets</i>				
Tenure	0.003* [0.001]	0.003* [0.001]	0.003* [0.001]	0.003** [0.001]
EduLevel	0.004 [0.008]	0.004 [0.008]	-0.004 [0.007]	-0.008 [0.007]
Certificates		0.006 [0.013]	0.008 [0.015]	0.019 [0.014]
FAE			0.047*** [0.014]	0.047*** [0.014]
LAW			0.020 [0.019]	0.015 [0.013]
MM			0.000 [0.016]	-0.009 [0.011]
EPF				0.013 [0.017]
EPO				-0.042*** [0.012]
FundSize	0.117* [0.064]	0.118* [0.064]	0.135** [0.062]	0.155** [0.062]
Retired	0.019 [0.058]	0.019 [0.058]	0.050 [0.065]	0.043 [0.062]
Year Dummies	YES	YES	YES	YES
Fund FE	YES	YES	YES	YES
Clustering by name	YES	YES	YES	YES
Robust	YES	YES	YES	YES
Observations	1,201	1,201	1,175	1,161
R ²	0.597	0.597	0.61	0.619

To conclude, the leading results for risky assets indicate that *Tenure* plays a major role in the policies that allocate to riskier assets. Furthermore, it seems that the more established and mature a pension fund is, the greater the allocation to riskier assets persists.

5.2. Discount Rates

Moving to the next dependent variable, discount rates, the results are not surprising. As it becomes apparent from Table 5.2, only three of the independent variables exhibit a relationship with the discount rates. The results from the panel data analysis represent the theoretical approaches. As it is already mentioned in the literature part (Chapter 2), the majority of the funds in U.S. follow what the GASB proposes as the appropriate rates to discount their liabilities. Consequently, there is not much space for variations to exist and thus the findings are restricted in only *Certificates*, *MM* and *EPF* which are associated with the discount rates. Specifically, the dummy variable *Certificates* indicates positive results only under Model (2) and (3) where the main analysis is whether the education of a CEO is able to have an effect on discount rates. The results show that when related certificates exist, the discount rates rise by 0.072 and 0.076 percent in Models (2) and (3). It is worth mentioning that the discount rates are multiplied by 100 intending in that way to make the results more readable. In addition, in Model (3) where I add all the dummies for the field of the obtained degrees, the dummy variable *MM* is negatively associated with the discount rates meaning that when the degree of a CEO is in marketing or management this results in declining the discount rates. In conjunction with this, when I control for previous experience of a CEO in Model (4), the *EPF* comes to add another adverse relationship with the discount rates. Previous experience in a private company in a finance position, affects the discount rates by -0.89 percent.

Summarizing, the research shows that from a CEO's perspective there are not many factors that are statistically significant for the U.S. pension funds. Until nowadays, the reason seems to be the influence of the GASB in regulating the discount rates which is stronger than every external or internal aspect. The results are in line with the theory and with what Brown and Wilcox (2009) prove.

Table 5.2: Panel Regressions: Discount Rates

In this table, we estimate a panel model. The dependent variable is the discount rate. As independent variables, I include Tenure, the tenure of a CEO, EduLevel, the education level of a CEO, Certificates, a dummy variable taking a value of one if a CEO has any kind of certificate, FAE a dummy variable taking a value of one if a CEO has a degree in finance, accounting or economics, LAW, a dummy variable taking the value of one if a CEO has a degree in law, MM a dummy variable taking a value of one if a CEO has a degree in marketing or management, EPF, a dummy variable taking a value of one if the CEO has experience in private sector in finance positions, EPO, a dummy variable taking the value of one if the CEO has experience in private sector in other positions. I also control for FundSize, the logarithm of total pension fund market assets and Retired, the percentage of retired people in a fund. Where indicated I include year dummies and fixed effects by fund. All regressions are evaluate by clustered standard errors by pension CEO's name and by robust variance estimator. I report standard errors in brackets. *, **, and *** indicate significance levels of 0.10, 0.05, and 0.01, respectively.

	Model (1)	Model (2)	Model (3)	Model (4)
<i>Dependent Variable: Discount Rates</i>				
Tenure	0.0022 [0.0047]	0.0028 [0.0046]	0.0018 [0.0047]	0.0009 [0.0046]
EduLevel	0.0194 [0.0187]	0.0191 [0.0183]	0.0124 [0.0181]	0.0205 [0.0179]
Certificates		0.0720** [0.0351]	0.0762* [0.0412]	0.0551 [0.0399]
FAE			0.0326 [0.0392]	0.0430 [0.0414]
LAW			0.0037 [0.0350]	0.0100 [0.0363]
MM			-0.0705** [0.0349]	-0.0592* [0.0350]
EPF				-0.0886* [0.0474]
EPO				0.0707 [0.0473]
FundSize	-0.2410 [0.4420]	-0.2330 [0.4410]	-0.1760 [0.4450]	-0.2000 [0.4560]
Retired	0.2570 [0.2230]	0.2510 [0.2200]	0.1620 [0.1970]	0.1620 [0.2010]
Year Dummies	YES	YES	YES	YES
Fund FE	YES	YES	YES	YES
Clustering by name	YES	YES	YES	YES
Robust	YES	YES	YES	YES
Observations	1,201	1,201	1,175	1,161
R ²	0.801	0.802	0.81	0.813

5.3. Performance

As stated by numerous theoretical and empirical studies, there is evidence that the performance of a fund is connected with factors such as tenure and education. This panel regression controls for fund fixed effects as both the previous regressions. Looking at Table 5.3, it is observable that CEOs with higher tenure bring better performance for the fund when controlling for *EduLevel*, *FundSize*, *Retired* and fund fixed effects. In contrast, invest in a CEO with all levels of education appears not to be associated at all with the returns of a fund. Likewise, Model (1) indicates that funds which hold higher percentage of assets under their management and funds with greater proportion of retired individuals cannot influence the returns' flow. Looking now in models (2) and (3), after adding all the remaining dummies related with education, the outcomes are not in line with other empirical studies.

Both *Certificates* and the dummies for the degree field have no relationship with the performance of a fund. The analysis for the last test, Model (4) demonstrates the same results for the dummies *Certificates*, *FAE*, *LAW* and *MM*; all of them have insignificant impact on a fund's performance. However, in this regression analysis I add dummies to control for prior holding experience in the private sector in a position linked with finance or any other position as could be clearly seen from Table 5.3. After examining the relationship between *EPO* and performance, significant conclusions can be drawn. A CEO that has prior experience in finance positions in the private sector results on a growth of 1.19 percent in the performance of a fund. On top of this, when taking into account the size of a fund, a negative significant relation occurs. Considering for larger funds automatically this means that the returns will be less by 0.26 percent in 1 percent significant level.

In general, the independent variables in this regression analysis do not act in agreement with theoretical and empirical investigations which will be discussed in the next chapter. In this test, there are two main findings that arise; firstly, the only significant factors that plays a role is the *Tenure*, indicating that a CEO will perform better for the fund when the active years in the fund increase, and secondly, none of the dummy variables for education have an impact on the returns of a fund showing in that way that the outcomes here are not in line with what older studies indicate.

Table 5.3: Panel Regressions: Performance

In this table, we estimate a panel model. The dependent variable is the performance. As independent variables, I include Tenure, the tenure of a CEO, EduLevel, the education level of a CEO, Certificates, a dummy variable taking a value of one if a CEO has any kind of certificate, FAE a dummy variable taking a value of one if a CEO has a degree in finance, accounting or economics, LAW, a dummy variable taking the value of one if a CEO has a degree in law, MM a dummy variable taking a value of one if a CEO has a degree in marketing or management, EPF, a dummy variable taking a value of one if the CEO has experience in private sector in finance positions, EPO, a dummy variable taking the value of one if the CEO has experience in private sector in other positions. I also control for FundSize, the logarithm of total pension fund market assets and Retired, the percentage of retired people in a fund. Where indicated I include year dummies and fixed effects by fund. All regressions are evaluate by clustered standard errors by pension CEO's name and by robust variance estimator. I report standard errors in brackets. *, **, and *** indicate significance levels of 0.10, 0.05, and 0.01, respectively.

	Model (1)	Model (2)	Model (3)	Model (4)
<i>Dependent Variable : Performance</i>				
Tenure	-0.0084* [0.0046]	-0.0084* [0.0048]	-0.0087* [0.0045]	-0.0093* [0.0049]
EduLevel	0.0112 [0.0404]	0.0112 [0.0405]	0.0183 [0.0416]	0.0303 [0.0425]
Certificates		-0.0025 [0.0614]	-0.0327 [0.0702]	-0.0726 [0.0752]
FAE			-0.0118 [0.0493]	-0.0184 [0.0476]
LAW			-0.0286 [0.0491]	-0.0338 [0.0457]
MM			0.0496 [0.0601]	0.0713 [0.0639]
EPF				0.0257 [0.0668]
EPO				0.1910*** [0.0593]
FundSize	-0.2040 [0.1660]	-0.2050 [0.1660]	-0.2260 [0.1600]	-0.2620* [0.1550]
Retired	0.0384 [0.1710]	0.0386 [0.1710]	-0.0135 [0.1690]	0.0367 [0.1770]
Year Dummies	YES	YES	YES	YES
Fund FE	YES	YES	YES	YES
Clustering by name	YES	YES	YES	YES
Robust	YES	YES	YES	YES
Observations	1,201	1,201	1,175	1,161
R ²	0.425	0.425	0.425	0.432

6. Discussion

After indicating the results, this chapter discusses in detail all the panel regressions. In order to achieve a thorough investigation, some future research points will also be presented at the end of this Chapter. With the intention to create a clear and strong objective for this study, I use a number of research questions in section 4.1 to give answers to issues that will enrich the literature and work as a starting point for several other studies. In this chapter, you will find appropriate answers to these research questions.

In the first regression analysis, we employ dependent variables linked to tenure, education and previous experience in order to identify the existence of relationship with assets that are allocated as risky. The research question (1a) seems to be proven right; *Tenure* is a factor that as it increases is able to make CEOs invest more in riskier assets. The same results stand also for question 2a; degrees in fields related with finance, accounting or economics demonstrate a rise in the risky assets invested. Unfortunately, there is no empirical evidence for results specified for the field of studies that a CEO holds. The same concept applies to the previous position that one might have held in the past. The existence of *EPO* results in a reduction of the proportion allocated to risky assets. Looking on the other half of the experience, *EPF*, we notice that it is unrelated with the risky assets and consequently there is no positive answer to research question 3a. Furthermore, if we look through Andonov's (2014) investigation, we find that the size of a fund plays a positive significant role. The author supports that the bigger funds allocated higher percentage in risky assets. However, when he controls for fund fixed effects, as happens in this research, the relationship becomes insignificant.

Moving to the examination of discount rates, as I already mention in a previous chapter there are not many encouraging outcomes to deal with. In this research, findings from education and experience relate some of their dummies to the liability discount rates. Most of the theoretical investigations support the idea that the GASB has been over the years the only organization that can control and determine the rates for the funds. Brown and Wilcox (2009) prove that none of the characteristics can move the rates, either from the perspective of a CEO or the fund. To give an answer to the research questions, I can conclude that there is no relationship with the tenure of a CEO; as well the education factors can be slight negatively linked with the rates by an executive that the field he/she studied is relating to marketing or management topics. Other than this, there is no existing variable that can influence the liability discount rates. Even though Andonov (2014) in the same paper finds that the retired members are negatively associated with discount rates and the fund's size is positively related,

the results of this research indicate that there is no relationship between these two control variables and discount rates.

A great debate concerning returns of funds has been taking place over the years. In the present analysis, only three out of ten variables have significant effect on the performance of a fund. An existing research from Golec back in 1996 shows that CEOs with longer tenure (and also younger) adopt a strategy that results in better performance and this opinion is not consistent with what this study implies. On the other hand and in line with what Ding (2012) proved in his paper, an answer to the research question 1c, is that tenure in this study appears to have a negative but significant relationship with the performance. The same author presents findings on how the experience in other than finance positions in the private sector proved to be positively related with the performance of a fund but mainly under big teams. Thus, in the question if the experience in finance position indicates any effect in performance the answer is that only *EPO* shows a positive and significant relationship. Not all the CEOs characteristics have a significant influence in the returns of a fund. Lastly, in agreement with Gottesman (2006) both education level and obtained certificates do not affect at all the performance of a fund. The findings cover entirely question 2b which is enquiring about the existence of a relationship between education and performance.

6.1. Future Research

Based on the findings, there is a number of suggestions that arise and will be proposed in this section. As in every study, the present one also includes some issues that in forthcoming researches could be solved by taking into consideration several factors. In this investigation the examined period is 2001-2013. During this time period the U.S. market suffers a deep credit crisis and as was expected this had harmful effects on public pension funds as well. Due to the economic instability, strategies changed to more conservative rather than aggressive as previously. As a result, the returns were lower for a long period. The biggest concern in this study is if the effects of the crisis guide the results. An interesting topic for next investigation would be to test the same sample of data in a different period which does not include situations such as a financial crisis. Another suggestion could be to keep the examined years and change the sample looking for answers in the private sector of pension funds or even in the top performed companies in U.S., Canada or Europe. Trying to increase the period is also a recommendation for future research aiming to balance the values of economic factors and present a more spherical picture. From methodology's viewpoint, there are still some open scopes that could change and bring diverse results. Choosing not to control for fund fixed effects will give room to unobserved effects such as gender, culture, age as well as religion to act in contrast to that in the

present case. In addition, clustering by funds and not by the name of a CEO applies to a wider separation as of the size of the groups compared to the groups created in this study.

7. Conclusion

The key objective of this research is to investigate whether a relationship between CEOs or Executives' personal characteristics and factors related to U.S. public pension funds exists. Specifically, we empirically test for assets allocated as risky, liability discount rates and performance of funds and for specific features related to tenure, education and experience of a CEO. Intending to contribute to the existing literature from the viewpoint of CEOs, I employ a dataset which had been created by merging data from the Public Plans Database (PPD) and the Comprehensive Annual Financial Reports (CAFRs). On top of this, in order to form a totally complete database, I hand-collect information about the CEOs individual characteristics from the web. The study uses pooled panel data regressions where I analyze every dependent variable separately. In particular, three different regressions are created and the dependent variables are risky assets, discount rates and performance. Controlling for tenure, education and experience was not a simple process mainly for the last two because I create dummy variables in order to express and cover all disciplines. Besides, I supplement the analysis by controlling for the number of retired members and the size of the fund.

The findings show critically which of the CEO characteristics can influence the asset allocation, discount rates and performance. Tenure is a factor that brings diverse results for the different dependent variables; can push the risky assets in higher percentages but can also reduce the returns. Considering for the experience dummies, the results indicate that EPO has a positive significant effect on the returns while it implies a negative influence and a further decrease on the proportion allocated to risky assets. For the education independent variables, it is interesting to report that having a CEO with a degree in fields related to finance, accounting or economics, will help to adopt a more aggressive strategy. It seems that the size of a fund works contrary for allocation to risky assets and performance. On the one hand, the bigger pension funds rise the risky assets and on the other hand when it comes to performance works totally different and drop the returns. Referring, to the discount rates there are not many observable results that are statistically significant. This happens because GASB controls over the years for the discount rates and therefore there is no room for variations.

As described, the results vary for the different parts of a pension fund that are tested and therefore the impact to the literature is limited. The study is not always consistent with past theoretical and empirical investigations. Along with the results, performance and education level are not linked and this belief is supported by Gottesman's (2006) empirical research. As for the tenure of a CEO and the size of a public pension fund, the data prove that these two variables affect by the same way the risky assets and the performance. In terms of risky assets, they sustain decisions to invest in equities and in

terms of performance they negatively affect the returns. The factors which describe the experience, *EPF* and *EPO*, demonstrate that when a CEO held in the past a position in a private company in a position not related with finance can impact the risky assets by adopting a more conservative strategy and the performance by boosting the returns even more. Both conclusions are in line with past theoretical researches. Another part of the findings is the discount rates which indicates that dummies for degree in marketing and management and for experience in a finance position in a private held company limit the rates chosen to discount the liabilities. In general what is proved is this research is along the lines of the theory meaning that the CEOs have limited access in the process of choosing the appropriate rates which are roughly 8% the last years.

After testing and deliberating the results, it is crucial to refer to the factors that create limitations in this research. Analyzing a sample during a time period which a deep credit crisis occurred, is one of the main explanations that the findings are not the expected. Under suitable circumstances, I believe that the results would have been different and would have been more consistent with the existing literature on relevant topics. A suggestion for future research includes a wider sample of testing funds whether this means to consider for public funds in Europe, Canada and Middle East or funds that are privately held. Other than this, choosing different methodology could result in various differentiations which may affect the final findings. Thus, to conclude, this research apply to the existing literature by adding facts about U.S. public pension funds when these were highly suffer by underfunded difficulties which were followed by an intensely credit crisis.

8. References

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9. Appendix

Table 9.1: Correlation Matrix

	FundSize	Retired	Tenure	EduLevel	Certificates	FAE	LAW	MM	EPF	EPO
FundSize	1									
Retired	-0.0436	1								
Tenure	-0.0946	0.13	1							
EduLevel	0.0626	-0.026	0.0507	1						
Certificates	-0.034	-0.035	0.0127	-0.1352	1					
FAE	-0.1314	0.029	0.271	0.0591	-0.0452	1				
LAW	0.0685	-0.043	0.064	0.5631	-0.2014	-0.016	1			
MM	0.0527	0.038	-0.182	-0.0018	0.1261	-0.1031	-0.2995	1		
EPF	-0.0265	0.045	-0.019	-0.1006	0.1014	0.0276	-0.0835	-0.065	1	
EPO	0.0814	0.021	-0.07	-0.0641	-0.0099	-0.0897	0.0566	-0.0641	0.0104	1

Table 9.2: Risky assets: Hausman Test

	---- Coefficients ----			
	(b) fixed	(B) random	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Tenure	0.0032478	0.0033893	-0.0001415	0.0002112
EduLevel	-0.0080581	-0.0066396	-0.0014185	0.0012885
Certificates	0.0227499	0.0176394	0.0051105	0.0037878
FAE	0.0458127	0.040627	0.0051857	0.0020524
LAW	0.0169934	0.0143336	0.0026598	0.0028452
MM	-0.0053378	-0.0032012	-0.0021366	0.0020518
EPF	0.0154189	0.0172278	-0.001809	0.0033437
EPO	-0.0417302	-0.0351514	-0.0065788	0.0028826
FundSize	0.2274606	0.092396	0.1350646	0.0209059
Retired	0.0914793	0.1123656	-0.0208863	0.0189902

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic

chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 71.51
Prob>chi2 = 0.0000

Table 9.3: Discount rates: Hausman Test

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
Tenure	-0.0000156	-0.0000322	0.0000166	5.13E-06
EduLevel	0.0002488	0.0001674	0.0000813	0.0000294
Certificates	0.0004039	0.0002342	0.0001698	0.0000897
FAE	0.0004084	0.0004157	-7.30E-06	0.0000475
LAW	0.0001176	0.0000817	0.0000359	0.0000658
MM	-0.000748	-0.0007911	0.000043	0.000048
EPF	-0.0010862	-0.0009047	-0.0001815	0.0000782
EPO	0.0008693	0.0008629	6.38E-06	0.0000671
FundSize	-0.0049682	-0.0022817	-0.0026865	0.0005492
Retired	-0.0020499	-0.0029404	0.0008905	0.0004587

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
 $\chi^2(10) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 49.44$
Prob>chi2 = 0.0000

Table 9.4: Performance: Hausman Test

---- Coefficients ----				
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	random	Difference	S.E.
Tenure	0.0018671	-0.0028782	0.0047453	0.0043908
EduLevel	-0.0317146	-0.0217331	-0.0099815	0.0375339
Certificates	-0.02444	-0.0219482	-0.0024917	0.0737112
FAE	-0.0190594	-0.0407549	0.0216956	0.0540656
LAW	0.0034609	-0.0148984	0.0183593	0.0721938
MM	0.1567987	0.0725044	0.0842943	0.0512123
EPF	0.1105556	0.090878	0.0196776	0.0786563
EPO	0.1620742	0.0291783	0.1328959	0.068802
FundSize	-0.9036447	-0.0164461	-0.8871987	0.2014657
Retired	0.6578027	-0.1499132	0.8077158	0.3536696

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg
Test: Ho: difference in coefficients not systematic
 $\chi^2(10) = (b-B)'[(V_b-V_B)^{-1}](b-B) = 26.5$
Prob>chi2 = 0.0031

Table 9.5: Risky assets, Discount rates, Performance: Testparm

risky assets	discount rates	performance
(1) fy = 0	(1) fy = 0	(1) fy = 0
(2) fy2 = 0	(2) fy2 = 0	(2) fy2 = 0
(3) fy3 = 0	(3) fy3 = 0	(3) fy3 = 0
(4) fy4 = 0	(4) fy4 = 0	(4) fy4 = 0
(5) fy5 = 0	(5) fy5 = 0	(5) fy5 = 0
(6) fy6 = 0	(6) fy6 = 0	(6) fy6 = 0
(7) fy7 = 0	(7) fy7 = 0	(7) fy7 = 0
(8) fy8 = 0	(8) fy8 = 0	(8) fy8 = 0
(9) fy9 = 0	(9) fy9 = 0	(9) fy9 = 0
(10) fy10 = 0	(10) fy10 = 0	(10) fy10 = 0
(11) fy11 = 0	(11) fy11 = 0	(11) fy11 = 0
(12) fy12 = 0	(12) fy12 = 0	(12) fy12 = 0
F(12, 1031)= 2.98 Prob > F= 0.0004	F(12, 1031)= 5.78 Prob > F = 0.0000	F(12, 1031) = 52.19 Prob > F = 0.0000