

THE DETERMINANTS OF PORTUGUESE SALARIES

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Master Thesis

In Business Administration

Supervisor:

Professor Doutor José Dias Curto

Quantitative Methods Department

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ABSTRACT

This research studies the determinants of executive's remuneration in Portugal, resorting to the Human Capital Theory, the Mincer Equation and Agency Theory as background research. Given the lack of studies regarding Portuguese executive remuneration, this study gives an important contribution to Portuguese literature regarding this subject.

The research was performed using data from 274 companies operating in Portugal in the year 2007 containing information about certain characteristics pertaining to 56000 observations on most white-collar employees. Two regression models were estimated using this data, collected by a Human Resources company, to verify the hypotheses formulated.

The results obtained through the estimated models support the hypotheses formulated. Indeed, the education and experience of the executives are two important determinants of remuneration. Furthermore, the size of the companies is positively correlated with the executive remuneration: we expect that the higher the firm, the higher the remuneration. The company performance is also positively correlated with remuneration, which means that it is expected that higher performances lead to higher salaries.

Keywords: Executive remuneration, Agency Theory, Portugal, Labour Economics theories

JEL Classification System: G35, J33

RESUMO

Este trabalho estuda os determinantes da remuneração dos executivos em Portugal, recorrendo à Teoria do Capital Humano, a Equação de Mincer e a Teoria da Agência, como base de estudo. Dada a escassez de estudos relativos à remuneração dos executivos em Portugal, este estudo fornece um importante contributo para a literatura portuguesa acerca deste tema.

A análise foi realizada recorrendo a dados de 274 empresas que operaram em Portugal no ano de 2007, contendo informação acerca de diversas características de 56000 empregados de colarinho branco. Dois modelos de regressão foram estimados usando a informação recolhida por uma empresa de Recursos Humanos, com o objectivo de verificar as hipóteses formuladas.

Os resultados obtidos através dos modelos estimados verificam as hipóteses formuladas. De facto, a educação e experiência dos executivos são dois determinantes importantes da remuneração. Além disso, a dimensão das empresas está positivamente correlacionada com a remuneração dos executivos: é esperado que, quanto maior a dimensão das empresas, maior a remuneração.. A performance das empresas também está positivamente correlacionada com a remuneração, o que significa que é esperado que performances mais elevadas conduzam a salários mais elevados.

Palavras-chave: Remuneração dos executivos, Teoria da Agência, Portugal, Teorias de Economia do Trabalho

Sistema de Classificação JEL: G35, J33

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1. INTRODUCTION

In the last decades, the remuneration of executives has been changing, due to the different importance given to its components over time. Prior to 70's, low levels of compensation, moderate pay-performance sensitivities and little remuneration dispersion across executives were observed. From the mid 70's to 2000's, the compensation grew in a large scale. The differences in pay across firms started to increase and manager's wealth became more close to firm performance due to equity incentives. The remuneration and performance started to be linked, in other words, the executive compensation started to depend on performance. This new kind of compensation is seen as solution for convergence of interests, since better performances of executives lead to better company's performance, and, therefore, better owners return (Holmstrom and Kaplan, 2003).

Also in the last two decades, this kind of remuneration has been followed by bankruptcy of firms and banks, which raised questions about the effectiveness of the practices regarding executive compensation. Leman Brothers is an example of a case in which CEO Richard S. Fuld was given a millionaire bonus before the collapse of that bank.

It is important to understand what are the determinants behind the high salaries of executives. This study tries to explain why executives are being so well paid, resorting to the Human Capital Theory and the Mincer Equation, along with Agency theory to test the relation between compensation, the level of education, tenure (as a proxy for experience), the firm performance, firm size, among other factors.

Regarding the Portuguese literature focusing the determinants of remuneration, there is a list of few studies, such as Duarte (2006), Duarte *et al.* (2010), etc. These studies are focused on the variable pay policies. This study aims to fulfil the lack of research for the Portuguese case, being one of its goals verify the labour economics theories, in which the authors concluded that education and experience are two important determinants of remuneration, resorting to Portuguese data. This analysis will resort to a database with 56000 observations of several companies, including multinational and Anglo-Saxon companies.

Using the same data, the second main objective is to check if the company performance and size are two important factors of executive compensation.

Given the objectives, this study is divided into four chapters, being the first chapter this introductory section. The second chapter includes the prior literature, which includes the previous studies regarding Human Capital Theory, the Mincer model, which is included in the Human Capital Theory field, but it will be studied separately, due to its relevance in this work, and Agency Theory, along with the formulated hypotheses.

The third chapter presents the database that will be used and the descriptive statistics of the database variables, as well as the chosen variables and the two regression models that will be created. The chapter finishes with the exposure of the empirical results.

The fourth chapter presents the main conclusions of investigation, the final remarks of study, its limitations and some suggestions for future projects.

2. LITERATURE REVIEW AND HYPOTHESES

The determinants of remuneration have been widely researched without consensus. A wide list of authors has been trying to define the factors causing salary differences. Agarwal (1981), who finds there are three factors that determine salaries: the amount of skills, experience and knowledge possessed by workers. By its turn, Schultz (1961) studied the cost-benefit analysis of training and investing on education. The theory uses a regression analysis, with wages as dependent variable and capital investment, depreciation value, time invested to acquire human capital and the investment in goods or services to perform the human capital acquisition as independent variables. Mincer (1974), through his equation, studied remuneration resorting to two variables: the education and experience.

Other authors have studied remuneration, through the Agency Theory, such as Jensen and Meckling (1976); Jensen (1983), Murphy (1985), Eisenhardt (1989), etc.

2.1 The Human Capital Theory

This section aims to present the Human Capital Theory, focusing on Becker (1994), although other authors are referred. The Mincer equation is also included in this theory, but it will be presented separately, in order to highlight its importance.

Research by Becker (1994) distinguishes the usual definition of capital (bank accounts, corporate shares, assembly lines, etc.) from human capital (schooling, training courses, lectures, etc.). The author refers that “...*expenditures on education and training are investments in human capital, not capital, because it is not possible to separate an individual from his knowledge or skills*”.

Individuals invest in human capital over their whole life, and this human capital is accumulated through post-school investments, which represent more than 50% of their life. (Heckman, Lochner and Taber, 1998). Given the importance of human capital, it is important to study this concept.

According to Becker (1994), Human Capital analysis assumes that education (schooling) leads to higher productivities, through knowledge, skills and a “*way of analysing problems*”. From an economic perspective, higher productivities lead to a higher salary. Training and education are, thus, seen as investments, since they represent expenditures that increase incomes (Becker, 1994).

Becker (1994) refers human capital as “*physical means of production*”, since an additional investment on training or education will lead to higher outputs and that output depends on the rate of return of the human capital acquired throughout education or training. The decision to invest human capital depends on the calculation of the present value of the costs and benefits of that investment. During an initial period individuals invest on training (representing a cost) and at the following periods they receive returns (representing benefits).

Richard Blundell *et al.* (1999) refers that the concept of human capital “...*arose from a recognition that an individual’s or firm’s decision to invest in human capital (i.e. undertake or finance more education or training) is similar to decisions about (...) investments undertaken by individuals or firms*”. According to the authors, the human capital can be divided into three components: (1) “*early ability*”, which can be acquired or innate; (2) the knowledge acquired through formal education; and (3) skills, competencies and expertise acquired and developed throughout the on-the-job training.

The HCT is also concerned with the gender differences. The study by Becker (1994) provides evidence that, regarding women, the value of market skills has increased immensely, although the job opportunities are not as great as they should be. The author is, obviously, referring to the gender gap issue, which is one of the determinants of remuneration.

The On-the-Job training is another important concept in the Human Capital field. The productivity of workers can be increased through the learning of new skills, or improving the acquired ones. Becker (1994) states that “*Future productivity can be improved only at a cost, for otherwise there would be an unlimited demand for training...*” Examples of costs are the time and effort of employees, the knowledge provided by others, the equipment and materials

used, etc. This sort of costs are known as opportunity costs: they could have been used presently, if they had not been used in training future output.

Richard Blundell *et al.* (1999) defines training in terms of “courses” that aim to help individuals acquire skills that can be useful in their jobs. The authors also distinguish training from “*formal school*” and post-school qualifications, which are seen as education. Training has some benefits, such as the “*positive influence on subsequent occupational status*”, or the “*likelihood of promotion*” (Richard Blundell *et al.*, 1999).

The effect of training on wages depends on the kind of training: specific training given in any firm will have different effects compared to general training. (Leuven, 2004). The next section will approach these two kinds of training.

2.1.1 The Concepts of General and Specific Training

Research by Becker (1964) defines general training as the one done by workers, since if firms provide that investment they will not have any return. Becker (1994) states, “...*perfectly general training would be equally useful in many firms and marginal products would rise by the same extend in all of them*”. Consequently, “...*wage rates would rise by exactly the same amount as the marginal product and the firms providing such training could not capture any of the return*”.

General training is useful in many firms, both in those providing it, and in other firms. (Becker, 1994). In order to support this argument, Becker (1994) gives the example of a machinist, who “...*finds his skills of value in steel and aircraft firms*” and “...*a doctor trained at one hospital finds his skills useful at other hospitals*”. Whilst most of on-the-job training increases the future marginal productivity of workers in a specific firm, general training increases the productivity of workers at any firm, since this kind of knowledge is transversal.

According to the Human Capital Theory, Becker (1994) refers to the earnings during the training period as the “...*difference between an income or flow term (potential marginal product) and a capital or stock term (training costs)*” In other words, during the training

period; the training of employees has costs that are covered by employers. So that, those costs have to be subtracted from the income produced by those employees.

Regarding specific training, Becker (1994) defines it as “...*the training that increases productivity more in firms providing it...*” The author also refers that “...*much of the on-the-job training is neither completely specific nor completely general but increases productivity more in the firms providing it and it falls within the definition of specific training*”.

Becker (1994) concludes that employees must assume all the costs of their investment in general training whereas the costs of specific training must be shared between workers and firms.

The research by Anke S. Kessler and Christoph Löffelmann (2002) provides evidence that not only specific training makes the provision of general training viable for employers, but also that general training leads to higher employer's incentives to give specific knowledge to workers. There is, indeed, a complementary relationship between general and specific training.

The study by Acemoglu and Pischke (1999) has provide evidence that employers provide general training due to market frictions that lead to lower salaries than the marginal product of workers. On the other hand, Franz and Soiskice (1995) find that employers only provide general training in the case in which general and specific investments are complements that are included in the company's investment cost function.

A wide number of authors studied the effects of training on productivity. Authors such as, Ballot (2001), Pischke, (2005), Bassanini, Booth, De Paola and Leuven (2005), Frazis and Lowenstein (2005), Conti (2005) and Rita Almeida e Pedro Carneiro (2008) find that the estimates of the effects of training on productivity are high.

Rita Almeida e Pedro Carneiro (2008) state, “...*an increase in training per employee of 10 hours per year, leads to an increase in current productivity of 0.6%*”. There is, indeed, a positive correlation between training and productivity, meaning that it is expected that higher investments on training lead to higher productivities.

2.1.2 The contribution of human capital for Economic Growth

A wide number of authors have studied the contribution of education in economic growth. Wheeler (1980) finds that the level of income may influence the level of education, despite of the other way around. Marris (1982) finds that education generates very high benefits to economic growth and, particularly, the author refers that “...*the general investment plays a weak role when not supported by education*”. Krueger (1968), in his study, concluded that education is one of the most important factors that can explain the difference in income levels in the United States of America, referring that this variable, itself, contributes “...*one-quarter to one-third in explaining income differences*”. Griliches (1969), Psacharopoulos (1973) and Fallon and Layard (1975) concluded that a higher stock of human capital (in which education is included) enhances the economic growth.

Shultz (1961) refers that “...*one of the prime indirect ways in which education contributes to the economic growth is that it enhances the efficient use of the new inputs*”. Thus, people with a higher level of education will be more efficient and productive in their jobs.

Gary S. Becker (1994) also finds a close link between investments in human capital and the growth of the countries. The author shows that countries, which have achieved persistent growth in income, had large increases in education and training. The education and training are, thus, two important factors that can lead to economic growth. Becker (1994) illustrates this relation, giving the example of the Asian countries, in which the education has been an important investment over the recent decades. Examples such as the outstanding economic records of Japan, Taiwan and other Asian countries in the recent decades are an evidence of this relation. The author refers these countries have made great investments on training their employees, upgraded their technology continuously, “...*relying on a well-trained, hard working and conscientious labour force*”. The education and training are helpful, since these investments can face the technology changes and the increasing productivity, particularly, in the manufacturing and service sectors (Becker, 1994).

Since economic development depends on the knowledge and skills learned by workers, it is important to invest on the accumulation of human capital in order to achieve development. This is the reason why education expenses represent a large investment in the developed

countries and a desired investment in the less developed countries.

2.1.3 The rates of return of education: the discrepancy between developed and undeveloped countries

Becker (1994) shows that the rates of return are correlated to the human capital accumulation: they are low when the level of human capital is low, then, they start to grow for a certain period of time as human capital increases. Due to the difficult to retain knowledge, the rates start to fall.

As we know, human capital stock is high in developed economies, due to high investments on education, and low in the undeveloped economies. Thus, it is expected that developed economies have higher rates of return of education. An undeveloped economy will continue to be undeveloped until a big and sufficient shock happens (e.g.: technological shock) (Becker, 1994). Nevertheless, it does not mean that a big shock will cause an evolution to a developed state (Becker, 1994).

There is a positive correlation between the stock of human capital and the development of new technologies. Becker (1994) finds that investments in developing new technologies increase with the rise of the stock of human capital. This explains why economies that make high investments in human capital have high levels of technology and achieve high levels of development.

Becker (1994) concludes that the rates of return on human capital investments are high when human capital is abundant, whereas these rates are low when capital is scarce. This conclusion is important to understand that societies with limited or scarce human capital choose large families, with very small investments in each member.

Summarizing, there is a discrepancy between developed and undeveloped economies regarding technology and rates of return of education, due to the high investments in human capital performed by developed economies and, on the other hand, the lack of investments in education, in the undeveloped economies, thus causing scarcity of human capital.

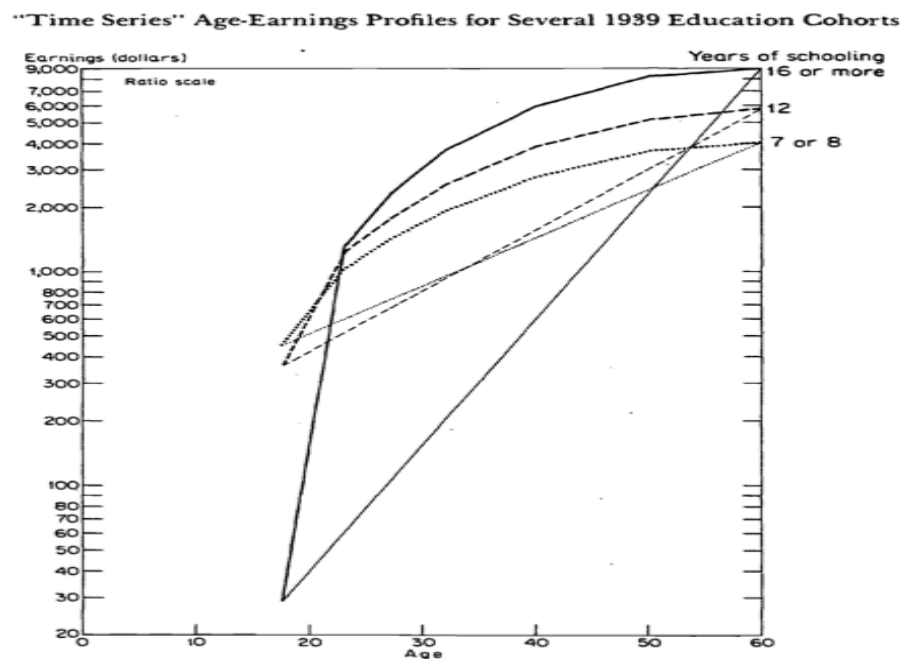
2.1.4 The Age-earnings Profiles

The study of age-earnings profiles is important to understand the declining incomes of older persons, the low incomes of young ones and the relationship between learning and productivity.

Research by Becker (1994) has provided evidence that incomes at a certain age group are strongly correlated with education. The author also finds that incomes are low at the beginning of careers, then, they rise throughout later ages until the highest income is reached and then they start to decline in the last age group.

The common thinking that unskilled workers have their peak earnings earlier than skilled workers is not necessarily true, since it is based on “*misleading statistics*” (Becker, 1994). The author also refers that “...*earnings in different occupations at a given moment in time might show an earlier peak in unskilled occupations merely because older unskilled workers are less able than younger ones*”.

Figure 1: Example of an Age-Earnings profile



Source: Human Capital: A Theoretical and Empirical Analysis with Special Reference to Education (3rd Edition)

This chart is an example of a time series age-earnings profile. It shows the amount of income (earnings) for a group over time (t). Becker (1994) states that this graph was obtained “...multiplying the base year of the cohort with the same schooling and t years older by $(1.02)^t$ with the assumption of 2 per cent average annual growth in incomes”.

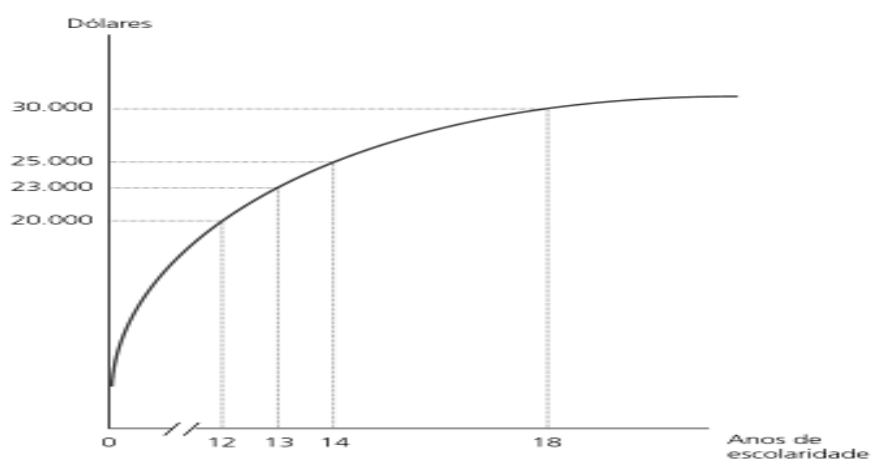
In this specific case, the profiles don't decline at older ages, but they continue to raise to the last age on the graph (65).

2.1.5 Wage Schooling Locus

Another important tool in the Human Capital Theory field is the Wage-Schooling Locus. It gives the salary evolution throughout the life cycle of an individual, associated with each schooling option, considering an economic *trade-off* (George Borjas, 2010).

According to Human Capital Theory, an individual would allocate the present value associated with each schooling option and would select the quantity of schooling that maximizes the present value of the gains in earnings. However, there is an easier approach which indicates when an individual should leave school and enter the labour market, as well as showing a way of estimating the rate of return of school: the Wage Schooling Locus (Borjas, 2010).

Figure 2: Example of a Wage Schooling Locus graph



Source: *Labour Economics*, 5Th edition, George Borjas (2010)

This graph is an example of a Wage Schooling Locus, which shows the salary that employers are willing to pay to employees, given the level of education of those employees. The market determines the Wage Schooling Locus.

According to Borjas (2010), the Wage Schooling Locus has three properties: (1) it is upward sloping, implying that higher levels of education lead to higher salaries, as long as the financial gains determine educational decisions. In order to attract employees, firms compensate them for the costs incurred in the acquisition of education; (2) the slope gives the information of how much the workers' earnings would increase, if those workers have one more year of education. This slope is empirically related to the rate of return of school; (3) the Wage Schooling Locus is concave, in which the monetary gains of an additional year of schooling decline with more required schooling. This is known as diminishing returns, since each additional year of education generates less incremental knowledge and lower additional earnings, compared to the previous years.

2.2 The Mincer Equation (Jacob Mincer, 1974)

The standard Mincer equation aims to explain remuneration, through two important variables: the education and experience of individuals. In this section a first Mincer equation with only the education variable will be presented, followed by the standard model in which the experience is considered.

Mincer (1974) finds that the correlation between “*educational attainment*” (measured in years of school) and the earnings of individuals is positive, but weak. However, the author also refers when “...*earnings are averaged over groups of individuals differing in schooling, there are strong discrepancies*”. Due to these discrepancies, Mincer (1974) used earnings averaged over groups in his study. Thus, the model presented on his study deals with the earnings differentials among groups with different schooling groups.

Since the investments in human capital require time, each additional year of schooling or job training suspends the earnings that the individual would receive if that individual was working (Mincer, 1974). Those additional years will reduce the working life period and they

are called “*time costs*” (indirect costs). There are also direct costs (e.g. the money that will be spent with education: tuitions, books, etc.). The internal rate of return on investment is the discount rate that equals the present value of real earnings with the investment and the real earnings without the investment (Mincer, 1974).

Before presenting Mincer’s model it is opportune to identify the assumptions related to the model.

Mincer (1974) identified the following assumptions: (1) The rate of return is seen as “*a parameter*” for the worker/individual; (2) a change in an individual’s investment won’t affect his/her marginal rate of return; (3) all investment costs are “*time costs*”; (4) no further human capital investments are assumed after the conclusion of schooling/training; (5) the flow of individual earnings is constant over working life; (6) there is no depreciation during the education period and no net investment during working life and each additional year of schooling reduces life earnings by one year.

2.2.1 The Mincer’s Schooling Model

The first schooling model presented by Mincer (1974) in order to calculate the effects of schooling is presented below. This is the very first form of human capital earnings function. In this equation, Mincer (1974) restricts human capital investment to schooling. The Y variable represents earnings and S refers to years of schooling.

$$\ln Y_{Si} = \ln Y_0 + r_S S_i \quad (1)$$

In which,

Y_{Si} = hypothetical earnings of a worker who does not continue to invest in human capital (schooling) after the completion of S years of schooling.

Y_0 = Original earning capacity

r_S = Rate of return of schooling

This equation shows the logarithm of earnings as a linear function of the time spent at school. The reasoning behind this equation is that percentage increments in earnings are strictly

proportional to the time spent at school, and the rate of return is the coefficient of proportionality. The logarithmic transformation converts absolute differences in schooling into percentage differences in earnings.

Mincer (1974) refers that “...dispersion in the distribution of education is correlated with the relative dispersion and skewness in the distribution of earnings”. If the dispersion in the distribution of education is higher, the relative dispersion and skewness in the distribution of earnings will be higher as well. The same logic applies to the rate of return to schooling and the earnings inequality. If the rate of return to schooling is higher, the earnings inequality will be higher too.

This simple model may be questioned: the initial earnings amount (Y_0) and the rate of return r cannot be assumed to be the same at all levels of schooling and for all workers. This is just an assumption, but not a realistic one (Mincer, 1974). In order to offset this problem, the equation suffers a transformation:

$$\ln Y_S = \ln Y_0 + \sum_{t=1}^S r_t = \ln Y_0 + \bar{r}_{si} \quad (2)$$

Where:

r_t = Marginal rate of return for a worker for a specific level f schooling

$\bar{r}$ = average rate of return

In order to simplify the last equation:

$$\ln Y_{Si} = \ln Y_{0i} + \bar{r}_i S_i \quad (3)$$

After this procedure, not only the dispersion levels of education and the average rate of return affect the inequality of earnings in a group, but also the dispersion in the rates of return and the average level of education.

Summarizing, this initial simple model applies to the earnings of workers who do not perform post-school investments in human capital (in this case the human capital is restrict to education investments only).

Although this simple schooling model is an important tool to understand and explain the remuneration and interpreting the age-earnings profiles of individuals, there are some limitations. This schooling model is not a complete specification of the distribution of earnings (Mincer, 1974). Furthermore, this model can't explain the equality of earnings of workers who differ in another forms of investments in human capital, such as the post-school investments. In order to solve this problem, Mincer (1974) decides to include the post-schooling investment in the schooling model, thus enhancing the model's power to explain remuneration, taking in account the variation in earnings caused by the life cycle and individual differences in the post-school investments.

2.2.2 The Standard Mincer Model: the addition of experience variable in the model

This section aims to introduce the final model developed by Jacob Mincer, which includes the schooling model, plus a new variable: experience. In this new model, the natural logarithm of earnings is a function of years of education and potential years of potential labour market experience (which results from the age minus year of schooling minus six).

Mincer (1974) identifies two assumptions when considering this model which includes post-schooling investments: (1) the rates of return to schooling are not very different from rates of return to post-schooling investments. (2) Earnings profiles Y_S with no further investment are constant for the most of the working life. Mincer (1974) refers “...*YS is the amount of annual earnings in a constant income stream whose present value equals the present value of the actual earnings profile*”.

The two most important components of human capital in this model are schooling and post-schooling investments. In the absence of specific measures of post-schooling investments, Mincer (1974) uses the term experience, which is the most used and referred one in the majority of studies. The author also emphasizes that experience should be used, instead of age, in order to explain “*variations in earnings*”. The inclusion of experience, besides the inclusion of schooling, in a multivariate regression analysis of earnings, leads to a more powerful analysis (Mincer, 1974).

Mincer (1958) refers that “...education should have a multiplicative effect on human capital in a model where identical individuals maximize the present value of the future income.” The author also refers that “...investments in human capital, like other investments, are only accepted and incurred when the rate of return on the investment exceeds the discount rate”.

This equation has been estimated for a wide range of data sets for a large variety of countries and periods of time. Thomas Lemieux (2003) refers to this equation as “...the most widely used model in empirical economics”. The equation is based on a formal model of investment in human capital and it is written as follows:

$$\ln Y = \ln Y_0 + rS + \beta_1 X + \beta_2 X^2 \quad (4)$$

In which:

Y: Earnings of an individual;

Y₀: Level of earnings of an individual with no education and no experience;

S: Years of schooling;

R: Rate of return to an additional year of education;

X: Years of potential labour market experience;

As it can be seen, this model includes the first schooling model presented before:

$$\ln Y = \ln Y_0 + rS \quad (5)$$

This “*schooling part*” is an equilibrium condition in a model where identical agents invest in human capital in order to maximize the present value of their future earnings (Mincer, 1974). To this schooling part, Mincer (1974) adds experience, which takes into consideration post-school investments in human capital.

The equation (4) can be interpreted as follows:

Log Y₀ = gives the amount of earnings of a worker who has neither education nor post-school investments (with $rS=0$ and $X=0$).

rS gives the impact of one more year of schooling on the salary, *ceteris paribus* (the other variables remain constant). It is the marginal effect of schooling in percentage on log wages. The impact on salary is given in average terms.

B_1 gives the impact of one more year of training on the salary, *ceteris paribus* (the other variables remain constant). It is the marginal effect of experience in percentage on log wages. The impact on salary is given in average terms.

Finally, the quadratic term in experience means there are possible declines in post-schooling human capital acquisition. Those declines are known as diminishing returns.

Summarizing, the Mincer regression is a representation of the statistical relationship between wages and experience for an exogenously determined rate of on-the-job training. With this equation Mincer (1974) tried to prove that wages are determined by two important factors: the schooling and experience of workers. Higher levels of schooling and experience lead to higher wages. However, this is true to a certain extent since the marginal increments will be getting lower (this is known as marginal diminishing returns).

2.2.3 The Mincer Model in recent studies

In this section, two models of the Mincer equation have been presented so far: the schooling model, which is the simplest and the very first model introduced by Mincer (1974), which includes the post-school investments. Besides these two models, a wide range of studies have used other specifications.

Corrado Andini (2013) uses a dynamic Mincer equation on his study. Andini (2013) states that, “...the dynamic Mincer equation can be seen as a solution of a simple wage-bargaining model between worker and an employer where the unemployment-benefit level depends on past wages”. The standard Mincer equation, which is the one used in this study, puts emphasis on the supply side (the higher the investment in human capital development of an individual, the higher the productivity and the wage of that individual), whereas the dynamic Mincer model presented by Andini (2013) aims to enhance the role of demand factors in

determining wages. According to Andini (2013), individual wages are well explained by the dynamic Mincer equation. Concluding, the Mincer equation continues, indeed, to be an important tool to explain the salary dispersion nowadays.

The dynamic Mincer equation will not be presented in this study, nor will other Mincer equation specifications.

2.2.4 The Limitations of the Mincer Equation

The quadratic experience has been widely discussed by a variety of authors. Murphy and Welch (1990) examined how well the quadratic specification in years of potential experience captures the empirical experience-earnings profile. The authors concluded that the quadratic form understates earnings, due to the absence of flexibility in capturing the experience-earnings profile.

Research by Susan S. Hamlen and William A. Hamlen (2012) has provided evidence that the quadratic specification is not the most suitable one. According to the authors, the Mincer Equation is inconsistent with the generally accepted view that there is a diminishing marginal utility of net income (after investment in continuing education). In a case in which a polynomial function is used to estimate earnings equation, at least a third degree polynomial function of experience should be included in the model, instead of the second degree one (Susan S. Hamlen and William A. Hamlen, 2012).

Thomas Lemieux (2003) refers that Mincer equation “...tends to understate or overstate the effect of experience and schooling on the earnings of young workers”. The author also highlights that it is important to use higher polynomials in potential experience, which is in accordance with Susan S. Hamlen and William A. Hamlen (2012).

This model is also criticized in terms of its outdated data. The Mincer equation is not consistent with the recent data (Thomas Lemieux, 2003). The standard model was based on data from 1960, which is clearly outdated. Heckman *et al.* (2003) also confirms this finding. Nevertheless, Lemieux (2003) still considers the basic Mincer human capital earnings model as an accurate model, considering a stable environment. In a less stable environment, changes

in the structure of wages have to be taken in account when estimating the standard Mincer equation.

The log earnings regression, in which the equality of schooling and the internal rate is assumed for simplicity, is not the appropriated one (James J. Heckman, Lance J. Lochner and Petra E. Todd, 2003). Heckman, Lochner and Todd (2003) refer that “...*log earnings regression does not increase linearly with schooling*”. The authors also refer that Mincer model “...*does not provide a valid estimate of the internal rate of return.*”. The uncertainty is also not taken into account, since the Mincer model assumes perfect certainty (Heckman, Lochner and Todd, 2003).

A more general dynamic analysis of the earnings function takes into account the non-separability between experience and schooling, the nonlinearity in schooling and the accounting of taxes is the required approach (James J. Heckman, Lance J. Lochner and Petra E. Todd, 2003).

The estimates of return to schooling that are obtained through the regression of wages on education are biased (Baris Kaymak, 2009). This problem is known as “*ability bias*” and it is used to describe the situation in which the differences in the wage of workers with different levels of education may reflect innate unobservable characteristics (Griliches, 1977). In order to offset this problem, authors such as Angrist and Krueger (1991), Card (1995) and Harmon and Walker (1995) resorted to the estimate of the relationship between wage and education through the Instrumental Variables (IV) method, with variables that are orthogonal to ability, instead of using the OLS method (which is not the most appropriate one in this case). Standard estimates of the return to education overstate the relation between education and earnings, since there are unobserved components which are positively related to education (Baris Kaymak, 2009).

Regarding the Human Capital Theory and the Mincer Equation, one hypothesis can be formulated:

H1: The education and experience of a worker are two important determinants of wages.

2.3 The Agency Theory

2.3.1 The concept of Agency theory

The Agency Theory has been discussed among a wide range of authors in order to study the executive remuneration differences, as well as the high compensation of top executives (also referred as overcompensation).

The concept of Agency Theory is transversal to different fields, such as Accounting (Demski & Feltham, 1978), Finance (Fama, 1980), Economics (Spence & Zeckhauser, 1971), among other areas. Eisenhardt (1989) defines Agency theory as a “*broadened risk-sharing literature*”. The study of Agency Theory includes the agency problem that occurs when cooperating parties have different goals and perspectives of labour.

(Eisenhardt, 1989) refers that the focus of Agency theory is on “...*determining the most efficient contract governing the principal-agent relationship given assumptions about people (e.g., self-interest, bounded rationality, risk aversion), organizations (e.g., goal conflict among members), and information (e.g., information is a commodity which can be purchased)*”. In other words, the Agency theory aims to offset the conflicts of interest between the two parties (principal and agent), based on contracts, which can be behaviour-oriented or outcome-oriented. Whilst behaviour-oriented contracts can be salaries or hierarchical governance, outcome-oriented contracts are commissions, stock options, transfer of property rights, etc.

This theory is concerned with the resolution of two situations: the first is related to the conflict between principal and agent's goals and the difficulty of the principal to verify if the agent is doing the work correctly (Becker, 1994). The major problem is that the principal cannot verify with certainty that the agent had behaved properly, leading to the *moral hazard* and *adverse selection* problems. The second situation is related to the risk-sharing problem, which happens when principals and agents have different risk preferences. Because of their distinctive preferences, principals and agents may prefer different actions (Becker, 1994).

The Agency Theory is highly debated in economic and managerial terms. When considering a company, there are two sides that may have different interests: shareholders and managers. The conflict of interest between these two parties is known as an Agency problem. Research by Jensen and Meckling (1976) and Shleifer and Vishny (1997) has provided evidence that the separation between ownership and control, which has occurred in modern companies, generates costs (agency costs), which are: information asymmetry, “*management deriving benefits*” from the resources they control and different time horizons. In this Agency relationship, shareholders are the principals, since they delegate work to the managers, who are the agents (who perform the work delegated by shareholders).

Jensen and Meckling (1976) refer that “... *the agency costs are always a result of an agency relationship...*”. The principal incurs on a set of costs in order to avoid divergences from his interest and these costs can be monitoring costs, or bonding costs (in order to guarantee that the agent will not take some kind of actions that are not in accordance with the interests of the principal) (Jensen and Meckling, 1976). Another cost of the agency relationship is the “*residual loss*” and it is a result of the divergence of interests between the two parties. Jensen and Meckling (1976) refer that “*residual loss*” is the “...*dollar equivalent of the reduction in welfare experienced by the principal*”. According to the authors, the agency costs are the sum of monitoring expenditures incurred by the principal, the bonding expenditures incurred by the agent and the “*residual loss*”.

Susan P. Shapiro (2005) shows an example of an Agency Theory case, presenting herself as an agent, who has the task of writing an essay, which was delegated by the editors of the *Annual Review of Sociology* (the principals). In this case, they are the principals and together the editors and Shapiro are bounded in a principal-agent relationship. Furthermore, Shapiro (2005) shows there is also a principal-agent relationship between the author and readers of her study. The readers are the principals and the author and editors of the article, the agents.

2.3.2 The Two Streams of Agency Theory: The Positivist and Principal-agent Streams

The agency theory is divided in two areas: the positivist and the principal-agent areas. Both share the same assumptions and are based on contracts between principals and agents. However, they differ in some aspects.

The positivist stream studies the “*governance mechanisms*” needed to solve the agency problem and, generally, the studies regarding this stream are less mathematical than the principal-agent stream (Eisenhardt, 1989). There are a wide range of studies regarding the positivist stream, such as Jensen and Meckling (1976), who studied how equity owned by managers aligns the interest of those managers and the owners of corporations; Fama and Jensen (1983), who studied the board of directors as an information system which can be used by stockholders in order to monitor the self-interest and opportunism of the top executives, etc.

The Principal-agent stream is more focused on the principal-agent relationship itself and more mathematically and logically oriented. It is also more general than the positivist theory, which studies the specific case of relationship between shareholders and CEO relationship regarding large corporations (Eisenhardt, 1989).

The principal-agent line also determines which contract is more adequate to the relationship between the two parties (Eisenhardt, 1989). As it was referred previously, there are two kinds of contracts: the behaviour-oriented and outcome-oriented contracts.

Eisenhardt (1989) considers some basic assumptions of the principal-agent theory: (1) the goal conflict between principal and agent; (2) an easily measured outcome; (3) and an agent who is more risk averse than the principal. These assumptions are simple but they are important in understanding this theory.

2.3.3 The Two Major Cases of Principal-Agent Model: the behaviour-based and outcome-based contracts

Demski & Feltham (1978) divide the principal-agent model in two major cases.

- The first case is a simple case of complete information, in which the principal knows what the agent is doing. In this situation, the most efficient contract is the behaviour-oriented one, because the agent is risk-averse, so that the risk is not transferred to the agent (the principal, who is risk-neutral bears the risk).
- The second case occurs when one of the parties (the principal) does not have any information about the behaviour of the other one (the agent). Without knowing if the agent behaved as agreed, the agency problem arises and the *moral hazard* and the *adverse selection* are two problems that the principal faces in this situation. The *moral hazard* refers to the agent's disrespect for what was agreed (the agreed conditions between the two parties). Eisenhardt (1989) refers that *moral hazard* is the "...lack of effort on the part of the agent". The argument here is that the agent may simply not put the needed effort into the delegated task. The second problem is the *adverse selection* and this occurs when the principal is not able to verify and validate the skills and abilities that the agent states, before the agent is hired. Thus, the principal may select the wrong candidate to occupy the work position.

Considering the second case, two solutions can be applied. The first solution is to use information systems in order to get information about the agent (Eisenhardt, 1989). The author gives some examples of information systems, such as: reporting procedures, additional layers of management, budgeting systems and boards of directors, etc.

The second solution is to use outcome-based contracts, in which the agent's compensation depends on the results of the company (Eisenhardt, 1989). This method stimulates good behaviours, thus aligning the interests of the agent with those of the principal.

There are two propositions capturing the governance mechanisms. Becker (1994) refers the first proposition: "...outcome-based contracts are efficient in restricting and minimizing the opportunism of agents, since they are more likely to behave in the interests of the principal".

Such contracts match the preferences of agents with those of the principal because the rewards for both dependent on the same actions, and therefore, the conflicts of self-interest between principal and agent are reduced (Eisenhardt, 1989).

The second proposition is related to the information about agents. In the case in which the principal has information to verify an agent's behaviour, there is a higher probability of good behaviour. The information systems are useful mechanisms that provide information about what the agents are doing, since agents know that those information systems will not allow any "cheating" behaviour (Eisenhardt, 1989).

Despite the benefits presented before, outcome-based contracts have a disadvantage. They will transfer the risk of uncontrollable factors that determine outcomes, (e.g. the economic condition, technological changes, government policies, political stability, competition, natural disasters, etc.) to the agent, thus increasing uncertainty (Eisenhardt, 1989).

2.3.4 The determinants of the attractiveness of outcome-based contracts

Research by Eisenhardt (1989) relates the uncertainty with the attractiveness of outcome-based contracts. The author refers that "...when outcome uncertainty is low, the costs of shifting the risk to the agent are low and outcome-based contracts are attractive". In the other hand, he adds, "...as uncertainty increases, it becomes increasingly expensive to shift risk despite the motivational benefits of outcome-based contracts".

The focus of the principal-agent stream is on the trade-off between the cost of measuring behaviour/outcomes and the cost of transferring risk to the agent (Eisenhardt, 1989). The choice between the behaviour-based contracts and the outcome-based contracts depends on the cost of implementing those contracts.

Eisenhardt (1989) identifies other factors, such as the risk-averse level of the agent (in which a less risk-averse agent increases the attractiveness of those contracts), goal conflict (when there is no goal conflict, no outcome-based contracts are needed), task programmability (the agent's behaviour is more visible when more programmed tasks are performed and, thus,

outcome-based contracts are less attractive) and outcome measurability (the measurability of outcome-based contracts is more difficult when the tasks require more time to be completed and, thus, outcome-based contracts are less attractive).

Lambert (1983) identifies a relationship between the length of the relationship and the attractiveness of the outcome-based contracts. With a long-term relationship, the two parties will have more time to get to know each other more in depth, so that, the principal will assess the agent's behaviour more accurately (Lambert, 1983). With more knowledge about the agent's behaviour, the information asymmetry will disappear and the best method is to use the behaviour-based contracts. On the contrary, if the relationship length is short, the principal won't get the necessary information about the agent's behaviour, resulting in information asymmetries. In this opposite case, the most adequate method is to use the outcome-based contract, transferring the risk to the agent.

2.3.5 The Contributions of the Agency Theory

Eisenhardt (1989) suggests some contributions of Agency theory: the treatment of information and the risk implications are two of those contributions.

Regarding the first contribution, according to Agency theory, the information is seen as a commodity, which can be traded at a cost (Eisenhardt, 1989). Thus, organizations can use information in order to know and control the agents' self-interest and opportunism. The management of that information can be done through information systems (boards of directors, budgeting systems, managerial supervision, etc.). The board of directors was studied by a variety of authors. Research by Fama and Jensen (1983) has provided evidence that boards are important monitoring devices, providing information about management behaviour, so that, the approach is to use behaviour-based contracts instead of contracts based on firm performance. With this important tool, the situation of incomplete information will be reverted to a case of complete information.

In regards to risk implications, there are some factors affecting the company's results (government regulation, innovation, competition, etc). Since these factors occur naturally and unpredictably, companies cannot control them, thus causing uncertainty. In an Agency theory

perspective, the uncertainty is not only considered as a difficulty to do a preplan, but also as a “*risk/reward trade-off*” (Eisenhardt, 1989). According to the Agency theory, a risk-neutral principal is not influenced by outcome uncertainty and prefers contracts based on behaviour (behaviour-based contracts) (Eisenhardt, 1989).

If the principals are risk-averse, they will be sensitive to outcome uncertainty and will prefer a contract, which transfers risk to the agent (outcome-based contracts) (Eisenhard, 1989).

A wide list of authors has studied the two Agency theory streams, where the positivist stream has been studied and analysed by authors such as Jensen and Meckling (1976), Walking and Long (1984), Kosnik (1987), etc. Agrawal and Mandelker (1987) studied the influence of executive holdings of firm securities on agency problems between stockholders (the principals) and management (the agents), more specifically, the relationship between stock option holdings of the executives and the consistency of acquisition and financing decisions with the interests of the two parties. According to their study, managers prefer lower risk acquisitions and lower debt financing. Agrawal and Mandelker (1987) also show that executive security holdings, which are outcome-based contracts had an important role on the financing decisions. The authors concluded that executive holdings made those decisions more consistent with stockholder interests. Thus, executive stock holdings were important on the alignment of managers and stockholders’ interests, which is consistent with the Agency theory. Singh and Harianto (1989) studied the relationship between *golden parachutes* (which represent a set of benefits, such as stock options, given to top executives) and the alignment of the two parties’ interests in takeover situations. The authors concluded that *golden parachutes* align executive and stockholders’ interests in those situations.

Regarding the Principal-Agent Stream, there were also important findings, such as Anderson (1985), Eisenhardt (1988) and Eccles (1985), etc. Eisenhardt (1988) performed a study in which the author analysed the choice between commissions (outcome-based contracts) and salary (behaviour-based contract), considering a study of salespeople in the retailing area. Variables such as task programmability, information systems (e.g. span of control variable), outcome uncertainty variables (e.g. number of competitors) and institutional variables are significant when predicting the commissions.

The Agency theory helps us to understand the compensation and benefits that most of CEOs and top managers earn, since these earnings can be seen as incentives and tools to align the interests of the two main parties: the managers and the shareholders. There are a variety of studies arguing for and against these incentives. Some of them argue that CEOs are overpaid, stating that CEO's remuneration is biased; whilst others state that compensation maximizes company's value, through the alignment of interests. The next section will approach the determinants of executive remuneration, with focus on the firm's performance/growth opportunities and size, due to the lack of the other variables in the database. Furthermore, the increasing trend of remuneration regarding top executives will be studied.

2.3.6 The Agency Theory and the Determinants of Executive Compensation

2.3.6.1 The level of growth opportunities and firm performance as determinants of executive remuneration

A wide variety of authors has studied growth opportunities and firm performance as two important factors of executive remuneration. This section aims to present some of them.

Richard Heaney, Vineet Tawani and John Goodwin (2010) identified the prior and present firm performance as an important factor of executive remuneration. This finding is supported by Merhebi *et al.* (2006) who also identified a link between company performance, both past and present, and executive remuneration. Murphy (1985), Core *et al.* (1999), Leone *et al.* (2006), used the prior period performance as an instrument for performance in the analysis of Australian remuneration.

Richard Heaney, Vineet Tawani and John Goodwin (2010) also find that CEO remuneration package is sensitive to performance measure chosen. Each performance measure (e.g. market-to-book value of assets, return-on-assets, etc.) has its own way of obtaining the aspects of company performance, so that, the results and conclusions may differ according to the performance measure chosen.

Gabay (2005) finds a positive correlation between performance and CEO compensation., referring that incentive contracts “...*motivate efforts and dissuade inefficiency*”. The author also refers that, when a large percentage of executive remuneration is equity-based, “... *CEO will take more risk-neutral decisions...*”.

The study by Core, Holthausen and Larcker (1999) has provided evidence that high return and high performance companies are the ones that pay their executives the highest, when compared to other firms..

Frydman and Jenter (2010), show that the measure of incentives should consider every relationship between firm performance and CEO wealth. These relationships include the effects on current performance, on the values of stock and option holdings, changes in on the probability that the CEO is dismissed, etc.

Other authors have studied the relationship between firm performance and executive remuneration, such as Graham *et al.* (2009), who finds that CEOs of higher ability (better performance) tend to earn higher compensation, Mehran (1995) finds that firm performance is positively correlated to the percentage of stock-based executive compensation, Michaela Rankin (2006) identified the firm performance as one of the factors that is related to compensation policies in Australia; Ryan and Wiggins (2000) find that the CEO has the ultimate responsibility for the performance of a firm.

Regarding the relationship between growth options and remuneration, there are some studies, such as the study by Smith and Watts (1992), which find that firms with growth opportunities will choose more performance-based compensation such as cash bonuses or stock options; Fenn and Liang (2001) find that growth opportunities are the major determinant of the CEO compensation structure; research by Smith and Watts (1992) has provided evidence that, compared with non-growth firms, the remuneration of top executives is higher in growth firms. Baber *et al.*, (1996) and Ryan and Wiggins (2001) also find that there is a relationship between growth options and information asymmetry, which justifies the higher CEO payments in growth firms.

2.3.6.2 The company size as determinant of executive remuneration

The company size is also an important determinant of executive remuneration and it has been widely researched over the last decades.

There are some important studies regarding firm performance, such as the study by Frydman and Jenter (2010), which has provided evidence that one of the theoretical explanations for the rise in CEO pay is the increasing firm size and scale effects. Rosen (1982) refers that “...*higher CEO talent is more valuable in larger firms*”, which explains that firms should offer higher levels of remuneration; Himmelberg & Hubbard (2000) find that a little growth in CEO talent leads to high increments in both compensation and firm value, due to the scale of operations controlled by CEOs; Richard Heaney, Vineet Tawani and John Goodwin (2010) conclude that there is positive relation between CEO remuneration and the size of the companies.

Other studies relate to company size, CEO talent/expertise and remuneration, such as Michaela Rankin (2006), who finds that the firm size of the organization is a factor that affects the expertise required from the top management members, Grabke-Rundell and Gomez-Meija (2002) refer that “...*more complex organizations require the top management team to detain expertise across a variety of functional areas, demanding higher quality management as result*”. In other words, more complex companies require high quality management teams. As the Labour Economics theories (e.g. HCT) predict, it is expected that high quality teams have higher productivities and, then, higher salaries.

There are also authors that relate company size with monitoring difficulties, such as Gaver and Gaver (1995), who concluded that it is expected that large firms have more hierarchical levels and they are more decentralized, which makes the actions of mid-level managers more difficult to be observed; Sok-Hyon Kang, Praveen Kumar, and Hyunkoo Lee (2006) refer that “...*firms put more emphasis on equity-based compensation*...”. That emphasis is in accordance with the hypothesis that monitoring is a more difficult task in large firms (Holthausen, Larcker, and Sloan 1995).

The task complexity is also related with company size. Rose and Shepard (1997) conclude that, when the company becomes bigger the task complexity increases.

2.3.6.3 Other determinants of executive remuneration

Although the focus of this research is on the company's performance and size as determinants of remuneration, there are other important determinants that will be referred to in this section.

Michaela Rankin (2006) identified some monitoring and governance determinants. The most important ones are: grew directors, busy directors, length of board tenure, external blockholders, CEO duality and CEO tenure:

- Grew directors, which are the ones with past executive roles or relationships with the firm, allow CEOs to detain more power and influence over outside directors (Core, Holthausen and Larker, 1999). Due to the reduced level of their independence, they cannot effectively monitor managers' actions.
- Busy directors, the ones who are always busy due to their multiple tasks, are less likely to question managerial proposals and decisions (Michaela Rankin, 2006). Thus, CEOs are more powerful with the existence of a wide number of busy directors.
- The length of board tenure is also relevant for the CEO remuneration package, since new directors (with short tenures) don't have the necessary specific firm knowledge to evaluate managerial proposals. Rankin (2006) also finds a positive relationship between length of CEO's tenure and remuneration.
- The external blockholders, the ones who own a large amount of a company's shares/bonds, have a great influence on the company's decisions, so that, in a case in which the ownership is more concentrated, the board is more likely to pay attention to the expectations of external blockholders, with regards to managerial remuneration (Mallette and Fowler, 1992). There is also a negative association between the existence of external blockholders and share-based compensation as a percentage of total remuneration (Mehran, 1995).
- The CEO duality, the situation in which the CEO has two roles (CEO and Chairman of the board), has influence on the CEO's final remuneration package. CEO compensation was higher in the cases in which CEOs were simultaneously CEO and Chairmen of the board. (Rankin, 2006).

Michaela Rankin (2006) also finds that, as we go down the executive hierarchy the importance of bonuses and long-term incentive pay in the compensation contracts of non-CEO executives decreases.

The ownership structure of the company and shareholders' characteristics have implications in CEO remuneration (Richard Heaney, Vineet Tawani and John Goodwin, 2010). The authors refer that “...*active shareholders are more likely to criticize the excessive remuneration levels...*”

The study by Bebchuk and Fried (2003) and Del Guercio *et al.* (2008) has provided evidence that shareholder engagement increases company performance. The authors affirm that those engagements have “...*considerable influence over CEO excesses...*” . The authors also refer that shareholders concerns can also “...*affect CEO's reputation and reduce the support in takeover bids...*”.

The lenders (e.g. banks and other financial institutions) also determine CEO remuneration. If a company has a high level of debt, that debt may be monitored by lenders and that monitoring includes the CEO remuneration package (Richard Heaney, Vineet Tawani and John Goodwin, 2010).

Other authors have studied CEO remuneration, such as Richard Heaney, Vineet Tawani and John Goodwin (2010), who affirm that CEO power and boards of directors are also two factors that can have influence on the executive remuneration; Bertrand and Mullainathan (2000); Bebchuk and Fried (2003) and Choe *et al.* (2009) find that CEOs and non-executive directors don't have the same perspective regarding remuneration, so that, a board controlled by a powerful CEO can transfer the wealth from shareholders to that CEO, etc.

2.3.7 The evolution of executive compensation: the rising of remuneration and CEO Overcompensation

The executive compensation has not been linear over time. There has been an evolution regarding the level of payment, and the components of CEO packages have been changing.

Carola Frydman and Dirk Jenter (2010) divided the evolution of CEO compensation since World War II into two periods:

- The first period is prior to the 1970's, in which companies pay low compensations, low differences were observed between top executives and there were adequate pay-performance sensitivities;
- The second period dates back to the mid-1970's until the early 2000's, in which compensation grew intensely, the compensation differences among companies started to rise and equity incentives lead to a close relationship between managers' wealth and company performance.

Frydman and Jenter (2010) identified five main components of most CEO remuneration packages, despite the different pay practices across firms: salary, annual bonus, payouts from long-term incentive plans, restricted option grants, and restricted stock grants.

The importance of the components listed above was not linear over time. Frydman and Jenter (2010) identified the following periods, in which compensation has changed:

- from 1930's to 1950's, CEO compensation included salaries and annual bonuses (cash or stock and tied to measures of annual accounting performance);
- In the 1960's, long-term incentive plans, which are bonus plans based on performance in several years, started to have a significant impact in CEO pay;
- In the 1980's, stock options compensation started to be used. The purpose of this component is to link remuneration directly to share prices, in order to stimulate executives to increase shareholder's value.
- Between 1980's and 1990's, stock options become the most important and the biggest component of the executive payment.

Other authors have studied the components and the structure of the executive compensation. Sanders (1995), refers to executive remuneration as a “...*combination of various components (...) according to the proportions of variable vs fixed pay, deffered vs immediate payment, monetary vs non-monetary compensation, and short-term vs long-term compensation*”. Gomez-Meija & Wiseman (1997) refer that the components listed before are, indeed, “... *the components of the total remuneration of CEO and they can be in line with the various organizational objectives, from performance objectives, internal and external equity, to the selection and retention of the executives.*”.

A study by Gerhart & Milkovich (1990) has provided evidence that the structure of executive compensation varies significantly between firms of similar size, performance and domain of activity. Moreover, different organizational and environmental characteristics require different compensation policies and practices (Assaâd El Akremi, Patrice Roussel and Georges Trepo, 2001).

The equity-based compensation (including restricted stock awards and stock options) is an important component of executive compensation (Hyon *et al.* (2006). However, those equity-based contracts that are not well prepared will not result in greater performances (Campbell and Wasley, 1999).

The research by Ingmar Bjorkman and Patrick Furu (2000) has provided evidence that Multinational Corporations (MNC) that face significant agency problems use variable pay in order to offset possible interest differences between top management and the parental organization.

Michael J. Cooper, Huseyin Gulen and P. Raghavendra Rau (2011) find that managerial compensation (e.g. long-term incentive payouts and options) do not necessarily align managers and shareholders' interests. They also find that firms with high levels of compensation show significant differences in performance.

Over the last decades, CEO compensation has grown in a large dimension, being considered as excessive and subject of a wide range of studies. This problem is known as overcompensation.

Nicolas Couderc & Laurent Weill (2009) studied the problem of CEO overcompensation, referring to it as a “...*strong increase of CEO pay and a widespread use of stock options, increasing inequality and decreasing welfare...*” The main result of their research is that the increase in CEO compensation is a consequence of higher managerial performance. Nevertheless, the impact on CEO compensation is not the same for all components of compensation. Salary, annual bonuses and option grants contribute to increase managerial performance, thus aligning the interests of both managers and shareholders. On the other hand, the authors didn't find any positive association between stock grants and performance. The results of Nicolas Couderc & Laurent Weill (2009) suggest CEO compensation provides incentives for managerial performance.

Murphy & Zábojník (2004) identified the changes in the sort of skills required by firms as a market-based explanation for increasing CEO pay. According to the authors, those changes motivate talent competition.

2.3.8 CEO compensation: How should it be?

In order to deal with the problem of adverse selection and moral hazard, Assaâd El Akremi, Patrice Roussel and Georges Trepo (2001) point out two possible solutions: (1) develop a supervision system to ensure the actions of the two parties do not conflict; (2) develop compensation programs based on the measurement of performance. An optimal compensation program includes two kinds of compensation: basic pay linked to behaviour and incentive pay linked to performance. There should be an optimal combination between basic and incentive pay, aligning CEO and shareholders' interests, but, without transferring too much risk to the CEO, through a flexible compensation (Jensen and Murphy, 1990).

Assaâd El Akremi, Patrice Roussel and Georges Trepo (2001), find that the strategic approach to CEO compensation must allow for the link of four main complementary objectives: the organizational performance, motivation to work, attraction and loyalty of the best executives. The authors also find that, in order to improve the choice between the different components of compensation and their combination, firms must be precise when defining the objectives of compensation policy

Other authors studied the overcompensation problem, such as Heaney, Tawani and Goodwin (2010), who find that CEO remuneration package should take in account the task complexity and the costs that result from "*shirking*".

Regarding the research on Agency theory, two hypotheses can be formulated:

H2: There is a positive correlation between firm performance and CEO compensation.

H3: The firm size is one important determinant of CEO compensation.

3. DATA ANALYSIS AND EMPIRICAL STUDY

This chapter will present all the empirical work performed in order to test the hypotheses formulated in the prior literature presented. The data used in this work will be presented and described as well as the two econometric models and the variables that will be considered. The empirical results of this work are also presented in this chapter, which point to the conclusions in the next chapter.

3.1 Data recovery and Sample descriptive statistics

The database used in this work has some similarities with the one used in Duarte (2006). It uses information about 56000 observations on most white-collar employees, distributed in 274 firms for year 2007.

For each observation (executive) there is information about his firm such as: firm size (defined as the total number of employees), the correspondent industry, the growth of sales, return on sales, firm ownership (if the firm is national or foreign) and the firm culture (if the firm has Anglo-Saxon culture or not)

There is also information about the job where the worker is assigned (hierarchical level, functional area of the firm), some human-capital variables (age, tenure at the current job, university education, gender), and about the annual compensation (annual fixed salary, month pay, variable pay) of the worker.

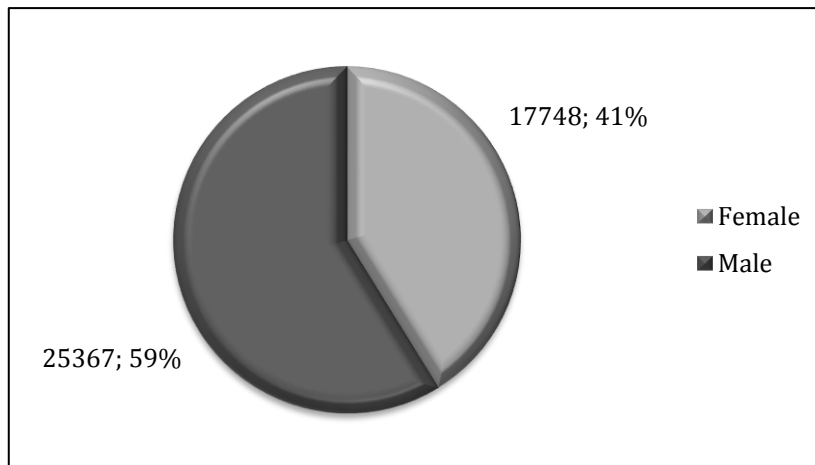
The data used in this work were obtained from the confidential compensation files of a major consulting firm and was collected using a questionnaire survey prepared by technicians working for that consultancy firm. The data can be considered as truthful, since firms paid to participate in this survey, and they used the survey results in their compensation programs.

Table 1: Age and Tenure of firm's executives

	Mean	Median	Std. Deviation
Age	39.7	38	8.7
Tenure	13.1	11.3	8.9

Relative to executives' characteristics, the average age in this database is 40 years (Table 1). The median is 38 years, which means that half the population is older than 38 years. Regarding tenure, the average number of years of an executive at a firm is 13 years (Table 1).

Figure 3: Executives by gender



As can be seen in Figure 1, the male gender is more representative than the female one. Of the 43115 database executives, 59% are men and 41% are women.

Table 2: Sample's Industry Description

	Frequency	Percent	Valid Percent	Cumulative Percent
Consumer Goods	2115	4,91	4,91	4,91
Car and components Retail	497	1,15	1,15	6,06
Distribution	10186	23,63	23,63	29,68
E-Commerce	5077	11,78	11,78	41,46
Pharmaceutics	52	0,12	0,12	41,58
Chemistry industry	1100	2,55	2,55	44,13
Diversified Industries	1062	2,46	2,46	46,59
Services	2224	5,16	5,16	51,75
Financial Services	13912	32,27	32,27	84,02
Telecommunications	6890	15,98	15,98	100,00
Total	43115	100	100	

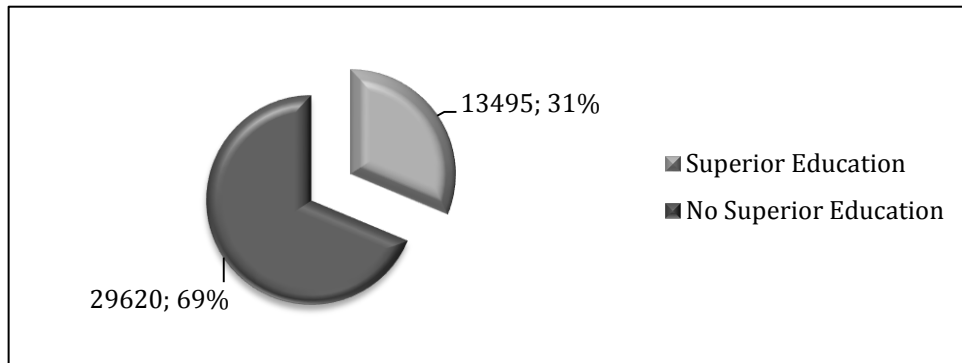
Regarding the industry of executives' companies, the database divides the industry into 10 categories, as shown in Table 2. The most representative one is financial services with 13912 observations (32,27%), with 3726 more observations compared to distribution, the second industry with higher frequency. Pharmaceutics is the least representative one, with only 52 observations (0,12%).

Table 3: Functional Area of Sample's Executives

	Frequency	Percent	Valid Percent	Cumulative Percent
Board	357	0,01	0,01	0,01
Finance	2842	0,07	0,07	0,08
Information Technology	3643	0,08	0,08	0,16
Human Resources	882	0,02	0,02	0,18
Public Relations	448	0,01	0,01	0,19
Marketing	1664	0,04	0,04	0,23
Commercial	13995	0,32	0,32	0,55
Engineering/Maintenance	2641	0,06	0,06	0,61
Quality control	511	0,01	0,01	0,62
Production	1850	0,04	0,04	0,66
Call centre	513	0,01	0,01	0,67
Logistics	1549	0,04	0,04	0,71
Administrative	12220	0,28	0,28	100
Total	43115	100	100	

In regards to the functional area of executives in the sample, table 3 shows that the higher numbers belong to the commercial area, which is the most representative one (13995 observations; 32%) and the administrative area, which is the second most representative one, with 12220 observations (28%). The less representative areas are board, public relations, quality control and call centre, each with only 1% of the frequency.

Figure 4: Education Level on the Sample



This database divides the education level of the executives into two levels: superior education and no superior education. The number of executives with no superior education (29620) is higher than the number of the ones with superior education (13495).

Figure 5: Nationality of Sample's Firms

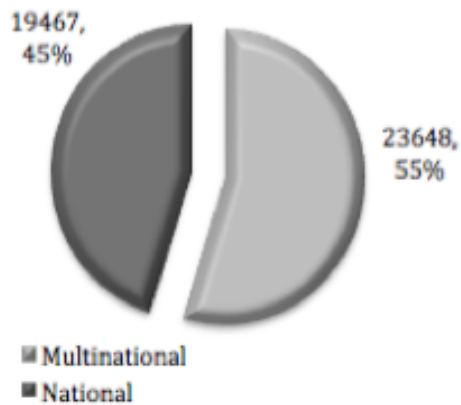


Figure 6: Firm Culture of Sample's Firms



Concerning the nationality of the sample's firms, more than half of the sample's executives work in multinational firms (55%) (Figure 3). The majority of the firms are also non Anglo-saxon firms (84%) (Figure 4).

Table 4: Sample's firms size range

	Frequency	Percent	Valid Percent	Cumulative Percent
Micro Size [1-9]	97	0,002	0,002	0,002
Small Size [10-49]	459	0,011	0,011	0,013
Medium Size [50-249]	5904	0,137	0,137	0,15
Large Size [250-500]	5083	0,118	0,118	0,268
Very Large Size [>500]	31572	0,732	0,732	100
Total	43115	100	100	

Table 4 divides the firms according to the size range (number of employees). The table shows that the majority of the firms are big, with more than 500 employees, representing 73% of the observations. There are only 97 executives working in micro-firms, representing only 0,002% of the total of observations. The majority of observations are from big companies, with more than 249 employees, since only 15 % work in SME's.

Table 5: Return on Sales and Sales Growth of Sample's firms

	Minimum	Maximum	Mean	Median	Std. Deviation
ROS	-10%	23%	7%	7%	5%
Growth	-40,6%	242,9%	8,4%	8%	11,4%

Regarding the Return on Sales of the sample's firms, executives had good performances in the year 2007. The average Return on Sales is 7% (Table 5), although the worst performance was negative (-10% of ROS) and the best was 23% (Table 5).

In regards to the sales growth, the average growth is 8.4% (Table 5), although the worst growth has been a negative value of -40,6%% and the best value was 242,9% (Table 5).

Table 6: Executive's Remuneration descriptive statistics

	Minimum	Maximum	Mean	Median	Std. Deviation
Annual pay	3127,2	694124	28655	22609	21673,61

On average, the executives of the sample received 22 thousand euros of annual base pay. The worst remunerated executive received around 3127 euros, whilst the better paid received around 694124 euros and the average annual pay remuneration is 22609 euros (Table 6).

In order to study executive pay, one dependent variable will be used: the annual base pay (guaranteed).

3.2 Variables

In order to test the hypotheses formulated in the Literature Review, a Multiple Linear Regression Model (MLRM) will be presented and estimated. This model will be described and explained later. Before presenting this model, it is important to define and describe the variables used in the study – independent, dependent and controlling ones, considering each hypothesis supporting it in prior empirical work.

3.2.1 Dependent Variables

The aim of the three hypotheses is to study Human Capital Theory (HCT), the Mincer Equation, and the Agency Theory. The aim is to study to what extent education, experience, firm size and performance lead to higher salaries. This way, the dependent variable that will be used is *annualpay*.

The *annualpay* variable represents the annual guaranteed pay, no matter the kind and does not include any variable component, since the aim of this study is not the study of the variable payment component. This variable is measured in euros.

3.2.2 Independent Variables

Concerning the first model, which tries to test hypotheses 1 and 3, the independent variables that will be used in order to test them will be the following ones: ***female_1***, ***Age***, ***High_Tec***, ***Manufact***, ***Dist***, and ***Multin_1***.

The ***female_1*** is a dichotomous variable that assumes the value “0” if the executive is a male and the value “1” if the executive is a female. This variable is important to get the information about the gender differences, which are not the main objective of this study, but the study of this problem can help to explain the remuneration differences among executives. ***Age*** is another important variable that can give us an insight into the age differences in this sample and is measured in years. The ***High_Tec***, ***Manufact*** and ***Dist*** are dichotomous variables that assume the value “1” if the company belongs to the industry and the value “0” if the company does not belong to that industry. The variable ***Multin_1*** is a dichotomous variable that assumes the value “1” if the company is multinational and the value “0” otherwise. This variable, the descriptive statistics of which were presented before, gives an insight into the differences between the remuneration in national companies and multinational ones.

The second model, which aims to study hypothesis 2, uses ***Eduniv_1***, ***Female_1***, ***Anglo_1***, ***Tenure*** and the industry variables: ***High_tec***, ***Manufact*** and ***Dist*** as independent variables. The ***Eduniv_1*** and ***Tenure*** will be explained in the Controlling Variables section. The ***female_1*** and the industry variables were explained before.

The ***Anglo_1*** is also a dichotomous variable that assumes the value “1” if the company is of Anglo-Saxon origin and the value “0” otherwise. The Anglo-Saxon companies are from countries such as the USA, Great Britain and Canada. The purpose of this study is not to study the cultural influence on remuneration. Nevertheless, it is important to include a cultural variable to enrich the model.

3.2.3 Controlling Variables

As controlling variables, the first model uses three variables: ***Eduniv_1***, ***Lnsize*** and ***Tenure***.

The ***Eduniv_1*** variable is a dichotomous variable that assumes the value “1” if an executive has superior education and “0” if otherwise. This variable is used to study the first hypothesis and it is a proxy for “schooling”, the variable used in the Mincer Equation. The aim of using this variable is to analyse and test if education leads to higher remuneration, as Human Capital Theory and Mincer (1974) predict.

The ***Tenure*** is a variable that indicates how many years an executive is in the actual firm. It is a proxy for the “*Years of potential labour market experience*”, the concept used in the Mincer Equation (1974). The aim of using a variable is to study and test to what extent tenure influences remuneration, considering the data used in this study.

The ***LnSize*** variable is the non-linear version of the size variable, which is operationally defined using the total number of employees. The main reason for the logarithmic form is to avoid extreme values. It gives the total number of employees of each firm, so that, firms can be divided into micro firms, if they have 1 to 9 employees, small firms if they have 10 to 49 employees, medium firms if they have 50 to 249 employees, large firms if they have 250 to 500 employees and very large firms in the cases that have more than 501 employees.

The second model uses the variable ***ROS*** as controlling, since the aim of the second model is to test hypothesis 2, which states that there is a positive correlation between firm performance and CEO compensation. In this study, the performance variable is ***ROS*** (Return on Sales), that is a sales related indicator of a certain period of time (in this case for the year 2007), providing a perspective into how much profit is being produced per dollar of sales. There are other good measures of performance, such as ROE or ROA, or earnings per share, etc. Nevertheless, this database does not have sufficient information to obtain such indicators. It only has sales growth and return on sales variables, so that, it was decided to use the ***ROS***, since growth can derive from a conjectural situation. Furthermore, the ROS is used to compare companies and industries and it is a valid indicator of the efficiency of a company:

an increasing **ROS** means that the company is growing more efficient. So that, the most suitable sort of variable as performance one.

Table 7: Controlling variables and supporting prior literature

Variable (label)	Description	Used ¹ to test in	Related Prior Literature
Superior Education (<i>Eduniv_1</i>)	Education level of executive (0 – No superior education; 1 – Superior education ²)	H1	Shultz (1961), Mincer (1974), Becker (1994), Borjas (2010)
Firm size (<i>Lsize</i>)	Size of company measured in terms of n° of employees ³	H3	Rosen (1982), Rose and Shepard (1997), Grabke-Rundell and Gomez-Meija (2002), Rankin (2006), Kang, Kumar, and Lee (2006), Frydman and Jenter (2010), ,
Tenure (<i>Tenure</i>)	Tenure of executive in years	H1	Mincer (1958), Mincer (1974), Rankin (2006), Andini (2013)
ROS (ROS)	Yearly Return on sales	H2	Murphy (1985), Smith and Watts (1992), Baber <i>et al.</i> (1996), Core <i>et al.</i> (1999), Fenn and Liang (2001), Ryan and Wiggins (2001), Gabay (2005), Leone <i>et al.</i> (2006), Merhebi <i>et.al</i> (2006), Rankin (2006), Graham <i>et al.</i> (2009), Richard Heaney, Tawani and Goodwin (2010), Frydman and Jenter (2010),

¹ As controlling variable.

² According to Bologna process.

³ Although in descriptive statistics a variable based on this one but with ranges to fit the companies' sizes has been used, the one that will be used to estimate the regression models is a continuous one.

3.3 Econometric Model

As is being described in this work, the objective is to evaluate the importance of education and tenure (which is a proxy for the experience of workers), resorting to the Human Capital Theory and the Mincer Equation, as well as the importance of the size of firms and the relationship between performance and remuneration, resorting to Agency Theory.

In order to verify the assumptions formulated before, regression models will be estimated with the aim of determining if the referred independent variables are statistically significant on explaining the dependent one. Two regressions will be estimated, using the *annualpay* variable as dependent. Nevertheless, the second model is focused on the relationship between *annualpay* and *ROS*.

So, in order to test the hypothesis 1 and 3 a Lin-Log model will be used, since there is a non-linear independent variable in this model. As *annualpay* is a continuous variable, the regression will be estimated by the OLS method.

The model is written as follows:

$$\text{Annualpay}_i = \beta_1 \text{Lnsize}_i + \beta_2 \text{Multin}_i + \beta_3 \text{Eduniv}_i + \beta_4 \text{Female}_i + \beta_5 \text{Age}_i + \beta_6 \text{High_tec}_i + \beta_7 \text{Manufact}_i + \beta_8 \text{Dist}_i + \beta_9 \text{Tenure}_i + \varepsilon_i \quad (6)$$

Where,

β_1 is the coefficient to variable Lnsize

β_2 is the coefficient to variable Multin_1

β_3 is the coefficient to variable Eduniv_1

β_4 is the coefficient to variable Female_1

β_5 is the coefficient to variable Age

β_6 is the coefficient to variable High_tec

β_7 is the coefficient to variable Manufact

β_8 is the coefficient to variable Dist

β_9 is the coefficient to variable Tenure

ε is the error term of regression

The estimation of parameters used in this model was obtained using *Eviews* software. All the available mechanisms were used in order to avoid and correct possible existing Heteroskedasticity and Autocorrelation problems.

As we have several dummy variables in the explanatory part of the model, and in order to deal with the dummies trap, we excluded the intercept in the estimated model.

In order to estimate the regression model regarding the second hypothesis, the equation suffers some changes. The aim of this regression is to analyse the correlation between CEO pay and the performance of the firms. So that, a new variable is introduced: **ROS** (Return on Sales). The dependent variable remains the same (**annualpay**).

Since **ROS** is a continuous variable, as **annualpay**, the regression will be estimated by using the OLS method, as in the first model. The regression will be:

$$\text{Annualpay}_i = \beta_0 + \beta_1 \text{Eduniv}_i + \beta_2 \text{Female}_i + \beta_3 \text{ROS}_i + \beta_4 \text{Tenure}_i + \beta_5 \text{Anglo}_i + \beta_6 \text{High_tec}_i + \beta_7 \text{Manufact}_i + \beta_8 \text{Dist}_i + \varepsilon_i \quad (7)$$

Where,

β_0 is the intercept (constant) parameter

β_1 is the coefficient to variable Eduniv_1

β_2 is the coefficient to variable Female_1

β_3 is the coefficient to variable ROS

β_4 is the coefficient to variable Tenure

β_5 is the coefficient to variable Anglo_1

β_6 is the coefficient to variable High_tec

β_7 is the coefficient to variable Manufact

β_8 is the coefficient to variable Dist

ε is the error term of regression

As well as in the first regression, this one was estimated via software *Eviews*. In order to prevent Heteroskedasticity and Autocorrelation problems, the Newey-West standard errors and covariance was applied.

3.4 Empirical Results

Table 7 presents the regression coefficients estimated through the *Eviews* program, regarding the first model, the original output of which can be checked in Appendix 1.

Table 8: Regression estimated Coefficients regarding the First Model
(Dependent Variable: *annualpay*)

Variable	Coefficient	T-statistic	Probability
LNSIZE	1457.262	17.41231	0.0000
MULTIN_1	1515.798	4.084609	0.0000
EDUNIV_1	13432.30	23.56423	0,0000
FEMALE_1	-751.4420	-2.997683	0.0027
AGE	391.3573	18.15078	0.0000
HIGH_TEC	5399.831	11.26615	0.0000
MANUFACT	-2136.078	-3.613681	0.0003
DIST	-8355.962	-19.64152	0.0000
TENURE	-259.5656	-8.659113	0.0000

Observations:

- (1) Statistical significant at: 5%
- (2) Standard errors are corrected with Newey-West Standard Errors and Covariance

The probability of the T-tests determined the individual feasibility of each variable in this model. In other words, all explanatory variables have statistical significant impact in explaining **annualpay**, the dependent one. One can conclude that all the estimated coefficients of the independent variables are statistically significant in explaining annual executive payment (based on the probability of rejecting the null hypothesis of T-tests with a significance level of 5%).

Through the coefficient column, one can conclude that **Female_1**, **Manufact**, **Dist** and **Tenure** have a negative impact on the executive annual base payment.

The **Lsize** variable is positively related to remuneration, which supports the prior literature, such as Rankin (2006), who argues the high increases in CEO pay are due to the increasing firm sizes and scale effects.

The relationship between Multinational Companies and annual base payment is positive, which means that a multinational company worker earns more than a national company one. The aim of this study is not to study the inequalities regarding the origin of the companies. This variable, along with **Anglo_1**, was introduced in this model in order to enrich it.

The **eduniv_1** coefficient shows a positive relationship between this variable and the annual base payment (annual pay), which is in accordance with the Human Capital and the Mincer equation theories, which predict that higher levels of education lead to higher levels of remuneration. In this specific case, the dummy **eduniv_1** coefficient can be interpreted as the difference between an individual who has superior education and an individual who does not have it. Through the result regarding education, in average terms, an executive with superior education benefits from a higher annual base payment due to the higher education level. On average, an individual with superior education earns 13432 euros more compared to an individual with no superior education, *Ceteris paribus* (all the rest constant).

Regarding the coefficient of **female_1** variable, the result is also the expected one: on average terms, female executives earn less than male executives. This result is consistent with Becker (1994), which approaches the job opportunities GAP between males and females. According to the model, on average, an executive female earns 751 euros less than

an executive male, *Ceteris paribus*, which translates the Portuguese gender GAP that still occurs nowadays.

With regards to **Age**, there is a positive relationship between this variable and the annual base payment. According to the model, the expected increase in salaries of executives who are a year older is 391 euros, *Ceteris paribus*. This is not fully consistent with what happens, but it the Age-earnings profiles can explain this relation. According to Becker (1994), the earnings profiles rise, as the age gets higher. However, there are diminishing returns at older ages (the remuneration will rise less every year).

With regards to the industry variables, the high technology industry (**High_tec**) exhibits a positive relationship with annual payment. On average, executives that work in high technology firms earn 5399 euros more compared to those who don't work in that industry, *Ceteris paribus*. **Manufact** and **Dist** have a negative relationship with remuneration. Regarding manufacturing, on average, executives who work in this industry earn 2136 euros less than those who don't work in that industry, *Ceteris paribus*. Finally, on average, executives who work in the distribution industry earn 8355 euros less than those who don't work in that industry, *Ceteris paribus*.

Regarding **Tenure**, this variable is, indeed, significant to explain remuneration and it shows a negative relationship with annual base payment. This negative relationship was explained before, in the Literature Review and it is related to the diminishing returns of the workers with higher tenures.

Table 9 presents the regression coefficients estimated in the *Eviews* program, regarding the second model, the original output of which can be checked in Appendix 2.

Table 9: Regression estimated Coefficients regarding the Second Model
(Dependent Variable: *annualpay*)

Variables	Coefficient	T-statistic	Probability
C	24710.94	58.94951	0,0000
EDUNIV_1	12830.02	22.69863	0,0000
FEMALE_1	-1586.318	-6.222347	0,0000
ROS	7427.091	2.550889	0,0107
TENURE	-64.60211	-3.015473	0.0026
ANGLO_1	6655.242	7.808684	0,0000
HIGH_TEC	2715.834	5.225352	0,0000
MANUFACT	-4590.851	-8.285670	0,0000
DIST	-8209.391	-21.49609	0,0000
F-statistic	1178.584		
P(F-statistic)	0,0000		

Observations:

- (1) Statistical significant at: 5%
- (2) Standard errors are corrected with Newey-West Standard Errors and Covariance

By analysing the result of the F-statistic, which is related to the significance of the overall model, we can conclude that the model has statistical significance on explaining annual payment variations.

Considering the individual significance of the independent variables explaining the dependent one, all variables are statistically significant, as can be seen through the probability of the T-tests (Table 8).

The ***Female_1***, ***Tenure***, ***Manufact*** and ***Dist*** variables show a negative relationship with the annual base payment, as occurred in the first model. The other variables show positive

relationships with annual base payment.

The **eduniv_1** variable shows a positive relationship with annual base payment, as does the first model. On average, an executive with superior education earns 12830 euros more than an executive without such a level of education, *Ceteris Paribus*.

The **female_1** variable shows a negative relationship with annual base payment, as does the first model. According to the model, on average, an executive female earns 1586 euros less than a male executive, *Ceteris paribus*.

The **ROS** (Return on Sales variable has a positive relationship with the annual base payment, which is in accordance with the theory. The performance is, as can be seen above, positively related to remuneration. It means that, on average terms, higher performances lead to higher executive remunerations, which is in accordance with prior literature. Authors such as Gabay (2005), Merhebi *et al.* (2006), Michaela Rankin (2006), Richard Heaney, Vineet Tawani and John Goodwin (2010), find a link between firm performance and executive compensation.

Regarding **Tenure** variable, this one shows a negative relation with annual base payment, as in the first model.

The **anglo_1** variable is positively related to remuneration, which means that, on average terms, executives who work for Anglo-Saxon companies earn more than workers that don't work for those companies. On average, executives who work for Anglo-Saxon firms earn 6655 euros more than executives who don't work for those firms, *Ceteris paribus*. As it was referred before, the aim of this work is not to study the disparities regarding countries of origin, so that this variable, along with **multin_1** was only introduced in this model in order to enrich it.

With regards to the industry variables, the **High_tec** variable has a positive relationship with annual base payment. On average, executives that work in high technology firms earn 2715 euros more compared to those who don't work in that industry, *Ceteris paribus*. Regarding manufacturing, on average, executives who work in this industry earn 4590 euros less than those who don't work in that industry, *Ceteris paribus*. Finally, on average, executives who work in the distribution industry earn 8209 euros less than those who don't work in that industry, *Ceteris paribus*.

4. CONCLUSIONS

The goal of this study was to complement the existing literature regarding executive remuneration in Portugal, verifying if education, experience, firm size and firm performance are important determinants of remuneration.

Having the prior literature regarding the executive remuneration subject as background, two econometric models were built in order to verify the formulated hypotheses.

The results support the first hypothesis. Indeed, education and experience of a worker are two important determinants of wages. The superior education dummy, which is a proxy for education is statistically significant and reveals a positive relationship with the annual base payment, which is a proxy for remuneration. Tenure, the proxy for experience, is also statistically significant and reveals a negative relationship with the annual base payment, which is in accordance with the diminishing return trend explained by Mincer (1974).

The second hypothesis is also supported by this analysis. Indeed, there is a positive relationship with the size of the firms and the annual base payment, which means that it is expected that larger firms pay greater salaries.

The third and last hypothesis is also verified. There is a positive correlation between firm performance and CEO compensation, which means that the Agency Theory, indeed, explains the CEO remuneration in the last decades. Since earnings are seen as incentives and tools to align the interests of the two main parties of a firm: the managers and shareholders, the Agency Theory appears as a valid explanation for executive remuneration.

It is important to point out some limitations regarding this study. The first limitation is related to the period of reference of the database. This database is from year 2007, which is outdated considering the current remuneration standards and policies, thus giving a wrong perspective about remuneration. However, having a 2007 database can be benefit, if we consider that post-2008 data can be biased by the 2008 financial crisis. Second, the ROS measure of performance is not the most adequate one. However, giving the variables included in this database, it was the only one available to study performance.

For future studies, it is important to work with more updated databases and more effective indicators of performance regarding remuneration. Other interesting studies could be performed in order to study Portuguese remuneration, based on more recent theories, instead of the classical ones referred in this study. Other studies could be done, regarding comparisons and benchmarks between Portugal and other countries. What are the factors that explain the salary differences among European countries? What could be done to reduce those salary differences?

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APPENDIX

Appendix 1: Eviews' regression output regarding Model 1

Dependent Variable: ANNUALPAY

Method: Least Squares

Date: 09/04/14 Time: 20:28

Sample: 1 56136 IF SEQ<>54476

Included observations: 56135

Newey-West HAC Standard Errors & Covariance (lag truncation=16)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNSIZE	1457.262	83.69148	17.41231	0.0000
MULTIN_1	1515.798	371.0998	4.084609	0.0000
EDUNIV_1	13432.30	570.0294	23.56423	0.0000
FEMALE_1	-751.4420	250.6743	-2.997683	0.0027
AGE	391.3573	21.56146	18.15078	0.0000
HIGH_TEC	5399.831	479.2970	11.26615	0.0000
MANUFACT	-2136.078	591.1086	-3.613681	0.0003
DIST	-8355.962	425.4234	-19.64152	0.0000
TENURE	-259.5656	29.97600	-8.659113	0.0000
R-squared	0.094967	Mean dependent var	26539.46	
Adjusted R-squared	0.094838	S.D. dependent var	20741.23	
S.E. of regression	19733.20	Akaike info criterion	22.61815	
Sum squared resid	2.19E+13	Schwarz criterion	22.61959	
Log likelihood	-634826.0	Durbin-Watson stat	0.721692	

Appendix 2: Eviews' regression output regarding Model 2

Dependent Variable: ANNUALPAY

Method: Least Squares

Date: 09/04/14 Time: 20:26

Sample: 1 56136 IF SEQ<>54476

Included observations: 56135

Newey-West HAC Standard Errors & Covariance (lag truncation=16)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	24710.94	419.1882	58.94951	0.0000
EDUNIV_1	12830.02	565.2332	22.69863	0.0000
FEMALE_1	-1586.318	254.9388	-6.222347	0.0000
ROS	7427.091	2911.569	2.550889	0.0107
TENURE	-64.60211	21.42354	-3.015473	0.0026
ANGLO_1	6655.242	852.2872	7.808684	0.0000
HIGH_TEC	2715.834	519.7419	5.225352	0.0000
MANUFACT	-4590.851	554.0711	-8.285670	0.0000
DIST	-8209.391	381.9016	-21.49609	0.0000
R-squared	0.143829	Mean dependent var	26539.46	
Adjusted R-squared	0.143707	S.D. dependent var	20741.23	
S.E. of regression	19193.12	Akaike info criterion	22.56265	
Sum squared resid	2.07E+13	Schwarz criterion	22.56408	
Log likelihood	-633268.2	F-statistic	1178.584	
Durbin-Watson stat	0.727808	Prob(F-statistic)	0.000000	