



NEWS INSIGHTS ON EXECUTIVE COMPENSATION

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Abstract

This paper aims to examine executive compensation structure and determinants on a panel of the so-called “new economy” and “old economy” firms in the USA over the period 1992-2004. The results reveal that executive compensation structure in new versus old economy firms is different and more importantly, it changes over time. Additionally, our results document that the factors explaining executive compensation of new and old economy are different, and also that stock options, despite the problems that have been related with these compensation components in the past, are still the most important ones, both in new and old economy firms. Our results imply that different reward structures exist for different industry sectors at different stages in their development and companies must readjust compensation structures frequently to provide incentive for their top executives.

Keywords Executive Compensation; New Economy; Old Economy; NASDAQ crash; Sarbanes Oxley Act

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1. Introduction

The purpose of this study is to examine the following research questions: (1) Is the executive compensation in old versus new economy firms the same? (2) Is the composition of executive compensation in old versus new economy firms the same? (3) Did the compensation composition change after the NASDAQ Crash and Sarbanes Oxley Act? (4) Are the factors that explain executive compensation in old versus new economy firms similar?

Recent studies on executive compensation including Anderson et al. (2000), Sesil et al. (2002), Murphy (2003), Ittner et al. (2003), Stathopoulos et al. (2004), and Chen and Hung (2006) correctly observe that the new economy firms (*Murphy (2003) defines new economy firms like firms competing in the computer, software, internet, telecommunications, or networking*

fields) are fundamentally different in terms of many characteristics they possess compared to the old economy firms. However, these studies have some limitations in terms of the nature and scope of their inquiry, and these limitations provide the motivation for the current research. There is only one study (Stathopoulos et al., 2004) that analyzes the executive compensation for both the new and the old economy firms, but it focuses on a small period of 1996 through 1999 - that is economic boom period of 90s and just before the NASDAQ Crash in 2000. The findings of the study could be influenced by the chosen economic boom period and are probably difficult to replicate in other periods. The other limitation is that most studies focus on the preponderance of stock options as a form of executive compensation without analyzing the remaining components of the compensation.

Also all other studies on executive compensation, except Murphy (2003), examine small periods of time; therefore, the conclusions achieved by these studies must be validated for a longer period of time.

Our research extends the previous research on incentive contracts in several ways. First of all, we include both new as well as old economy firms in our analysis and we utilize a longer time period (1992 to 2004) that can give us a better understanding of the trends in the value and composition of executive compensation. We also extend the analysis to all the important compensation components (salary, bonus, stock options, restricted stocks and long term incentive plans), as opposed to focusing only on one component of compensation - stock options. Our selected time period enables us to gauge the impact of the economic boom period (till 2000), the NASDAQ Crash (after 2000) and the Sarbanes Oxley Act (2002) on executive compensation of old versus new economy firms. We also investigate the determinants of executive compensation for new versus old economy firms. Based on the inherent differences between new and old economy firms, we believe that executive compensation may be influenced by different factors.

Data is from the Standard and Poor's ExecuComp database¹ that collects information about the five most well paid executives from firms listed on S&P Indexes. We use Unbalanced² Panel Data and fixed effect regression analysis, and our final sample is composed of 67437 observations of executive compensation for the 13 year period from 1992 to 2004.

In this study we also deal with the old problem in executive compensation literature as to what is the best variable to measure the impact of the firm size: LN (assets), LN (market value), LN (sales) or these variables without a natural logarithm. Effectively, firm size is described as one of the most important variables to explain the executive compensation. Still, using only one of these variable and excluding the others creates some doubt about the quality of the results. To solve this problem, we use the Principal Component method and extract a factor that is the best combination of the three stated variables to measure the firm size.

Our results reveal that the number of executives in new economy firms is considerably smaller than the number of executives in old economy firms. Most of the new economy executives are from firms

associated with *Pre-packaged Software* (26.02%), *Semiconductor and Related Devices* (17.29%), *Computer Programming, Data Processing* (9.46%) and *Telecommunications* (7.50%). We also find a gap between new and old economy executive compensation, but this gap decreases during the last years in our sample.

Our results also reveal that the factors that explain executive compensation in new versus old economy firms are generally different, and in the case of the variables that are the same, our tests generally rejected the hypothesis that the coefficients related to these common factors are equal.

The most important contribution of this paper is to find that the reward structures for different sectors of industry at different stages can be different, and the NASDAQ Crash and the Sarbanes Oxley act of 2002 instituted a fundamental change in the forms of executive compensation by reducing the use of stock options and increasing the use of bonuses and restricted stocks³.

The paper is organized as follows: Section 2 discusses the literature review. Section 3 describes the research questions and hypotheses. Section 4 explains the empirical tests. Section 5 states the results, and Section 6 presents the summary and conclusions.

2. Review of Literature

The literature review most closely related to our current inquiry can be categorized into four areas: A) Executive compensation studies; B) New versus old economy firms; C) Firm size; and D) Summary of the Sarbanes-Oxley Act of 2002 (SOX).

2.1 Executive compensation studies

One limitation of the executive compensation research around the world is the fact that only a small number of the countries (ex: US and England) have legislation that obligates companies to display individually executive compensation for top executives. The display of executive compensation has been obligatory in the US for a long time, but in most other countries, such information is only given to the market aggregated by boards. Chizema (2008) identifies, for the German market, what characteristics make companies resist disclosing data about executive compensation and finds that ownership, dispersed ownership, state ownership, prior adoption of shareholder value-oriented practices, and firm size are positively and significantly related with the

¹ The ExecuComp version is from 06-2006.

² An Unbalanced Panel data is, in our case, a panel where some executives don't have information in all the variables to whole analyzed period (1992 to 2004). The reason why this happens is because Execucomp database only collects information related with five most well paid executives of each of the S&P1500 listed firms. Some executives can be in this top 5 ranking between 1992 to 2004 and others not.

³ Restricted stocks are stock subject to restrictions on sale and risk of forfeiture until vested by continued employment. Restricted stock typically vests in increments over a period of several years. Dividends or dividend equivalent rights may be paid, and award holders may have voting rights during the restricted period.

disclosure of individual executive compensation. The size of the supervisory board and the number of the year of the firm are negatively and significantly related with individual disclosure of executive compensation.

As discussed earlier, there is only one study that includes samples of both the new and old economy firms based on data from U.K. listed firms (Stathopoulos et. al, 2004). Results show that new economy firms pay more stock options to executives compared to old economy firms. The authors attribute the differences in payment methodologies between old versus new economy firms to differences in firm size, growth opportunities, financial leverage, ownership, and governance arrangements. Stock options are also the reason why CEOs in the US receive, on average, higher compensation than executives in the U.K. (Canyon and Murphy, 2000). Due to institutional and cultural differences between the two countries, US companies give more stock options than UK companies. Conyon et al. (2000) also complement the information that portfolio of options varies with firm wealth.

Anderson et al. (2000) produced the pioneer study on executive compensation focusing on US new economy firms. They utilize the US data from 1992 to 1996. They find that the new economy firms pay more to executives based on firm performances, essentially with stock options. Conyon and Freeman (2000) show that firms with executive compensation packages significantly based on stock options exhibit higher productivity than other firms, and Frey et al. (2006) find that the relationship between CEO compensation and firm performance is smaller for firms with Social Responsibility than for firms with no Social Responsibility. Ittner et al. (2003) demonstrate, contrary to expectations, that significant equity options grants have relatively little association with future performance, providing no support for claims that the large equity options grants by new economy firms have a substantial negative impact on shareholder value. The most important factor that explains the grant of a significant amount of stock options to executives is to retain them in the firm. Murphy (2003) extends the research by increasing the sample period (1992 to 2001), and confirms that executives from new economy firms receive more stock options relative to the old economy firms. Murphy's period of analysis is only until 2001 - one year after the NASDAQ crash, so it does not give a clear picture of the real impact of the crash on the structure of executive compensation. He only describes that the NASDAQ crash has left many employees of new economy firms with seemingly worthless underwater options but says nothing as to what happens to other compensation components such as salary, bonus, restricted stocks and long term incentive plans.

Sesil et. al (2002) find that new economy firms that pay executives compensation predominantly in the form of stock options have a greater value added

per employee as a measure of performance. They also find that shareholders of new economy firms earn higher cumulative total returns.

Chen and Hung (2006) investigate the relationship between corporate governance factors and insider compensation in high technology firms and find that the existence of the founder CEO is negatively related with CEO cash compensation and positively related to CEO option compensation. Chen (2008) also analyzed S&P 1500 companies and found that CEO ownership and board independence affect, in different ways, the cash holdings in new economy and old economy firms. More precisely, higher board independence tends to increase cash holdings in new economy firms, and higher managerial cash holdings tend to reduce cash holdings in companies from the old economy.

Literature offers numerous underlying reasons to explain why new economy firms grant more stock options to executives compared to the old economy firms. Stathopoulos et. al (2004) believe that stock options are granted to the new economy executives to align the interests of shareholders with the management, reduce the agency costs, achieve beneficial tax gains, and attract and retain executives with significant knowledge of new technologies. Andersen Banker and Ravidran (2000) explain that new technology firms award stock options to executives because of cultural norm and practices in this sector of economy. Ittner et al. (2003) are of the view that new economy firms give stock options to executives because the firms have difficulty generating enough cash flow to pay high salaries. Murphy (2003) complements this information, adding that large firms compete in the market for high quality executives, and the compensation contracts that they offer to these executives force other firms to use the same structure of compensation, including stock options as a major component of compensation package. Another reason invoked is related to what the author calls the "perceived-cost-view", meaning that there is the wrong perception that executives compensated with stock options constitute a cheap form of compensation.

Essentially, new economy executive compensation research focuses basically on one component of the executive compensation - stock options - at the expense of other components of the executive compensation. It will be more comprehensive and useful to include the other components of compensation like salary, bonus, restricted stock and long term incentive plans as well. This way it will be possible to analyze the change, if any, in the composition of executive compensation over time.

2.2. Differences between new and old economy firms

New economy firms differ from old economy firms essentially because they produce higher growth of

sales and income; they spend more money for research and development; they present low ratios of book-to-market value; they offer lower dividends per share and a high volatility of share returns. They still hold a smaller number of employees, a reduced market value and smaller accounting returns than old economy firms. In addition, they provide a larger compensation relative to capital ownership, have a higher percentage of stock options and a higher percentage of the volume of stock options not exercised in relation to the total number of outstanding shares (Ittner et al., 2003; Murphy, 2003 and Stathopoulos et. al, 2004).

2.3. Firm size and executive compensation

Firm size has been presented in literature as one of the most important factors that influence executive compensation (Murphy and Conyon, 2002). It makes sense because big companies normally can pay higher remuneration whereas smaller companies can not.

When companies award top executives stock options plans, they normally expect an increase in performance (Portnot and Moltzen, 2000). Hermalin and Wallace (2001) and Aggarwall and Samwick (1999) find that the performance increases when company size also increases. In other words, there exists a positive relationship between the firm size, stock options grants and the firm performance. Canarella and Gasparyan (2008) also document that the effect of firm size on CEO compensation in new firms is more significant after the NASDAQ Crash in 2000.

An interesting finding that relates executive compensation and firm size is that mergers are motivated to increase the size of the firm so the executives of the firm may be able to demand an increase in compensation (Datta et al., 2001). Boyd (2006) also find that firm size, firm profitability, directors equity ownership, and resource richness of the board are positively and significantly related to director's compensation, but the power explanation of this variables reduced in last year.

Bushman et al. (1996) show that the firm size is positively related to salary and bonus but negatively related to long term compensation. Bertrand and Hallock (2002) find that firm size can also explain the difference in total compensation between men and women working in top positions. In other words, the gender gap is higher in bigger companies than the smaller companies.

The size of the company is also important for resetting, also called re-pricing, of stock options plans. As described above, new economy firms award more stock options to their executives. After the NASDAQ crash in 2000 the most granted options turned out to be out-of-the-money options, and the compensation based on the option incentive mechanism became ineffective (Murphy, 2003). The solution that many companies found to retain high

level executives was to change the exercise price to a new price closer to the market. Some companies cancelled the old options packages and offered new compensation packages or, in some cases, gave additional compensation based on cash. The process of re-pricing of the stock options plans is more common in small firms, younger firms, new economy firms or firms with the out-of-the money stock options (Bens et al., 2003; Brenner et al., 2000; Carter and Lynch, 2003; Chance et al. 2000 and Chidambaran and Prabhala, 2003).

Despite the tremendous significance of the size variable in the executive compensation literature there is still no consensus as to what is the best empirical proxy for this variable - LN (assets), LN (market value), LN (sales) and or these variables without a natural logarithm. Ittner, Lambert and Larker (2003) also use the variable number of employees to measure the impact of firm size on executive compensation. In the mind of the researchers, however, there exists a doubt if using one of the above variables, at the exclusion of other variables, will produce inferior results. In this study we try to solve this problem using factor analysis, as discussed later.

3. Research hypotheses

As discussed earlier, Ittner et al. (2003), Murphy (2003) and Stathopoulos et. al (2004), among others, argue that the new and old economy firms differ in many important aspects including, but not limited to, growth rates, R&D budget, book-to-market ratios, dividends, volatility of share returns, number of employees, market value, accounting returns, compensation relative to capital ownership, and stock options grants. Given these inherent differences, we expect that total compensation will also be different between the executives of these two groups. To investigate this situation we use the following hypotheses:

Hypothesis 1:

H0a: Total average executive compensation is the same for new versus old economy firms.

H1a: Total average executive compensation is not the same for new versus old economy firms.

As discussed earlier, Stathopoulos et al. (2004), among others, describe that new economy executives have compensation packages with more stock options than the old economy executives, and this difference in compensation relates to firm size, growth opportunities, firm financial policies, ownership, and governance arrangements. Based on these elements, I expect that the compensation composition of executives in new versus old economy firms will be different. By compensation composition I mean the weight of each component of compensation such as salary, bonus, stock options and long term incentive

plans. For example, 15% salary weight means that the salary component represents 15% of the total compensation. Because I have a panel of data with information from 1992 until 2004, I capture the boom period between 1995 to 2000, characterized by a significant number of the companies giving executives compensation plans based on firms performances, plus the period after the crash in 2000, and a third period characterized by strong market regulations to control corporate governance problems (Sarbanes Oxley Act in 2000). Given the above, I expect that the relative weighting of components of executive compensation also changed during the analyzed period. The null hypotheses that I test is:

Hypotheses 2:

Hob: Executive compensation composition is the same for the new versus the old economy executives.

H1b: Executive compensation composition is not the same for the new versus old economy executives.

Murphy (2003) indicates that the market crash left many employees of new economy firms with out-of-the-money stock options. As a result, the surviving new economy firms tried to grant new options, reprice or reissue the existing options or replace option grants with another compensation component. But the analysis done by Murphy only encompasses one year of data after the NASDAQ crash and focuses only on stock options. Murphy's analysis is silent as to what really happens after that 2000 crash in terms of executive compensation structure. Using the longer period (as I do in this study), it is possible to expand Murphy's conclusions and extend his evolutions not only to stock options but to all the other compensation components, verifying if companies reduced the use of some components and increased the use of others. I expect that the new rules of corporate governance reduce the use of stock options and thus companies are forced to use the less risky compensation components. To analyze the situation, I test the following null hypotheses:

Hypotheses 3:

H0c: NASDAQ crash and Sarbanes Oxley Act do change the executive compensation composition.

H1c: NASDAQ crash and Sarbanes Oxley Act do not change the executive compensation composition.

If new and old economy firms are different, I also expect that the factors that influence executive compensation can also be different. This way I test the following null hypotheses:

Hypotheses 4:

H0d. The factors that explain executive compensation are the same for new and old economy executives.

H1d. The factors that explain executive compensation are not the same for new and old economy executives.

4. Empirical Tests

4.1. Sample selection

Data is from the Standard and Poor's ExecuComp database that collects information about the five most well paid executives from firms listed on S&P Indexes. I use Unbalanced Panel Data, and our final sample is composed of 67437 observations of executive compensation for the 13 year period from 1992 to 2004⁴. I retrieve compensation package details for up to the top five executives in each firm, including salary, bonus, ex-ante value of options, restricted stock award, Long term Incentive plan (LTIP), other annual compensation, all other compensation and several variables associated with governance and finance.

To develop the sample used in this study, I apply a few restrictions. First, I remove 122 observations whose sum of salary and bonus was equal to zero, in other words, those executives who received neither salary nor bonus during the year, instead received some other remuneration types. I want to analyze only those executive that receive fixed compensation each month or week and thus pay their regular expenses like house loan, food, etc. I also exclude observations where total compensation is equal to zero that represent a total 400 exclusions.

Anderson et al. (2000), Murphy (2003), Ittner et al. (2003), Stathopoulos et al. (2004) and Chen and Hung (2006) say nothing about the exclusions that they have made in the database, but I suppose that, essentially those who work with Execucomp database, also delete cross-section where total compensation appear with zero value. It doesn't make sense to include such situations in the data.

Using the Consumer Price Index (CPI) compiled by the Bureau of Labor Statistics, with 1982 as the base year, I adjust the monetary variables for inflation.

In order to distinguish between executives from new and old economy firms, I use the methodology of Murphy (2003), who considers firms from the new economy with SIC codes 3570, 3571, 3572, 3576, 3577, 3661, 3674, 4812, 4813, 5045, 5961, 7370, 7371, 7372 and 7373 and firms from the old economy with SIC codes lower than 4000 unless categorized as new economy firms.

4.2. Measurement of dependent variable(s)

In this part I describe the methodology to test whether the executive compensation in new versus old

⁴ Last year of information available from Execucomp database when I started this investigation

economy firms is influenced by the same factors, and if it is influenced by the same factors then whether the intensity of common factors is same or different.

I use Unbalanced Panel Data and the Fixed Effect Regression Model, also called within estimator or the Least Square Dummy Variable model. The dependent variables are LN (Total Compensation) and LN (Short Term Compensation) and LN (Option Ratio).

LN (Total Compensation) is the total of remunerations gained by the executives and is the sum of salary, bonus, stocks options, restricted stocks, LTIP⁵, other annual compensations and all other compensations. This variable, without logarithm, is used by Aggarwal and Samwick (1999) to evaluate the contracts offered to executives in a context of strategic competition between products and evaluation of relative performance, and by Fields and Fraser (1999) to unmask the commercial banks when they attribute compensations to link executives to the performances. Chen and Hung (2006) also use this variable.

LN (Short Term Compensation) is the LN (salary+bonus). Salary and the bonus are considered short-term remunerations, and they are usually received in money. I use this variable like Stathopoulos et. al (2004) and Chen and Hung (2006).

Finally I also use LN (Option Ratio). I define option ratio as a percentage of options received by the executive relative to total compensation. This variable is also used by Chen and Hung (2006).

Each one of these dependent variables will be confronted separately against a group of independent financial and governance variables with the intention of finding, in a more trustworthy way, possible differences of compensation between new versus old economy executives.

The model is:

$$\begin{aligned} \text{LN(Compensation)} = & \beta_0 + \beta_1 * \text{New Economy} + \beta_2 * \text{Firm Size Component} + \\ & + \beta_3 * (\text{New Economy} * \text{Firm Size Component}) + \beta_4 * \text{LN(Not Exercised Ratio)} + \\ & + \beta_5 * (\text{New Economy} * \text{LN(Not Exercised Ratio)}) + \beta_6 * \text{LN(Number MITGS)} + \\ & + \beta_7 * (\text{New Economy} * \text{LN(Number MITGS)}) + \beta_8 * \text{LN(Tenure)} + \\ & + \beta_9 * (\text{New Economy} * \text{LN(Tenure)}) + \beta_{10} * \text{LN(Ownership)} + \\ & + \beta_{11} * (\text{New Economy} * \text{LN(Ownership)}) + \beta_{12} * \text{Growth 5Y} + \\ & + \beta_{13} * (\text{New Economy} * \text{Growth 5Y}) + \beta_{14} * \text{LN(BS Volatility)} + \\ & + \beta_{15} * (\text{New Economy} * \text{LN(BS Volatility)}) + \beta_{16} * \text{CEO} + \\ & + \beta_{17...28} * \text{Years Dummy (1993...2004)} + f + \epsilon \end{aligned}$$

The dependent variable LN (Compensation) can assume the values of LN (Total Compensation), LN (Option Ratio) and LN (Short Term Compensation) and f is the fixed effect.

4.3. Measurement of independent variables

I use two sets of independent variables, financial and governance, as described below.

Financial Variables

Generally, the firm size in executive compensation literature is used as one of the following variables: LN (Mktval), that is the natural logarithm of the market value of the firm, defined as the closing price for the fiscal year multiplied by the common shares outstanding (Datta et al., 2005); LN (Sales) is the natural logarithm of net annual sales as reported by the firm, and this proxy is used by many, including Elston and Goldberg (2003) and Aggarwal and Samwick (2003); and the LN (Assets) that is the natural logarithm of the total assets as reported by the firm, and this proxy is used by many including Anderson and Bizjack (2003) and Grinstein and Hribar (2004). One of the problems in all these studies is that the researchers use one of these variables at the expense of other variables. They expect to receive better results by using one variable and ignoring the others, but there is no sound reason for ignoring one variable and selecting another.

Because these variables are highly correlated, and can not be introduced at the same time to explain executive compensation, I use Principal Component Analysis to extract a factor that contains optimal information from the three variables. Consequently, I offer a solution to this old problem of using size variable in executive compensation literature.

Table 1 describes the statistics of Principal Component Analysis. The Principal Component Analysis methodology can be described, in this case, as:

$$y_1 = a_{11} \text{LN(Sales)} + a_{12} \text{LN(Assets)} + a_{13} \text{LN(Mktval)}$$

$$(1) \quad y_2 = a_{21} \text{LN(Sales)} + a_{22} \text{LN(Assets)} + a_{23} \text{LN(Mktval)} \quad (2)$$

$$\dots\dots\dots$$

$$y_p = a_{p1} \text{LN(Sales)} + a_{p2} \text{LN(Assets)} + a_{p3} \text{LN(Mktval)}$$

Where y_1, y_2, y_p are factors and

$$\sum_{i=1}^P a_{ij} = 1$$

⁵ A Long Term Incentive Plan (LTIP) is any plan that provides compensation that is intended to serve as an incentive for performance and that occurs over a period longer than one year but not including restricted stock, stock option or stock appreciation rights plans.

Table 1. Statistic from Principal Component Analysis

Panel A: Correlation Matrix (a)

		LN(Assets)	LN(Sales)	LN(Mktval)
Correlation	LN(Assets)	1	0.92	0.83
	LN(Sales)	0.92	1	0.75
	LN(Mktval)	0.83	0.75	1

Panel B: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.67	88.98	88.98	2.67	88.98	88.98
2	.266	8.878	97.860			
3	0.064	2.140	100.000			

To apply the Principal Components analysis it is necessary to have a high correlation among the variables. I use the Kaiser-Meyer-Olkin (KMO) test that compares the correlation between the variables. I find in table 1 that the variables are indeed highly correlated. I find only one factor with Initial Total Eigenvalues superior to 1 that explains 88.98% of the total variance. The vector is:

$$Y_1 = a_{11} \text{LN(Sales)} + a_{12} \text{LN(Assets)} + a_{13} \text{LN(Mktval)}$$

or

$$\text{Firm Size Component} = 0.975 * \text{LN(Assets)} + 0.945 * \text{LN(Sales)} + 0.909 * \text{LN(Mktval)}$$

I will use the Firm Size Component to test the impact of firm size on total compensation, option ratio, and short term compensation of new and old economy firms. Much of literature on executive compensation shows an expectation that firm size will be one of the most important factors to explain variations in executive compensation. It makes sense because bigger companies can generally pay more to executives than the smaller companies. Thus, I expect a positive relationship between size and all the dependent variables.

I also use the variable LN(Not Exercised Ratio), which is the natural logarithm of the number of vested but unexercised options that the executive held at year end divided by the aggregate number of stock options/stock appreciation rights granted. I expect that the number of options vested but not exercised has a negative relationship with total compensation and options ratio, meaning that if the executive has stock options that are not exercised, the firm will probably give fewer stock options in the future. I expect that effect will be more pronounced in new economy firms because many researchers such as Anderson et al. (2000), Ittner et al. (2003), Murphy (2003) and Stathopoulos et al. (2004) show that new economy firms grant more stock options to the executives.

To analyze the relationship between the risk and executive compensation, I use the variable LN (Bs Vlatility), which is the natural logarithm of the standard deviation calculated over 60 months with

Black and Scholes' methodology. Chen (2004) and Palia (2001) also use the same variable but without the natural logarithm. I expect a negative relationship between firm risk and short term compensation because if the volatility is higher, the firm can reward the executives with stock options (and not salary +bonus) as the option value increases with stock return volatility.

I also use the variable LN (Ownership), which is the natural logarithm of the percentage of the company's shares owned by the named executive officer. Morck et al. (1988) separates the impact of ownership variable on executive compensation into convergence and entrenchment effects with divergent implications. When the interests are convergent, the executive stock ownership aligns the interest of the executives with the shareholders, and consequently it is not necessary to give more incentives to executives to increase firm performances. In cases where entrenchment exists (Jensen and Meckling, 1976), executives' and shareholders' objectives are different, and executives can extract high compensation based on even low firm performance. This way, I can see that the level of entrenchment increases when executive ownership also increases. Core et al. (1999), Barron and Waddell (2003), Chen (2004), among others, also use this variable to analyze the impact of ownership on executive compensation. Similar to previous research findings, I expect that the percentage of the company shares owned by the executive will have a negative relationship with the executive compensation. According to Chen and Hung (2006), higher ownership indicates that managers' interests are more aligned with shareholders. This is also true because if the executives have ownership in the firm, they are already more involved and concerned about improving the firm's stock price, and therefore it is not necessary to increase the incentives to reduce agency costs.

To measure the impact of the firm growth on executive compensation, I use the variable Growthy 5Y, which is the 5-years least square annual growth sales rate.

I expect a positive relationship between the sales growth of the firm and dependent variables, meaning that if firm sales grow executives will ask for more money.

I use New Economy dummy that is equal to 1 when company is from new economy and zero when is from old economy. The variable CEO is also a dummy that is equal to 1 when executive is a CEO and 0 when not. I expect a positive relationship between CEO dummy and all the dependent variables meaning that CEO receives more than other executives.

To control for the effect of time, I use one dummy variable for each year between 1993 and 2004, just like Barron and Waddel (2003) and Grinstein and Hribar (2004). I expect that the dummy variable will be significant in explaining executive compensation, particularly in the bubble period of 1998 to 2000.

Governance Variables

LN (Tenure) is the natural logarithm of the number of years that the executive has been on the job, for example, in the capacity of the CEO. A significant number of researchers such as Chindambaran and Prabhala (2003), Ryan Jr and Wiggins III (2004), Murphy (1986), Barro and Barro (1990), Hallock (1997) and Chen (2004) use this variable with or without the natural logarithm to explain executive compensation. I expect a positive relationship between executive compensation and tenure because I observe that more experienced executives command higher compensation in the real world.

The influence of the board and the composition of the Compensation Committee on the executive compensation is one of the most recent fields of research in the area of executive compensation. Ryan Jr and Wiggins III (2004) find that the CEO compensation is related to the power and the influence that the CEO has on the board. They also find evidence that firms with external directors in the board pay more compensation based on stock options and restricted stocks. Anderson and Bizjak (2003) analyze whether board independence promotes the shareholders' interests and if the presence of the CEO in the Compensation Committee is related to opportunist behavior. They do not find evidence that when the executive leaves the compensation committee, the remuneration decreases.

To analyze the relationship between board members and executive compensation, I use the variable LN (Number Mtgs) similar to Davidson III et al. (1998), which is the natural logarithm of the number of board meetings held during the indicated fiscal year. According the authors, board members are more aligned with shareholders' interests when they have more meetings during the year. Because of that I expect a negative relationship between the number of meetings and executive compensation.

5. Results

5.1. Univariate tests

Table 2 presents the number of observations (compensation items) for each SIC code of new and old economy firms. For example, there are 123 compensation items from Computer and Office Equipment industry, which represent 0.77% of the total compensation items in that industry (% of the group) and 0.18% of the total sample of observations from old and new economy firms. Our sample has nearly 76% observations from old economy and 24% observations from the new economy firms. Moreover, I can see from table 2 that our sample observations are dominated by executives associated with companies from Pre-Packaged Software, Semiconductor, Related Devices and Telecommunications industries.

In Table 3, I present the results of our first hypothesis, whether or not the average executive compensation is the same for executives in new economy versus old economy firms. I also show the t-test of independence of means of executive compensation for new versus old economy firms during the period from 1992 to 2004.

Table 2. Number of items of compensation by SIC Code

SIC Code	SIC Code Description	Number of items of compensation	% of the group	% of total (old+ New economy)
PANEL A: New Economy				
3570	Computer and Office Equipment	123	0.77%	0.18%
3571	Electronic Computers	590	3.68%	0.87%
3572	Computer Storage Devices	595	3.71%	0.88%
3576	Computer Communication Equipment	981	6.12%	1.45%
3577	Computer Peripheral Equipment	412	2.57%	0.61%
3661	Telephone & Telegraph Apparatus	972	6.07%	1.44%
3674	Semiconductor and Related Devices	2770	17.29%	4.11%
4812	Wireless Telecommunication	423	2.64%	0.63%
4813	Telecommunication	1201	7.50%	1.78%
5045	Computers and Software Wholesalers	288	1.80%	0.43%
5961	Electronic Mail-Order Houses	562	3.51%	0.83%
7370	Computer Programming, Data Processing	1515	9.46%	2.25%
7371	Computer Programming Service	182	1.14%	0.27%
7372	Prepackaged Software	4168	26.02%	6.18%
7373	Computer Integrated Systems Design	1238	7.73%	1.84%
	Total New Economy	16020		
PANEL B: Old Economy				
< 4000 and not new economy		51417		76.24%
Total New+Old Economy		67437		

Notes: To distinguish between executives from new and old economy firms, I used the methodology of Murphy (2003) that considers firms from new economy those with SIC code 3570, 3571, 3572, 3576, 3577, 3661, 3674, 4812, 4813, 5045, 5961, 7370, 7371, 7372 e 7373 and firms from old economy those with SIC code less than 4000 and not yet categorized with new economy.

Table 3. Mean total executive compensation levels for new and old economy firms (1992-2004)

	New Economy		Old Economy		T test of mean		
	N	Mean	N	Mean	Mean Difference	t	Sig.
1992	485	1477.41	2412	1260.39	217.02	2.134	0.033
1993	887	1399.42	3778	1183.84	215.58	3.177	0.002
1994	958	1668.20	4058	1302.55	365.65	4.640	0.000
1995	1026	828.22	4166	1306.67	521.56	4.529	0.000
1996	1226	2339.72	4319	1542.72	797.01	5.414	0.000
1997	1398	2721.97	4335	1815.28	906.67	5.558	0.000
1998	1495	3438.06	4419	2805.12	1641.51	2.664	0.008
1999	1577	4996.27	4301	2145.37	2850.90	7.368	0.000
2000	1507	6660.90	4091	2570.57	4090.85	9.109	0.000
2001	1417	5159.96	3880	2438.90	2721.07	6.032	0.000
2002	1366	3114.48	3942	2165.15	949.34	5.283	0.000
2003	1373	2346.03	3926	2033.53	312.50	2.863	0.000
2004	1305	2618.61	3790	2420.20	208.42	1.384	0.166

Table 4. Executive components as a percentage of total compensation in new and old economy firms (1992-2004)**PANEL A: CEO's**

Year	N		Salary		Bonus		Stock Options		Restricted Stocks		LTIP	
	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old
1992	27	170	37.51%	39.02%	25.00%	19.30%**	23.70%	26.28%	2.84%	4.30%	6.20%	6.02%
1993	118	537	35.50%	43.12%*	19.84%	19.80%	37.65%	22.60%*	1.10%	4.80%*	2.18%	3.47%
1994	161	701	32.55%	41.02%*	19.25%	20.91%	40.58%	26.22%*	1.80%	4.25%*	1.39%	2.77%**
1995	167	732	33.31%	40.92%*	18.87%	21.22%	39.46%	26.22%*	1.41%	4.25%*	2.48%	3.32%
1996	175	745	31.12%	37.32%*	17.01%	20.28%**	42.22%	24.65%*	3.81%	4.09%	1.52%	3.77%*
1997	201	751	30.19%	33.96%***	16.30%	20.74%*	45.67%	29.03%*	1.93%	4.36%*	1.22%	4.46%*
1998	220	761	30.23%	34.52%**	13.72%	18.50%*	49.28%	31.07%*	1.32%	4.36%*	0.76%	3.23%*
1999	278	765	28.14%	31.81%***	12.56%	18.96%*	52.87%	34.42%*	1.50%	3.77%*	0.94%	3.15%*
2000	270	757	28.09%	31.96%***	13.09%	18.56%*	53.54%	36.84%*	1.28%	4.64%*	0.39%	2.77%*
2001	249	703	25.59%	32.76%*	8.69%(*)	14.51%*/(*)	57.80%	36.37%*/(*)	2.44%(*)	4.70%*	0.64%	2.07%*
2002	237	700	28.11%	30.99%	10.02%	17.78%*	54.95%	40.48%*	2.07%	6.06%*	0.42%	2.89%*
2003	239	701	30.14%	31.83%	15.70%*	18.44%*	44.98%*	35.57%*/(*)	5.21%(*)	7.85%*/(*)	0.29%*	3.98%*/(**)
2004	239	711	27.34%	28.03%	14.71%	22.73%**	46.83%	32.77%*	7.19%	11.07%*	0.43%	3.73%*

PANEL B: DIRECTORS

Year	N		Salary		Bonus		Stock Options		Restricted Stocks		LTIP	
	New	Old	New	Old	New	Old	New	Old	New	Old	New	Old
1992	206	1121	42.29%	46.38%**	19.77%	18.49%	29.91%	22.28%***	1.90%	3.76%***	2.88%	3.65%
1993	325	1584	41.24%	45.71%***	18.96%	19.17%	33.49%	22.06%***	1.40%	3.84%***	1.72%	3.08%***
1994	331	1594	37.47%	42.73%***	19.40%	21.03%***	35.56%	24.87%***	2.06%	3.46%***	1.55%	2.84%***
1995	349	1593	35.39%	42.86%***	19.45%	20.77%	36.32%	22.71%***	1.71%	3.95%***	2.51%	3.45%*
1996	418	1606	34.18%	39.12%***	15.90%	20.03%*	41.76%	27.81%***	2.77%	3.93%***	1.24%	3.59%***
1997	465	1618	32.58%	36.56%***	15.54%	20.57%*	43.88%	29.62%***	2.08%	3.97%***	1.20%	3.94%***
1998	478	1611	34.72%	36.54%	13.81%	18.08%*	44.17%	32.76%***	1.39%	4.03%***	0.69%	3.09%***
1999	483	1492	30.09%	34.04%***	13.10%	19.24%*	49.50%	34.36%***	1.82%	3.65%***	0.99%	2.85%***
2000	464	1362	27.97%	33.59%***	11.70%	18.83%*	53.81%	34.42%***	1.69%	4.64%***	0.43%	2.52%***
2001	416	1229	28.07%	34.75%***	8.52%***	1.39%***/**	56.32%	37.72%***/**	2.04%***	4.11%***/**	0.56%***	1.99%***/**
2002	373	1180	29.70%	32.85%***	10.32%	18.32%***	52.67%	34.88%***	1.76%	5.60%***	0.58%	2.55%***
2003	354	1144	32.15%	32.93%	15.24%***	19.51%***/**	43.27%***	31.10%***/**	4.31%***	7.15%***/**	0.30%***	3.30%***/**
2004	343	1065	29.74%	28.92%	15.62%	22.86%***	43.75%	28.49%*	6.66%	10.31%***	0.71%	3.61%***

Note 1: Difference between old and new economy is statistically significant at 1% level ***, 5% level ** and 10% level *. In rows for years 2001 and 2003 I also describe if the differences between each component of compensation between years 2001 and 2000 (before and after Nasdaq crash) and 2003 related to 2002 (before and after Sarbanes-Oxley Act) are statistically significant. Significance is presented as ().

Table 3 shows, with the exception of the year 1993, that the total average compensation of executives from both new and old economy firms increases from 1992 to 2000 (NASDAQ crash), decreases until 2003, and starts to increase again, but slowly, in 2004. I can also verify that the difference in mean total compensation between the two groups of executives is high in the years 1999 and 2000 but reduces drastically after 2002 (Sarbanes Oxley Act), and it is small in 2004, closer to 1992 values.

In Table 4, I test hypothesis 2, if the composition of executive compensation is the same for new versus old economy executives. The table summarizes the evolution of the compensation components (as a percentage of total compensation) for new versus old economy firms from 1992 to 2004. I use the Independent-Samples T-test to compare the means of executive compensation components and Levene's test

for equality of variances between the two sub-samples of old versus new economy firms.

In table 4, I also test hypothesis 3, whether or not the NASDAQ crash and the Sarbanes Oxley Act changed the executive compensation composition. I perform the same tests, as described above, to compare if the difference between the values of each component of compensation in the years 2001 to 2000 (before and after the NASDAQ crash) and years 2003 to 2002 (before and after the Sarbanes-Oxley act) is statistically significant.

We see from the examination of the compensation for CEO and Directors that beginning in 1992, salary is the most important component of compensation in both new and old economy firms. In the case of new economy firms, however, after 1993 stock options become the most important compensation component for CEOs.

This finding is compatible with the previous studies, including Anderson et. al (2000), Murphy (2003), Ittner et al. (2003) and Stathopoulos et al. (2004). But our results also document something new: it is not only in new economy firms that stock options represent the largest part of compensation for CEOs. After 1998, stock options are also the most important compensation component in old economy firms but in a smaller percentage. The difference between the first (stock options) and second (salary) most important compensation components, is higher in new economy firms. More importantly, I find that despite the scandals of firm bankruptcies attributed to performance based options grants, stock options continues to be the most important component compensation for CEOs until 2004 for both the new economy and the old economy firms.

In the case of Directors, salary is the most important compensation component in 1992 for new as well as old economy firms. After 1995, stock options become the most important compensation components in new economy firms and continue to be the largest compensation item until the end of our study (2004). In the case of old economy firms, the situation is different. Salary is the most important component from 1992 to 1999 and again in 2003. In the year 2004, the compensation weights of salary and stock options are practically the same for Directors of old economy firms.

In hypothesis 3, I test if the *NASDAQ* crash and the Sarbanes Oxley Act change the executive compensation composition. Rows for the years 2001 and 2003 in table 4 represent if the change between the values of each component of compensation in the years 2001 to 2000 (before and after the *NASDAQ* crash) and the years 2003 to 2002 (before and after the Sarbanes-Oxley act) is statistically significant. In the case of the CEOs, the changes are statistically significant for bonus and stock options. In the case of the Sarbanes Oxley Act impact, I find statistically significant changes in stock options, restricted stocks, and long term incentive plans for old economy firms. In the case of Directors, the changes related to the *NASDAQ* crash are statistically significant for bonus, stock options, restricted stocks, and long term incentive plans in old economy firms.

From table 4, I see that stock options for CEO and Directors continues to be the most important compensation component in new and old economy firms, but in most cases the options weight (percentage of the total compensation) decreases after the *NASDAQ* crash. However, restricted stock, and in some cases bonus, increases in years 2003 and 2004. In our view, the change from stock options to restricted stock may be due to the fact that both are compensation components associated with the performance of a firm, whereas salary is not dependent upon performance. More precisely, when a firm grants stock options to the executives, these options can be cashed in only after a significant number of years (generally 3 to 10 years) and only if

the market price is higher than the exercise price. Thus, executives have an incentive to manipulate the firm accounting data to influence the stock price and to refrain from sending less positive information to the market about the future performances of the firm (Povel et al., 2007; Yermack, 1997 and Hu and Noe, 2001).

The main goal of the introduction of the Sarbanes-Oxley Act, as described earlier, was essentially to reduce the manipulative acts and fraudulent cases. Restricted stocks can be a safer compensation component than stock options because executives effectively receive stocks and not the possibility of buying stock in the future. And this way they assume the daily loss or gain if the stock price decreases or increases. Like restricted stocks, bonus is also a comparatively safe component of executive compensation though not totally free from possible manipulation of data by executives. On the other hand, salary is not a compensation component related to firm performance. In other words, if the firm pays more salary, this does not imply that executives will increase their efforts, to have better performances, as compared with options as incentive.

5.2 Multivariate tests

Hypothesis 4 tests whether the factors that explain executive compensation are the same or not for new and old economy firms. I first test for correlations among independent variables, as discussed above, and find that values are relatively low. This way, I don't have multicollinearity problems with independent variables. Tables 5, 6 and 7 present the results of LSDV (least squares dummy variables) regressions.⁶

The regression uses three separate dependent variables: LN (Total compensation), LN(Option ratio), and LN(Short term compensation). Each of the dependent variables is potentially explained by various independent variables as discussed earlier. I use unbalanced panel data because some executives do not necessarily stay with the same firm throughout our sample period. Standard errors are corrected using period Seemingly Unrelated Regression (SUR) Panel Corrected Standard Errors (PCSE) which corrects for both period heteroskedasticity and general correlation of observations within a given cross section (Beck and Katz, 1995).

⁶ Because we are working with unbalanced panel data and also not all the variables have information for all the executives when we run the regression analyse, the number of observation reduce to 4290.

Table 5. Fixed Effect Regression: Least Square Dummy Variables - LN (Total Compensation)

INDEPENDENT VARIABLES	LN(TOTAL COMPENSATION)	(T-STATISTIC)
Constant	5.600***	6.546
New Economy	-0.842	-0.717
Firm Size	0.209***	22.944
New Economy * Firm Size Component	0.053***	3.776
LN (Not Exercised Ratio)	-0.249***	-26.435
New Economy * LN (Not Exercised Ratio)	-0.071***	-4.201
LN (Number MTGS)	-0.037	-1.013
New Economy * LN (Number MTGS)	-0.018	-0.287
LN (Tenure)	-0.618*	-1.779
New Economy *LN (Tenure)	0.051	0.116
LN (Ownership)	0.038**	2.183
New Economy *LN (Ownership)	-0.065**	-2.062
Growth 5Y	0.000	-0.005
New Economy *Growth5Y	0.001	1.351
LN (BS Volatility)	0.148**	2.374
New Economy *LN (BS Volatility)	0.240**	2.139
CEO	0.128***	5.221
Year 1993	-0.027	-0.583
Year 1994	0.092*	1.874
Year 1995	-0.001	-0.020
Year 1996	0.128**	2.504
Year 1997	0.171***	3.296
Year 1998	0.200***	3.742
Year 1999	0.226***	4.062
Year 2000	0.343***	5.754
Year 2001	0.331***	5.543
Year 2002	0.366***	6.094
Year 2003	0.269***	4.361
Year 2004	0.465***	6.546
N° of observations		4290
Adjusted R-Sq		83.25%

*** Significant at 1% level, ** significant at 5% level * significant at 10%

Note 1: Standard errors are corrected using period Seemingly Unrelated Regression (SUR) Panel Corrected Standard Errors (PCSE): correction for both period heteroskedasticity and general correlation of observations within a given cross section (Beck and Katz, 1995)

Table 6. Fixed Effect Regression: Least Square Dummy Variables – LN (Option Ratio)

INDEPENDENT VARIABLES	LN(OPTION RATIO)	(T-STATISTIC)
Constant	-0.952	-0.929
New Economy	0.306	0.229
Firm Size Component	0.080***	8.225
New Economy * Firm Size Component	-0.012	-0.797
LN (Not Exercised Ratio)	-0.320***	-31.499

Table 6 continued

New Economy * LN (Not Exercised Ratio)	0.077***	4.345
LN (Number MTGS)	-0.117***	-3.062
New Economy * LN (Number MTGS)	0.143**	2.134
LN (Tenure)	-0.375	-0.905
New Economy *LN (Tenure)	-0.100	-0.201
LN (Ownership)	-0.060***	-3.300
New Economy *LN (Ownership)	0.010	0.303
Growth 5Y	0.001	1.583
New Economy *Grwoth5Y	-0.001	-1.347
LN (BS Volatility)	0.300***	4.573
New Economy *LN (BS Volatility)	-0.074	-0.632
CEO	0.107***	4.195
Year 1993	0.049	0.928
Year 1994	0.103*	1.827
Year 1995	-0.020	-0.348
Year 1996	0.162***	3.027
Year 1997	0.146***	2.598
Year 1998	0.177***	3.146
Year 1999	0.143**	2.433
Year 2000	0.122*	1.956
Year 2001	0.214***	3.321
Year 2002	0.179**	2.786
Year 2003	0.108*	1.647
Year 2004	0.151*	2.238
N° of observations		4290
Adjusted R-Sq		70.44%

*** Significant at 1% level, ** significant at 5% level * significant at 10%

Table 7. Fixed Effect Regression: Least Square Dummy Variables – LN(Short Term Compensation)

INDEPENDENT VARIABLES	LN(SHORT TERM COMPENSATION)	(T-STATISTIC)
Contant	6.750***	6.0816
New Economy	-3.352**	-2.4523
Firm Size Component	0.124***	12.5570
New Economy * Firm Size Component	-0.022	-1.4980
LN (Not Exercised Ratio)	-0.031***	-3.3200
New Economy * LN (Not Exercised Ratio)	0.036**	2.2228
LN (Number MTGS)	-0.062*	-1.7712
New Economy * LN (Number MTGS)	-0.005**	-0.0786
LN (Tenure)	-0.809**	-1.8033
New Economy *LN (Tenure)	1.031	2.0223
LN (Ownership)	0.030	1.7548
New Economy *LN (Ownership)	-0.025	-0.8204
Growth5Y	-0.001	-0.8117
New Economy *Growth5Y	0.001	1.5037
LN (BS Volatility)	-0.019	-0.2873

Table 7 continued

New Economy *LN (BS Volatility)	-0.416***	-3.6750
CEO	0.179***	7.6436
Year 1993	-0.088*	-1.8205
Year 1994	-0.071	-1.4201
Year 1995	-0.113**	-2.2220
Year 1996	-0.104*	-1.9541
Year 1997	-0.089	-1.6145
Year 1998	-0.098*	-1.7426
Year 1999	-0.082	-1.3931
Year 2000	-0.075	-1.1967
Year 2001	-0.177***	-2.6812
Year 2002	-0.032	-0.4904
Year 2003	-0.037	-0.5356
Year 2004	0.076	1.0848

N° of observations	4290
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Adjusted R-Sq	73.89%
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*** Significant at 1% level, ** significant at 5% level * significant at 10%

Our results reveal that there are significant differences in terms of factors explaining executive compensation in new versus old economy subsamples, and generally these differences are statistically significant.

The dummy New Economy is not statistically significant in the case of total compensation and option ratio, but is negative and statistically significant related with short terms compensation, meaning that old economy pay more in cash than new economy firms. The results are congruent with the findings of Muphy (2003) among others who argue that new economy firms pay their executives more with stock options.

As expected, the firm's size has a positive and statistically significant relationship with total executive compensation, option ratio and short term compensation, meaning that when firm size grows executive compensation also grows. From the interaction of the variable new economy with firm size component I only find a positive relationship in the case of total compensation. Option ratio and short term compensation are not statistically significant. The results suggest that as the firm size increases, new economy executives receive more compensation than executives from the old economy firms. Stathopoulos et al. (2004) only find a positive and statistically significant relationship between firm size and total compensation in the case of Other Executive and not for CEOs.

The number of vested stock options that executives have, but not exercised, affects, in negative terms, the total compensation, options ratio and short term executive compensation and this relationship is statistically significant. From the interaction of this variable with New Economy dummy I can also conclude that the relationship is negative and

statistically significant in the case of total compensation and short terms compensation and positive in the case of option ratio.

The number of board meetings is negative and statistically significant only in the case of option ratio and short term compensation. The results are congruent with the findings of Ryan and Wiggins III (2001) and Chen and Hung (2006), who believe that more monitoring power can reduce the need to provide executives with incentive compensation. Davidson et al. (1998) also defend that when board meetings increase, board members are more aligned with shareholders' interests when they have more meetings during the year, and therefore the CEOs' compensation is more controlled. From the interaction of new economy dummy with all the dependent variables only total compensation is not statistically significant. In the case of the interaction of this dummy with option ration I find a positive, and not negative relationship meaning that when the number of board meeting increases the number of stock options that executives receives also increase.

The number of years has CEO (Tenure) as negative and statistically significant relationship with total compensation and short term compensation, meaning that experienced executives probably receive compensation in forms other than cash. In the case of new economy firms this relationship is not statistically significant. When I include the dummy variable new economy with the dependent variables I only find a positive and statistically significant relationship with option ratio, meaning that more experienced CEOs of new economy receive more option than old economy CEOs. The firm size also influences the number of options granted to the executives in new and old economy firms, but the relationship is stronger in new economy firms.

The results are congruent with the findings of Ittner et al. (2003), Murphy (2003), Stathopoulos et al. (2004) and Anderson et al. (2000) that new economy firms grant more stock options to executives.

Contrary to our expectations, and the results of Chen and Hung (2006), I find that executive firm stock ownership has a positive influence on the total compensation. There is a negative association between executive ownership and the number of options that executives receive. From the interaction of new economy dummy with executive ownership I find a negative relationship with total compensation. The results, in the case of new economy firms are in line with Chen and Hung (2006). Executive ownership doesn't affect cash compensation.

I do not find a statistically significant relationship between firm 5 years sales growth and total compensation, option ratio or cash compensation.

Stock return volatility has positive influence on total executive compensation and this relationship is more pronounced in new economy firms. In the case of option ratio the relationship is also positive and statically significant, but not in the case of new economy firms. These results mean that if the volatility increases, firms will reward their executives with more stock. In the case of cash compensation the relationship is negative and statistically significant only for new economy firms meaning that more volatility will imply less cash compensation in new economy firms.

As expected, the relationship between CEO dummy and total compensation, option ratio and short term compensation is positive and statistically significant in all the cases meaning that CEOs are better paid than other executives. The results are in line with literature that describes CEO as receiving more than other top executives.

Finally, in most the cases, I find that time influences executive compensation.

6. Summary and conclusion

Comparative analysis of executive compensation in new and old economy firms is practically not yet investigated in the US market whereas there is rich evidence from researchers such as Ittner et al. (2003), Murphy (2003) and Stathopoulos et al. (2004) that new economy firms are different from old economy companies. Based on these differences, I analyzed the following research questions: (1) Is executive compensation in old versus new economy firms the same? (2) Is the composition of executive compensation in old versus new economy firms the same? (3) Did the compensation composition change after the NASDAQ Crash and the Sarbanes Oxley Act? (4) Are the factors that explain executive compensation in old versus new economy firms similar?

Our results show that, on average, executives from new economy firms receive more total compensation than executives from old economy firms, and these differences are statistically significant with the exception of year 2004. This gap is congruent with the findings of Stathopoulos et al. (2004). I also add the information that the gap is higher in 1999 and 2000 (boom period), and then it starts reducing significantly until 2004. This way I reject the null hypotheses that total executive compensation in new and old economy firms is the same.

In the second research question, I analyze if the composition of executive compensation in old versus new economy firms is the same. Our results reveal that, in 1992, salary is the most important component of compensation for CEOs and Directors in new as well as old economy firms. In the case of new economy firms, after 1993 stock options become the most important compensation component for CEOs. These findings are in line with Anderson et al. (2000), Murphy (2003), Ittner et al. (2003) and Stathopoulos et al. (2004) who believe that stock option is the most important compensation component in new economy firms. I confirm their findings for a longer period of time. What is new in our results is that stock options is the most important compensation component both in new and old economy firms. The difference between the first (stock options) and the second (salary) compensation component is higher in new economy firms than the old economy firms. Based on this fact, I can reject the null hypothesis that executives from old and new economy firms have the same compensation composition structure.

Another important finding of this research is that the compensation composition is not only different between new and old economy firms but also that it changes from 1992 to 2004.

In the third research question, I analyze if the NASDAQ crash and Sarbanes Oxley Act change the executive compensation composition. Overall I find evidence that the NASDAQ crash and Sarbanes Oxley do change the executive compensation structure.

Finally, I analyzed if the factors that explain executive compensation in old versus new economy firms are similar. I find that these factors normally are different, and these differences are statistically significant.

In terms of conclusion, I can say that our study complements the investigation of Ittner et al. (2003), Murphy (2003) and Stathopoulos et al. (2004) providing an analysis of executive compensation in new and old economy firms at the same time and for a period that covers a crash (NASDAQ crash) and the implementation of new rules about corporate governance (Sarbanes Oxley Act). Our study also offers an in-depth analysis of executive compensation because I examine numerous and important compensation components (salary, bonus, stock options, restricted stocks and LTIP), whereas the

other studies essentially focus on compensation based on stock options.

The paper fills an important gap in the existing literature by providing rigorous econometric evidence that the executive compensation factors and the compensation composition factors are different, and the compensation composition changes over time for new versus old economy firms. Overall, our results are consistent with the idea that there exist different reward structures for different sectors of industry at different stages in their development.

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