Master Thesis U.S.E

Title: The perception of the pay ratio in the marketplace[1][2]

Full name: Ioannis Tzakis

Student number: 5140145

Email: i.tzakis@students.uu.nl

Supervisor: Maurizio Montone

Second reader: Gyoso Gyongyosi

Abstract

In recent years, it has been apparent that more and more investors consider nonmonetary values when constructing their portfolios. Many firms set large wage differentials between workers and managers, with the former sometimes suffering from what is known as behindness aversion. Subsequently, pro-social investors might shun these companies, since they might exhibit income inequality. However, quite low wage differentials might be unfair for the managers and they can also be viewed as low salary growth expectations by employees, insinuating that there might be an optimal wage gap. In four dependent variables employed in this survey I find that the relationship between the pay ratio and institutional ownership is a concave across US listed firms, with the optimal pay ratio being situated at the 35th percentile of the pay ratio distribution.

[1] This paper gives special thanks to my family that have supported me over the last months during my Master program. Moreover, I am really grateful to my thesis supervisor Mr. Maurizio Montone who was of great assistance, provided me with significant feedback and was available whenever I needed his guidance.

[2] Keywords: Pay ratio; Concavity; institutional ownership; optimal; year fixed effects

I. Introduction

In recent years, it has been apparent that more and more investors seem to consider nonmonetary values when building their portfolios (Hong and Kacperczyk, 2009). Pay inequality between managers and workers has received increasing attention from academics, regulators, and the media, which is the main reason why on October 17, 2015, the Securities and Exchange Commission (SEC) decided to put a new law into effect as of January 1st, 2017. According to this rule, all the US companies are required to disclose the ratio of CEO pay to the median employee wage (Dittmann, Ingolf, Montone and Zhu, 2023). Moreover, a good many scientists argue that social norms play a vital role in shaping the economic behavior of many agents. These norms, sometimes, can be more important than the profit motivation (Becker, G., 1957) and can be inferred that agents are even willing to undertake losses, so long as their choices are consistent with these specific norms. It is therefore obvious that, a value that may play an important role is how a firm treats its employees. Some firms set large wage differentials between workers and managers. As a result, workers might feel they are not valued enough by their employers and may suffer from "behindness aversion" (Card, David, Mas, Moretti and Saez, 2012). In other words, employees have a conception of how fair their wage is and they adjust their work effort accordingly (Akerlof and Yellen, 1990). This is known as the fair-wage effort hypothesis. Consequently, workers that suffer from behindness aversion will reduce their effort in their workplace, because large wage differentials make their current wage less fair to them. Subsequently, investors with pro-social preferences may shun these companies, since they exhibit income inequality (Dittmann, Ingolf, Montone and Zhu, 2023; Pan, Yihui, Pikulina, Siegel and Wang, 2022). This is the main reason why, in a good many cases, managers try to use their discretion provided by the SEC when constructing the pay ratio in order to reduce its potential negative effects (Boone, Starkweather and White, 2019).

There are plenty of reasons why we witness high income inequality within enterprises. Firstly, some managers are envious and suffer utility losses whenever workers payment increases (Bartling and von Siemens, 2010). In this case, flat-wage contracts are utilized in order to decrease managerial enviousness. Moreover, when managers are not envious, but entrenched, that is, willing to increase salaries, financial incentives through cash flow ownership may mitigate such behaviors, thereby raising the wage gap (Cronqvist et. al., 2009). In addition, pay ratio is high because of a misconception that firms that hire high-wage workers are identical with firms that pay higher salaries (Abowd, Kramarz and Margolis, 1999). Most agents focus on the former rather on the latter. However, Kramarz and Margolis point out that, sometimes wage differences are rational on the grounds that they are associated with individual person effects. Furthermore, income inequality is high especially in the USA due to a number of parties, and more specifically, compensation consultants, companies' board of directors and board compensation committee (Crystal and Graef, 1991).

In this paper, I will try to shed new light on income inequality through focusing on the USA. In particular, I will try to identify whether or not investors take into consideration the salaries of the CEO managers compared to those of the workers when constructing their portfolios. To this effect, I will employ the pay ratio, which is the difference between the CEO total payment and the average workers' total payment in each and every company of my sample, thereby signifying the wage gap in such companies. In addition, I will try to identify an optimal pay ratio, insinuating that the relationship between the dependent variables utilized in this survey and pay ratio, is not linear, but a concave.

To begin with, this article will try to assess how much and to which direction the pay ratio affects the firms in the sample. In an attempt to estimate this, I am predominantly going to focus on four variables, namely institutional ownership, stock returns, return on assets (ROA) and return on equity (ROE). I expect to find that since social norms are taken into account at a constantly increasing rate by financial markets, the effect of wage differentials in the forementioned variables will be statistically significant. However, it is yet to be determined towards which direction, on the grounds that financial markets consist of different type of investors (Hong, Harrison, and Marcin Kacperczyk, 2009) as well as due to the fact that a potential large wage gap can also be viewed favorably (Card, David, Mas, Moretti and Saez, 2012), especially in the case that that investors take into consideration the utility of employment and, as a result, the overall satisfaction of employees. Moreover, high pay ratios may be viewed favorably on the grounds that they don't harm firm productivity (Cronqvist, Henrik, Heyman, 2009). However, they might harm firm profitability, in that firms with high-wage workers are not alike with firms that pay higher wages (Abowd, Kramarz and Margolis, 1999). I find existence of concavity between the pay ratio and institutional ownership. With regard to stock returns I have indication of convexity, but it exists only in the lowest 30th percentile of the pay ratio distribution. The relationship between the pay ratio and the return on assets depended highly on the respective industry, time invariant firm characteristics and the type of the model (contemporaneous vs predictive). Finally, I find no indication that wage gap differentials affect the return on equity in any significant way.

On the grounds that each investor in financial markets might behaves differently, there are two main categories of institutional investors, namely hedge and mutual funds (Hong and Kacperczyk, 2009). It is expected that these categories react different to the pay ratio fluctuations. Institutional investors seem to have been subject to social constraints. In other words, the executive managers of institutions need to make their investing decisions based on socially responsible investing (SRI) (Hong and Kacperczyk, 2009; Hartzmark and Sussman, 2019). The Social Investment Forum estimates that about $2.34 trillion dollars in 2001 or roughly 12% of the total assets under management in that year undergo some kind of social screens (Geczy, Stambaugh, and Levin, 2003), which suggests a potentially sizeable effect of socially responsible investing on the prices of stocks. According to Hong and Kacperczyk the institutions subject to social norms are banks, pension plans, insurance companies, universities and religious organizations. These institutional investors constitute the mutual funds for the sake of this research. With regard to the rest of investors, it features the natural arbitrageurs of the financial markets, namely hedge funds. The main intuition underlying here is that the two divisions behave differently to high pay ratios. If socially constrained institutions indeed shun companies with large pay ratios, their stocks will be underpriced. Hedge funds by nature will then invest in such firms given that they are natural arbitrageurs and therefore they will neglect some social norms if the stocks of high pay ratio firms are priced cheaply in the marketplace. The measure of the investors' preferences will be institutional ownership. This variable will provide information as regards the extent to which firms with high and low wage gap differentials are owned by institutions. Moreover, and although financial markets consist of both mutual and hedge funds, I assume that institutions are predominantly pro-social investors, that is, mutual funds. I find that the relationship between the pay ratio and institutional ownership is a concave, when employing year fixed effects estimator, with the latter being increased up to a point, the optimal pay ratio, and the decreasing as wage gap keeps increasing.

The paper is organized as follows. Section I introduces the reader to the main topic. Section II refers to the main contribution of my paper to the existing literature. Section III describes the regression models employed in this paper. Section IV reports results between the pay ratio and the dependent variables. Section VI concludes.

II. Literature review

The pay ratio has been employed in a number of surveys over the last years. Therefore, this paper makes several contributions to the existing literature. In 2023, Dittman and Montone utilized the pay ratio and provided evidence that many investors in the marketplace are indeed inequality averse. In their article, they used Germany as a base country to test their hypotheses and they proved that although high pay ratios are not a drawback but a perk as regards the firms' performance, financial markets don't seem to sympathize with this fact. In fact, investors did shun high pay ratio firms, thus providing evidence that there are pro social preferences in the market and, sometimes, these preferences overrule the profit motive. Taking these non-monetary values into account, they showed that there is a mispricing, with low pay ratio companies adore a lower cost of capital as well as a higher stock price as opposed to high pay ratio firms that have higher cost of capital and a lower stock price, resulting in arbitrage opportunities. In this paper, although I am not focusing in any potential arbitrage opportunities, I tend to show that overseas institutional investors are also subject to socially responsible investing and therefore will take into account any wage differential when shaping their portfolios. Similar to Germany, USA seems to be an ideal choice for such assumptions, since, unlike Europe, from 2017, all the US firms are obliged to disclose their CEO salary and the median salary which means that there is probably increasing aversion towards income inequality. On top of that, some specific US states impose additional tax obligations for firms, when their pay ratio is above 100. One notable example of such a case is the state of Oregon (Pan et. al., 2022).

This survey also contributes to this of Hong and Kacperczyk since it is based in, more or less, same principles. Hong and Kacperczyk deep further regarding socially responsible investing and provide evidence of its importance by analyzing stocks of sin companies, which are the firms that provide vice, namely alcohol, tobacco and gaming companies. In their article, they show that investors subject to pro-social norms avoid investing in such companies and they are willing to undertake losses, so long as their investing decisions are consistent with societal principles. To this effect, they separate the institutional investors in categories based on the degree to which they are subject to such norms and they verify the degree to which social-constrained institutions choose to abstain from investing in sin companies. They find that social norms indeed play a vital role in investing decisions, that is, sin companies have higher expected returns, which is quite rational, on the grounds that they are neglected by a large number of investors. In this paper, although high pay ratio companies are not identified as sin ones, I follow the same principles, and, I assume that socially constraint institutions will be unwilling to invest in high pay ratio firms for the same reasons that they neglect the sin companies. I also expect to find that, due to limited investing in their stocks, organizations that set large wage differentials will have larger expected returns than those that have more equitable pay schemes.

In 2022, Pan and Sieger examine the reaction of the equity markets to the disclosure of the pay ratio for the very first time in 2018 in USA. Pan et. al. test their hypotheses by examining the announcement returns and they lead to the conclusion that high pay ratio firms faced negative abnormal announcement returns. Consequently, pro-social investors rebalanced their portfolios in 2018, thus moving away from firms with high pay ratios. They also point out that it is the pay ratio and not the levels of payment that drive the inequality aversion. In this paper, we also examine the significance of pay dispersion within a firm by focusing on the pay ratio. Nonetheless, Pan et. al. focus primarily on how financial markets react to the announcement of the pay ratio and how this disclosure affects the stock returns. This study, on the other hand, does not focus on announcement returns, but tries to lead to a conclusion with regard to the significance of the pay ratio in the long run rather than just upon its disclosure.

Card, David and Saez in 2012 introduce a different insight as regards the wage gap within a firm. Specifically, they examine the pay ratio from the employees' perception. Their article focuses on the effect in utility of employment when workers have information regarding the compensation of their peer workers. Their survey finds that utility of most employees is negatively affected when workers find out that their peers earn higher salaries. Nonetheless, there is a portion that experiences increase in their employment utility. This increase is driven by a different perception as regards the pay ratio. In particular, an important number of workers view the pay ratio as an opportunity rather than inequality. In fact, large wage gaps can be viewed as salary growth expectations within the firm and, subsequently, they can be considered a perk rather than a drawback. Taking this into consideration, this paper will elaborate further on this perception. To this regard, I make two assumptions. Firstly, if a portion of employees can view the pay ratio favorably and given that pro-social investors' preferences are driven by the utility of workers (Pan et. al. ,2022), then some social constrained investors might view the high pay ratio positively too. Secondly, the pay ratio increases with managerial effort (Montone et. al., 2023). Therefore, low pay ratios could have two possible explanations. The first one is that the managers do not try enough in their respective companies, and the second one that their effort is not valued enough within their firms. Subsequently, a very low pay ratio could mean that the company does not value its managers enough, thereby having high inequality combined with low pay ratios. Institutions that have embraced the socially responsible investing principles will then shun such companies, even if they have low pay ratios. This different perception of the wage gap in the survey of Card and David leads to the conclusion that the assumption in which the lower the pay ratio, the lower the inequality might be wrong after all. That is, there might be an optimal pay ratio and the relationship between returns and pay ratio is not linear, but a concave.

In 1999, Abowd, Kramarz and Margolis pointed out that there is a distinct difference between enterprises that hire high-wage employees and those which pay high salaries. Nonetheless, many agents consider these two categories alike. In their paper, they show that firms that hire high-wage employees are more productive, but not more profitable. On the other hand, companies that pay higher wages are both more productive and profitable. They also point out that it is mostly the individual person effects that explain wage differentials within the companies rather than firms' effects. That is, a wage differential seems to be reasonable so long as it can be explained by person effects, on the grounds that each and every person behaves differently in their labor. This conclusion is in compliance with the existence of concavity, given that a linear relationship disregards the individual person effects. Nevertheless, it is yet to be proved that financial markets take the person effects into account when assessing high and low pay ratio firms.

Moreover, my survey is in agreement with the article of Akerlof and Yellen in 1990, in which they demonstrate the fair wage-effort hypothesis. According to this hypothesis, workers have a conception regarding how fair their wage is and their work effort is adjusted based on this conception. Subsequently, workers proportionately withdraw effort as their actual wage falls short of their fair wage. Such behavior causes unemployment and is also consistent with observed cross- section wage differentials and unemployment patterns. In this paper, we support the forementioned hypothesis, in that the pay ratio affects the employees' conception about fair wage, and, in particular, the fair wage decreases with the pay ratio. This paper anticipates that investors with pro-social preferences have a similar perception about fair wage. However, Akerlof and Yellen mention that workers insofar consider that actual wage is less than the fair wage. The potential existence of concavity between the three dependent variables and the pay ratio, signify that institutional investors do not sympathize with this statement and consider that the fair wage is indeed attainable. Otherwise, the relationship will not be quadratic, but linear.

Moving on, this paper implicitly denotes the pay secrecy contracts that, in plenty of cases, prevail among firms, and supports free information within organizations as regards wages. Such contracts have become outlawed at an increasing rate over the last years, with the disclosure of wages being a good reason for this. More specifically, this paper contributes to this of Futrell and Jenkins in 1978, in which they show that peer pay information should be disclosed within a company, in that it can lead to higher work efficiency and better performing firms. Their empirical research proved that people increase their effort when peer wage information is disclosed, thereby leading in an increase in job satisfaction. However, given that pay disclosure has a major impact in firm performance, they point out that any potential changes in pay policy should occur with excess caution since they can put the respective company at risk.

My paper, however, is not in compliance with this of Danziger and Katz in 1997, which views pay secrecy contracts favorably. In particular, they assume that there is a social convention under which employees have to stay loyal to their employers. As a result, pay secrecy seems to be in compliance with this convention, thereby reducing labor mobility from one firm to another. However, it is reduced mobility that increases risk-shifting labor contracts, which, in turn is can shift wages up and down via offering a salary higher or lower than the marginal product of labor. Subsequently, in a world of free flow of information, risk-shifting labor contracts are not applicable, that is, sooner or later wages will vary with the marginal product of labor. In essence, they infer that it is societal norms that make pay secrecy contracts still applicable. Nonetheless, societal norms change at an increasing rate, meaning that prevailing norms a few decades ago, might be considered outmoded in the present day, insinuating that investors might not be taking this convention into account, or that it is these conventions that they try to denote, since they are not in line with the SRI.

III. Model

In this segment I will provide an insight as regards the theoretical framework of our survey and I will demonstrate all the regression models and the variables I will employ in an attempt to assess the effect of the pay ratio. The survey will be conducted in US firms given that, from 2017, it is mandatory for them to disclose the CEO pay as well as the median salary. In a nutshell, the paper will test whether or not the pay ratio, which will be calculated as the total payment of the CEO divided by the median employee total compensation in a specific firm affects 3 dependent variables, namely the stock returns (R), return on assets (ROA) and return on equity (ROE). The survey will be conducted at US listed firms. With regard to the year range, it will be from 2018 until 2023. There are three different pay ratios disclosed by the US firms. For the shake of this study, I use the total compensation of the CEO manager divided with the median payment of the rank-file employees as disclosed by the respective firms. In particular, the pay ratio that will be obtained is the following:

$$Payratio_{it} = \frac{CEO\ Total\ compensationit}{median\ employee\ total\ compensationit} \quad (1)$$

In some cases, however, the higher compensation within a firm does not belong to the CEO manager. In that case, I will use the highest salary in the respective firm. Once I have gathered the data regarding the dependent variables, they are going to be regressed against the pay ratio, firm characteristics and specific risk factors. In other words, the regression model will be the following:

$R_{it}= a_{it} + b*payratio_{it}+ c*X_{it}+ u_{it}$ (2)
$ROA_{it}= a_{it} + b*payratio_{it}+ c*X_{it}+ u_{i}$ (3)
$ROE_{it}= a_{it} + b*payratio_{it}+ c*X_{it}+ u_{i}$ (4)

The control variable X_{it} incorporates the specific risk factors as well as firm characteristics. More specifically, the rest of the explanatory variables will be the beta coefficient, dividend yield, net debt, market capitalization, total assets and working capital. Lastly, all of the dependent and independent variables will be obtained in an annual basis.

The sample will consist of US listed firms that will come from different sections. The firms will also be separated in quantiles, based on their pay ratio. The pay ratio effect will be tested in each quantile in order to observe any potential changes between each quantile as well as non-linearities. At this point, it is essential to mention that financial section behaves differently than the rest of the market (Fama and French, 1992). Consequently, regressions will be run to sub-samples. This means that regressions will take place over different industries in order to observe any significant differences. Given that financial section behaves differently compared to the other sections, I will run regressions including and excluding this section. The sub-sample will be created by means of using dummy variables for the respective sections.

Apart from the three dependent variables, my paper would like to examine whether or not investors choose to invest in high pay ratio companies. In an attempt to verify that, I am going to check the institutional ownership in the firms of the sample. The main intuition underlying here is that more and more institutional investors have embraced the principles of socially responsible investing. That being said, and considering behindness aversion a drawback for the society I expect that institutions are more careful with their investing choices and shun companies that promote income inequality.

To sum up, it is expected that high pay ratio firms exhibit lower institutional ownership. Institutional ownership will then be regressed against the pay ratio specific risk factors and a number of firms' characteristics.

$IO_{it}= a + b*payratio_{it} + c*X_{it} + u_{it}$ (5)

X_{it} is a vector of firms' characteristics and risk factors. Firm's characteristics are preferred along with risk factors, in that they implicitly incorporate new sources of risk that might be unobservable (Brennan, Chordia and Subrahmanyam, 1998).

Last but not least, this survey will try to identify an optimal pay ratio. That is, the idea that the lower the pay ratio, the better might not be true. A very low pay ratio might be unfair for the managers indicating that their effort in their respective firms is not valued enough and maybe financial markets take that into account. In addition, a high pay ratio can be viewed favorably by many investors as well as employees. In the research of Card, David and Saez a fraction of employees views a large wage gap within their firms as high salary growth expectations. Furthermore, high pay ratios are associated with higher managerial effort, with high pay ratio firms demonstrating a better performance (Dittmann, Ingolf, Montone, and Zhu, 2023) and up to a point they are justified due to different person effects (Abowd, Kramarz and Margolis, 1999). As a result, the interpretation of the pay ratio may vary across the agents in the economy. For instance, although Americans have a strong preference over lower income inequality than the already existing across the USA (Norton and Ariely, 2011), wealthy Americans, who are more likely to be equity investors, have been found to be more accepting of inequality than the rest of the population (Cohn, Alain, Jessen, Klasnja, and Smeets, 2019). All these findings maybe insinuate that the relationship between the relationship between the three dependent variables and, more specifically the stock returns might not be linear, but a concave. To this end, the following quadratic regression equations will be included in the model:

$R_{it} = a_{it} + b*payratio_{it} + c*payratio^2{}_{it} + d*X_{it} + u_{it}$ (6)
$ROA_{it} = a_{it} + b*payratio_{it} + c*payratio^2{}_{it} + d*X_{it} + u_{it}$ (7)
$ROE_{it} = a_{it} + b*payratio_{it} + c*payratio^2{}_{it} + d*X_{it} + u_{it}$ (8)
$IO_{it} = a_{it} + b*payratio_{it} + c*payratio^2{}_{it} + d*X_{it} + u_{it}$ (9)

In the above-mentioned equations, a signifies the constant, where the pay ratio is once again the CEO payment divided by the median salary of the rank-file workers in the companies of my sample. The control variables X_{it} control for risk factors and firm characteristics respectively, whereas u_{it} stands for the error term (unobserved heterogeneity). Should I set the three dependent variables as Y_i, the marginal effect for each of them will be calculated as follows:

$$\frac{\partial Yi}{\partial payratio} = b + 2c*payratio \quad (10)$$

If $b < 0$ and $c > 0$ we will have a U-shaped parabola. Nonetheless, if concavity indeed exists, I anticipate an inverse U-shaped parabola, that is, $b > 0$ and $c < 0$. Lastly, if concavity indeed takes place, I will estimate the turning point of the concave function, which signifies the optimal pay ratio. The turning point will be estimated by means of the following formula:

$$\frac{-b*payratio}{2b*payratio} \quad (11)$$

Data availability

The data for this survey will be obtained from three databases. The first one is FactSet. FactSet is a notable provider of financial data all over the world. It incorporates real-time data and analytics tools from for a number of firms all worldwide. Its services feature, price data, fundamentals, consolidated financial statements as well as important profit and valuation ratios for specific firms and industries. Lastly, the data obtained from this database are considered reliable and accurate, thereby leading to valid conclusions.

The second database is Eikon. Eikon is a well-known database developed by Refinitiv and it is used by a variety of financial analysts via providing not only real-time data, but also historical. The environment of Eikon enables analysts with many analytic tools, especially when it comes to portfolio analysis, market trends identification and, overall, complicated research. Data process is also doable since data can be obtained in excel spreadsheets. Finally, the Eikon is the database utilized more in the Utrecht University.

Regarding the last database, it is WRDS (Wharton Research Data Services). WRDS is a comprehensive database that features quite many independent databases such as Compustat, IBES and CRSP and, therefore, provides a vast variety of economic and financial data, especially for overseas companies. Stock prices, interest rates, indices and firms' financial statements over multiple time periods are accessible via WRDS. However, the forementioned databases are accessible through accounts from Utrecht University and, in the case of WRDS, University of Pennsylvania. Subsequently, I will use the version of these databases in which Utrecht University is currently subscribed to, as they are the only one available.

IV. Discussion and results

In this section I run all the forementioned regressions and I will comment on the respective results regarding the pay ratio effect in the four dependent variables, namely the institutional ownership, stock returns, ROA and ROE. All of the dependent variables are expressed in percentage points, whereas all the independent variables in units. All the results I present in this paper have been controlled for heteroskedasticity and serial correlation. During the interpretation of the coefficients, it goes without saying that all the other control variables are held constant (ceteris paribus). The regression analysis took place using STATA, and, for the shake of this survey I employed fixed effects estimator (within estimator). More specifically, my data set was high dimensional having more than 5000 firms listed in US stock exchanges. As a result, I employed the regxfe command in STATA. The models I use in all of my regressions are both contemporaneous and predictive. The predictive regression equations are utilized due to the fact that firms disclose the pay ratio in their proxy statements in an annual basis. However, the pay ratio they disclose refers to the previous fiscal year, not in the current one. Therefore, should the pay ratio affect the dependent variables that would probably be by means of one period lag. Moreover, I have estimated my results using two methods in an attempt to have a more completed picture of the pay ratio effect. In particular, I have used firm and year fixed effects as well as only year fixed effects. Any potential differences between these two methods will be discussed in this section. Finally, in order to control for extreme values, all the independent variables have been standardized, before being used in the regression models.

<u>*Linear models*</u>

In Table 1, I start using both firm and year fixed effects and I run the first regressions in which the pay ratio is regressed against the four dependent variables. In these specific regressions I have incorporated the total sample, without excluding any industries in order to take a first picture of the pay ratio effect. The effect of pay ratio is not statistically significant in any regression when using both firm and year fixed effects. The only statistically significant variables are the dividend yield and the net debt that affect the stock returns as well as the beta coefficient with the market capitalization that affect the return on assets. However, given that firms disclose the pay ratio of the previous fiscal year in their proxy statements can be considered as a reasonable reason why there is no statistical significance in the contemporaneous model.

Table 1- Firm and year fixed effects total sample (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	0.0588	0.640	0.115	-0.753
	(0.653)	(0.563)	(0.313)	(0.722)
DIVYIELD	0.184	-52.08***	-1.209	6.002
	(0.896)	(0.000)	(0.457)	(0.646)
BETA	-1.333	-2.187	-2.731***	-2.396
	(0.406)	(0.764)	(0.000)	(0.770)
NETDEBT	-2.086	-59.18**	-9.298**	-162.3
	(0.551)	(0.007)	(0.003)	(0.199)
MARKETCAP	0.0792	2.623	0.440*	4.589
	(0.321)	(0.084)	(0.016)	(0.285)
TOTALASSETS	0.276	-10.61	0.360	13.99
	(0.876)	(0.423)	(0.873)	(0.778)
WCAPITAL	-0.0857	0.0159	-0.105	-3.772
	(0.540)	(0.982)	(0.544)	(0.557)
N	3806	3804	2675	3033
R-sq	0.004	0.058	0.059	0.000
adj. R-sq	0.002	0.056	0.057	-0.002

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In the next table I use lagged independent variables in order to capture the one period lag effect. This effect becomes statistically significant only in the case of institutional ownership. More specifically, one unit change in the pay ratio results in a 0.35%

increase in institutional ownership. Although existing literature insinuates a negative effect of the pay ratio in the percentage of institutional ownership, I find no such evidence. Hong and Kacperczyk in 2009, showed lower levels of institutional ownership in sin companies, namely those that produce vice, alcohol and gaming. According to my regressions, investors do not identify high pay ratio companies as sin ones. In fact, as in Montone et.al (2023), higher pay ratios are a result of higher profitability in the respective firms, which could be an explanation as to this positive relationship between institutional ownership and pay ratio. On top of that, the marketplace consists of many different type of investors, namely hedge funds, that constitute the natural arbitrageurs of the market and the mutual funds, which trade for reasons other than the fundamentals and are thought to be more socially constrained (Hong and Kacperczyk, 2009). Therefore, the positive relationship between institutional ownership and pay ratio could be due to the fact that hedge funds might choose to invest in these companies, as opposed to mutual funds. Should the proportion of mutual funds decrease, then indeed socially constrained investors shun such companies, even if the overall institutional ownership increases. This paper, however aims to focus on the pay ratio itself and does not elaborate on the constituents of institutional ownership.

As regards the remaining three dependent variables, the effect of pay ratio is statistically insignificant. Finally, the beta coefficient, which is considered an important distress factor, affects stock returns, ROA and ROE positively with statistical significance.

<u>Table 2- Firm and year fixed effects total sample (predictive model)</u>

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	0.359***	-0.763	-0.269	-0.736
	(0.000)	(0.518)	(0.187)	(0.210)
DIVYIELDL1	-1.956	14.78	-5.561***	-28.12
	(0.101)	(0.192)	(0.000)	(0.057)
BETAL1	-0.0292	28.46**	1.265*	14.24*
	(0.971)	(0.001)	(0.010)	(0.019)
NETDEBTL1	1.049	50.23	1.350	54.79
	(0.698)	(0.091)	(0.605)	(0.166)
MARKETCAPL1	-0.0541	-6.846*	0.130	-0.298
	(0.475)	(0.013)	(0.474)	(0.773)
TOTALASSETSL1	-2.568	-39.04*	-5.160*	-44.07
	(0.109)	(0.048)	(0.033)	(0.119)
WCAPITALL1	-0.0119	-0.275	-0.0663	0.359
	(0.908)	(0.835)	(0.591)	(0.775)

N	3009	3008	2104	2400
R-sq	0.006	0.069	0.057	0.026
adj. R-sq	0.004	0.067	0.054	0.023

p-values in parentheses

In Table 3 I run the same regressions using only year fixed effects. In the contemporaneous model, the pay ratio effect remains statistically insignificant. However, in the case of institutional ownership, the pay ratio effect is almost statistically significant, with the respective p-value being 0.065. Nonetheless in the 95% confidence level, this p-value is not enough so as to conclude that the pay ratio affects institutional ownership in any significant way. For the rest of the linear regressions, I will drop the contemporaneous regression equations given their insignificance in the total sample and I will proceed only by employing predictive regression models.

Table 3- Year fixed effects total sample (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	1.179	-0.168	-0.0836	-2.032
	(0.065)	(0.866)	(0.544)	(0.557)
DIVYIELD	-10.77***	-17.22***	-1.930*	11.82
	(0.000)	(0.000)	(0.042)	(0.291)
BETA	1.693*	4.581*	-1.477***	-6.152
	(0.011)	(0.021)	(0.000)	(0.103)
NETDEBT	-6.589	-5.314	2.068	-432.6
	(0.053)	(0.376)	(0.283)	(0.340)
MARKETCAP	-0.316	0.912*	0.751***	-10.86
	(0.061)	(0.049)	(0.000)	(0.505)
TOTALASSETS	-5.484***	0.340	-4.118***	187.1
	(0.000)	(0.911)	(0.000)	(0.369)
WCAPITAL	-0.390	0.491	0.439*	-21.52
	(0.128)	(0.356)	(0.015)	(0.332)
N	3806	3804	2675	3033
R-sq	0.160	0.035	0.101	0.008
adj. R-sq	0.159	0.033	0.098	0.006

p-values in parentheses

* p<0.05, ** p<0.01, *** p<0.001

In Table 4, the pay ratio effect becomes statistically significant when using lagged variables and year fixed effects estimator. More specifically, there is a positive relationship between the pay ratio and the institutional ownership. One unit increase in the pay ratio leads to approximately 1.1 percent increase in the institutional ownership. Just like Table 1, the pay ratio seems to be either associated with profitability, which is why institutional ownership is positively affected or the increase takes place due to hedge funds investment rather than mutual funds.

On top of that, when regressed against return on assets (ROA), the pay ratio effect is also significant, with a p-value of 0.014. More specifically, one unit increase in the pay ratio results in a 0.55 percent decrease in return on assets. A possible reason for this has to do with the perception of the pay ratio. When low pay ratio firms increase the CEO compensation, an amount of money that could be used elsewhere is going to the CEO manager. On top of that, if low pay ratio firms can bear less capital, then a constraint is created, which could partly explain this negative relationship with the returns on assets.

Regarding the rest of the independent variables, I find no statistical significance, that is, the pay ratio does not affect the values of these variables even when using only year fixed effects with lagged variables.

Table 4- Year fixed effects total sample (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	1.086*	0.612	-0.547*	0.833
	(0.042)	(0.439)	(0.014)	(0.390)
DIVYIELDL1	-12.71***	-1.938	-2.627*	4.419
	(0.000)	(0.605)	(0.013)	(0.610)
BETAL1	1.615*	8.210***	-0.691*	-2.845
	(0.014)	(0.000)	(0.025)	(0.288)
NETDEBTL1	-5.928	2.876	3.522	95.88*
	(0.108)	(0.589)	(0.099)	(0.018)
MARKETCAPL1	-0.430*	0.104	0.928***	7.441**
	(0.032)	(0.673)	(0.000)	(0.003)
TOTALASSETSL1	-5.351***	-2.507	-4.665***	-53.84**
	(0.001)	(0.342)	(0.000)	(0.006)
WCAPITALL1	-0.283	1.057**	0.410*	2.386

	(1)	(2)	(3)	(4)
	(0.284)	(0.005)	(0.026)	(0.193)
N	3009	3008	2104	2400
R-sq	0.181	0.026	0.094	0.034
adj. R-sq	0.179	0.024	0.091	0.031

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In the upcoming tables I decided to run regressions again, this time though, after having excluded the financial industry, given that sometimes it behaves differently than others, since potential distress factors for other industries are not necessarily ones for the financial section (Fama and French, 1992). The results are quite similar to those depicted at Table 2. The one-period-lagged pay ratio effect is statistically significant at 95% confidence level only when regressed against institutional ownership, with the respective coefficient being almost identical to that of Table 2, namely 0.36. According to this, although there is evidence that potential distress factors affect the financial section in a different way than other industries, I find no proof that pay ratio is indeed such a factor or that it affects the financial section in any different way. With regard to the other three dependent variables, the pay ratio effect remains insignificant in the linear model, when using firm and year fixed effects.

Table 5- Firm and year fixed effects excluding financial industry (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	0.357***	-0.761	-0.244	-0.649
	(0.000)	(0.517)	(0.232)	(0.201)
DIVYIELDL1	-1.959	14.29	-5.544***	-27.95
	(0.102)	(0.208)	(0.000)	(0.060)
BETAL1	-0.000882	28.72**	1.235*	13.93*
	(0.999)	(0.001)	(0.014)	(0.023)
NETDEBTL1	1.742	56.86	1.734	54.12
	(0.515)	(0.057)	(0.498)	(0.193)
MARKETCAPL1	-0.0570	-6.518*	0.141	-0.177
	(0.477)	(0.012)	(0.442)	(0.853)
TOTALASSETSL1	-3.558	-52.72	-5.387	-34.53
	(0.115)	(0.074)	(0.110)	(0.140)

WCAPITALL1	-0.00462	-0.0182	-0.0584	0.288
	(0.964)	(0.989)	(0.617)	(0.822)
N	2916	2919	2037	2324
R-sq	0.007	0.070	0.056	0.026
adj. R-sq	0.004	0.068	0.053	0.023

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Even when using the second estimation method, the results remain quite similar with those presented at Table 5. The pay ratio coefficients as well as their respective p-values are quite similar with the first estimation method. Therefore, there is some extra evidence that excluding the financial section does not cause any changes in the regressions' outcome. Subsequently, the pay ratio either does not seem to be a distress factor, or even if it is it affects all the sections in a similar way. As expected, at least, based on the previous regressions, institutional ownership increases with pay ratio and return on assets decreases, whereas stock returns and return on equity appear to remain unaffected of the pay ratio fluctuations. In the next tables I use subsamples by dividing the sample in percentiles based on the pay ratio, in order to get a better aspect regarding its relationship with institutional ownership and return on assets.

Table 6- Year fixed effects excluding financial industry (predictive model)

	(1) Institown	(2) Sreturns	(3) ROA	(4) ROE
PAYRATIOL1	1.088*	-0.607	-0.509*	0.839
	(0.042)	(0.443)	(0.023)	(0.386)
DIVYIELDL1	-12.64***	-2.204	-2.542*	5.435
	(0.000)	(0.561)	(0.015)	(0.533)
BETAL1	1.614*	8.414***	-0.660*	-2.623
	(0.016)	(0.000)	(0.033)	(0.331)
NETDEBTL1	-3.768	3.694	2.983	103.2*
	(0.313)	(0.531)	(0.193)	(0.024)
MARKETCAPL1	-0.383	0.174	0.854***	7.426**
	(0.068)	(0.503)	(0.000)	(0.005)
TOTALASSETSL1	-6.678***	-2.829	-4.158**	-57.53*
	(0.000)	(0.353)	(0.002)	(0.012)

WCAPITALL1	-0.187	1.038**	0.398*	2.757
	(0.483)	(0.008)	(0.028)	(0.165)
N	2916	2919	2037	2324
R-sq	0.183	0.028	0.084	0.034
adj. R-sq	0.181	0.025	0.081	0.031

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In tables 7 to 10, I have divided the firms of my sample into percentiles based on their pay ratios. The percentiles that have been created are the highest 30^{th} percentile as well as the lowest 30th percentile of the pay ratio distribution respectively. This creation of percentiles was based on dummy variables in order to divide the sample in subsamples.

In Table 7, I use the firms whose pay ratios belong to the highest 30th percentile, via using firm and year fixed effects. The pay ratio effect remains statistically insignificant in the linear regression model. Positive relationship between the pay ratio and the institutional ownership and negative relationship with the rest of the dependent variables. Nonetheless, there is hardly any evidence that the pay ratio coefficients are statistically different from zero. One possible explanation is that the pay ratio effect becomes insignificant when risk factors and firm characteristics are included in the model. Beta as well as dividend yield are to major components in determining returns and they are statistically significant in almost each regression. Market capitalization is another significant determinant of returns, and though it might be considered a firm feature, it incorporates additional sources of risk.

In Table 8, there is some statistical significance again. Institutional ownership increases approximately 2% for every unit increase in the pay ratio. Again, there is evidence that the pay ratio is viewed favourably in the financial markets (Card et. al, 2012). Nonetheless, there are plenty of reasons why this is happening. Higher pay ratios could mean higher profits, hedge funds could cause this increase or maybe investors take into account the utility of employment as Card and Saez pointed out in 2012. In other words, higher pay ratios could mean higher salary growth expectations and maybe institutional investors take that into consideration before making investment choices. Finaly, I am yet to add the pay ratio squared term in order to test if the rate of increase decreases as wage gap rises.

Furthermore, the negative relationship with the return on assets appears again, this time when the subsample consists of high pay ratio firms, showing that the most rational expectation is that the perception that prevails is the one in which compensation gaps are a result of excess cash, thereby indicating higher profitability. This excess cash is distributed to the CEOs instead of investment in assets, which constitute long-term investments, thereby generating this specific relationship.

Table 7- Firm and year fixed effects Top 30 (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	0.691	-3.813	-0.145	-2.850
	(0.248)	(0.377)	(0.675)	(0.212)
DIVYIELDL1	0.952	13.74	-5.619***	-40.48**
	(0.711)	(0.549)	(0.000)	(0.001)
BETAL1	1.295	34.51	0.0213	14.68
	(0.484)	(0.106)	(0.975)	(0.299)
NETDEBTL1	-1.646	47.66	4.850	88.80
	(0.605)	(0.230)	(0.073)	(0.123)
MARKETCAPL1	0.0341	-4.203*	0.275**	0.449
	(0.716)	(0.019)	(0.003)	(0.705)
TOTALASSETSL1	-1.951	-29.49	-8.094	-68.24
	(0.402)	(0.303)	(0.079)	(0.174)
WCAPITALL1	0.00262	0.399	0.0628	0.922
	(0.980)	(0.761)	(0.568)	(0.576)
N	1311	1309	1091	1184
R-sq	0.007	0.088	0.077	0.054
adj. R-sq	0.002	0.083	0.071	0.048

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 8- Year fixed effects Top 30 (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	1.671***	0.126	-0.467*	-0.615
	(0.000)	(0.945)	(0.042)	(0.722)
DIVYIELDL1	-10.76***	-11.17**	-3.026*	2.577
	(0.000)	(0.004)	(0.025)	(0.781)
BETAL1	2.784**	3.714*	-2.067***	-10.17
	(0.008)	(0.020)	(0.000)	(0.150)
NETDEBTL1	-5.012	8.425	4.332	97.40

	(0.263)	(0.251)	(0.083)	(0.064)
MARKETCAPL1	-0.345	0.168	0.855***	7.187**
	(0.050)	(0.559)	(0.000)	(0.004)
TOTALASSETSL1	-6.535***	-5.429	-4.705**	-58.26*
	(0.000)	(0.158)	(0.001)	(0.021)
WCAPITALL1	-0.185	1.338**	0.331*	1.920
	(0.513)	(0.003)	(0.048)	(0.379)
N	1311	1309	1091	1184
R-sq	0.256	0.017	0.158	0.045
adj. R-sq	0.252	0.012	0.153	0.040

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

When using the firms that their pay ratios belong to the lowest 30th percentile, the overall picture remains more or less the same. In Table9, the pay ratio effect is almost significant, with a p-value of 0.057, when regressed against ROA. More specifically, one unit increase in the pay ratio results in a 4.2 percent decrease in return on assets. Although the coefficient is not exactly statistically significant, its value is higher compared to the previous table and, given that I am now using low pay ratio firms, the association between salary gaps and profitability is further enhanced. A possible reason for this, is that low pay ratio firms are thought to be less profitable, that is, capital is difficult to be found. When the payment of the CEO increases the fall in ROA is larger. Consequently, a constraint is created, which could partly explain this increase in the pay ratio coefficient. I anticipate that the non-linear regressions will provide more evidence regarding the relationship between return on assets and the pay ratio.

Table 9- Firm and year fixed effects Low 30 (predictive model)

	(1)	(2)	(3)	(4)
	institown	sreturns	ROA	ROE
PAYRATIOL1	3.141	-14.17	-4.201	-7.833
	(0.138)	(0.394)	(0.057)	(0.160)
DIVYIELDL1	-7.556	17.69	-3.691	-34.23*
	(0.184)	(0.462)	(0.228)	(0.014)
BETAL1	0.521	30.79	2.841	5.945
	(0.755)	(0.135)	(0.057)	(0.181)
NETDEBTL1	-105.8	1308.5	196.8	415.5

	(0.393)	(0.163)	(0.211)	(0.269)
MARKETCAPL1	-52.56*	-488.1	43.22	55.03
	(0.034)	(0.057)	(0.090)	(0.542)
TOTALASSETSL1	241.0	-765.5	-267.5	-523.9
	(0.071)	(0.531)	(0.153)	(0.209)
WCAPITALL1	-3.905	4.481	3.548	-28.44
	(0.572)	(0.931)	(0.787)	(0.485)
N	450	445	157	235
R-sq	0.086	0.189	0.253	0.162
adj. R-sq	0.072	0.176	0.218	0.137

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

The next table is the last one in which linear regression equations are utilized. When employing year fixed effects, I observe changes as regards the way that pay ratio affects the dependent variables, especially stock returns. One unit change in the pay ratio of the firms in this specific subsample causes a 17.16 percentage decrease in the stock returns with statistical significance at 95% confidence level. Given that I use low pay ratio firms, the pay ratio seems to have a more important interpretation. It is thought as a measure to assess the financial hazard of a firm. Low pay ratios signify more financial distress as opposed to high pay ratios. Subsequently, when the pay ratio increases the respective firms are considered more trustworthy, thereby decreasing the financial hazard depicted as stock returns. With regard to the return on assets, the coefficient is almost statistically significant such as in the previous table. This leads me to the conclusion that the return on assets in this subsample is not significantly affected by pay ratio alterations.

In essence, according to my regressions so far, I find no proof that the pay ratio is a distress factor. The only negative effect it has is at return on assets. Whether or not the pay ratio can cause distress will be shown in the next regressions, in which I use quadratic regression models.

Table 10- Year fixed effects Low 30 (predictive model)

	(1)	(2)	(3)	(4)
	institown	sreturns	ROA	ROE
PAYRATIOL1	3.021	-17.16**	-2.374	3.928
	(0.154)	(0.002)	(0.069)	(0.291)
DIVYIELDL1	-23.06***	4.355	-0.386	-2.295
	(0.000)	(0.525)	(0.875)	(0.721)
BETAL1	0.698	11.90**	0.586	1.672
	(0.573)	(0.006)	(0.241)	(0.285)

NETDEBTL1	-4.946	40.79	-0.817	-3.947
	(0.932)	(0.760)	(0.978)	(0.975)
MARKETCAPL1	-9.004*	-5.795	12.26**	28.61***
	(0.020)	(0.355)	(0.001)	(0.000)
TOTALASSETSL1	26.00	-12.83	-23.29	-29.10
	(0.518)	(0.882)	(0.280)	(0.752)
WCAPITALL1	0.586	2.343	-0.721	0.410
	(0.838)	(0.719)	(0.482)	(0.940)
N	450	445	157	235
R-sq	0.200	0.080	0.138	0.069
adj. R-sq	0.187	0.065	0.098	0.041

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Quadratic models

Up to now, I have used only linear regression equations. From this point on, I make use of quadratic equations in order to check if the pay ratio behaves in a non-linear way that would supports the assumptions made earlier in this paper. The estimating methods remain the same, namely firm and year fixed effects and only year fixed effects using contemporaneous and predictive models. The dependent and independent variables remain the same too. The only thing I add at my regression models is the quadratic term which is depicted as payratio2. This term stands for the squared pay ratio.

In Table 11 I run a contemporaneous model using both firm and year fixed effects in the whole sample. The pay ratio as well as the quadratic term are of no statistical significance when regressed against all of the dependent variables. The only exception is, again, the ROA. The coefficients are almost statistically significant with the p-values being 0.056 and 0.053 respectively. The pay ratio coefficient is positive, whereas the one of the quadratic term negative indicating concavity. However, this concavity is hardly of significance. Over the next tables I will try to define whether or not it indeed takes place.

Table 11- Firm and year fixed effects total sample (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	-0.254	4.297	0.546	-5.327
	(0.695)	(0.242)	(0.056)	(0.605)
PAYRATIO2	0.00974	-0.114	-0.0127	0.141
	(0.537)	(0.199)	(0.053)	(0.587)

DIVYIELD	0.167	-51.86***	-1.166	5.669
	(0.906)	(0.000)	(0.474)	(0.660)
BETA	-1.327	-2.259	-2.749***	-2.203
	(0.407)	(0.757)	(0.000)	(0.790)
NETDEBT	-1.979	-60.41**	-9.458**	-160.8
	(0.573)	(0.006)	(0.002)	(0.198)
MARKETCAP	0.0878	2.522	0.429*	4.713
	(0.290)	(0.095)	(0.016)	(0.293)
TOTALASSETS	0.286	-10.71	0.335	14.22
	(0.872)	(0.421)	(0.881)	(0.775)
WCAPITAL	-0.0838	-0.00551	-0.108	-3.748
	(0.548)	(0.994)	(0.531)	(0.558)
N	3806	3804	2675	3033
R-sq	0.004	0.059	0.061	0.000
adj. R-sq	0.002	0.057	0.058	-0.002

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In the next table, I use the second estimating method. When employing it, I notice the existence of concavity between the pay ratio and institutional ownership. Both the pay ratio and the quadratic term coefficients are statistically significant. More specifically, one unit increase in the pay ratio causes institutional ownership to increase by 2.7%. Regarding the quadratic term, the negative coefficient implies that as the pay ratio increases, the rate of increase in institutional ownership diminishes, that is, institutional ownership increases at a decreasing rate before the optimal pay ratio and starts falling once the turning point of the concave function is reached. Given the existence of concavity, institutional ownership initially increases with a rate of 2.7% per unit increase in the wage gap at a decreasing rate of 0.07%. After a certain point, however, the overall marginal effect of the pay ratio becomes negative and institutional ownership starts decreasing with a rate of 0.07% as the pay ratio continues to rise, thereby indicating that the relationship is an inverse U-shaped parabola. The marginal effect of the pay ratio is estimated as shown in equation (10). Since concavity exists, I am going to pin point the turning point of the quadratic function. The turning point is observed at the 35^{th} percentile of the pay ratio distribution. The turning point was estimated by means of the equation (11) depicted earlier. That is, institutional ownership increases at a decreasing rate of 0.07% up to the 35^{th} percentile of the pay ratio distribution, which signifies the optimal pay ratio. From this point on, the overall marginal effect of the pay ratio on institutional ownership becomes negative, thereby causing the latter to decrease.

The assumption that the lower the pay ratio, the better does not seem to hold in this regression. In contrast, very low pay ratios are not viewed favorably by investors. There are plenty of reasons that can cause this concave relationship. Firstly, low pay ratios are unfair for the managers. Secondly, they could be perceived as low salary growth within the respective firms. In addition, they neglect individual person effects. Furthermore, probably institutions view low ratios as not an objective and realistic estimate, meaning that the respective managers might have used excessive discretion when constructing the pay ratio. Last but not least, pay ratio is associated with profitability up to a certain level, which is why institutional ownership initially increases. After that level, pay ratio is no longer an outcome of better performance, but a source of inequality. Regarding return on assets, the potential quadratic relationship that was observed in the previous table is far from being of any significance when using year fixed effects.

Table 12- Year fixed effects total sample (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	2.696***	0.130	-0.288	-4.614
	(0.000)	(0.944)	(0.221)	(0.570)
PAYRATIO2	-0.0731***	-0.0143	0.00903	0.120
	(0.000)	(0.757)	(0.148)	(0.587)
DIVYIELD	-10.55***	-17.18***	-1.964*	11.37
	(0.000)	(0.000)	(0.039)	(0.284)
BETA	1.608*	4.564*	-1.467***	-6.017
	(0.015)	(0.023)	(0.000)	(0.123)
NETDEBT	-6.631	-5.321	2.065	-432.6
	(0.053)	(0.377)	(0.284)	(0.340)
MARKETCAP	-0.339	0.907	0.754***	-10.82
	(0.052)	(0.051)	(0.000)	(0.505)
TOTALASSETS	-5.649***	0.308	-4.102***	187.3
	(0.000)	(0.920)	(0.000)	(0.369)
WCAPITAL	-0.387	0.492	0.438*	-21.53
	(0.138)	(0.356)	(0.016)	(0.333)
N	3806	3804	2675	3033
R-sq	0.167	0.035	0.101	0.008
adj. R-sq	0.165	0.033	0.098	0.005

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In the next table I use a predictive model with lagged explanatory variables. The first estimating method indicates no existence of significance between the pay ratio and the dependent variables. The results indicate that the coefficients for the pay ratio and pay ratio squared are not statistically significant across these dependent variables. The lack of statistical significance suggests that changes in the pay ratio and its quadratic term do not have a reliable or strong influence on any of my dependent variables.

Table 13- Firm and year fixed effects total sample (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	0.489	-4.625	-0.606	-2.933
	(0.306)	(0.149)	(0.262)	(0.170)
PAYRATIO2L1	-0.00390	0.116	0.0412	0.0653
	(0.738)	(0.128)	(0.380)	(0.216)
DIVYIELDL1	-1.947	14.52	-5.584***	-28.31
	(0.103)	(0.202)	(0.000)	(0.057)
BETAL1	-0.0333	28.58**	1.258*	14.37*
	(0.967)	(0.001)	(0.011)	(0.018)
NETDEBTL1	1.001	51.65	1.468	55.55
	(0.711)	(0.079)	(0.580)	(0.162)
MARKETCAPL1	-0.0592	-6.693*	0.139	-0.211
	(0.437)	(0.014)	(0.449)	(0.836)
TOTALASSETSL1	-2.584	-38.58*	-5.130*	-43.76
	(0.108)	(0.048)	(0.034)	(0.120)
WCAPITALL1	-0.0120	-0.271	-0.0651	0.359
	(0.908)	(0.834)	(0.597)	(0.775)
N	3009	3008	2104	2400
R-sq	0.006	0.070	0.058	0.027
adj. R-sq	0.004	0.067	0.054	0.023

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

With the second method, concavity reappears between institutional ownership and pay ratio. The existence of concavity is further enhanced since there is evidence of it at the predictive model too. The coefficients of the pay ratio and its quadratic term are statistically significant with their values being slightly different than those of the contemporaneous model. Initially, as the pay ratio increases institutional ownership increases too at a 2.4 percentage rate which decreases by 0.06% as wage gap rises. After a certain point, the marginal effect becomes negative and the relationship flips signs. As regards the p-values, they are identical with the contemporaneous model, namely zero. Lastly, there is no evidence that the respective coefficients are statistically different from zero when regressed against the rest of the dependent variables. The forementioned results can be observed at Table 14.

Table 14- Year fixed effects total sample (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	2.439***	-1.379	-0.850	3.026
	(0.000)	(0.453)	(0.078)	(0.135)
PAYRATIO2L1	-0.0603***	0.0342	0.0582	-0.0947
	(0.000)	(0.459)	(0.310)	(0.089)
DIVYIELDL1	-12.54***	-2.035	-2.642*	4.704
	(0.000)	(0.587)	(0.012)	(0.587)
BETAL1	1.540*	8.253***	-0.694*	-2.962
	(0.019)	(0.000)	(0.025)	(0.272)
NETDEBTL1	-5.903	2.861	3.513	95.99*
	(0.113)	(0.590)	(0.099)	(0.018)
MARKETCAPL1	-0.456*	0.119	0.933***	7.399**
	(0.026)	(0.638)	(0.000)	(0.003)
TOTALASSETSL1	-5.520***	-2.411	-4.641***	-54.06**
	(0.001)	(0.360)	(0.000)	(0.006)
WCAPITALL1	-0.277	1.054**	0.409*	2.401
	(0.302)	(0.005)	(0.027)	(0.191)
N	3009	3008	2104	2400
R-sq	0.186	0.027	0.094	0.035
adj. R-sq	0.184	0.024	0.091	0.032

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Moving on, I create subsamples again so as to get a better picture of the significance of the pay ratio fluctuations. At first, I exclude the financial industry. As opposed to Table 11, in this table, yet unexpectedly, I find concavity between return on assets and the pay ratio. The pay ratio coefficient is statistically significant and positive, which is in contrast with the prevailing relationship so far, under which the relationship between the pay ratio and ROA was negative. Nonetheless, the negative relationship was observed when using only year fixed effects. Year fixed effects neglect time-invariant characteristics specific to each firm and controls only for across-time variations. As a result, the estimates of the first estimating method are thought to be more trustworthy. Therefore, I attribute this difference between the two methods to some unobserved heterogeneity not captured by year fixed effects estimator. Based on firm and year within estimator, the return on assets increases with pay ratio at a rate of 0.6%. This rate decreases at a 0.01% rate as pay ratio increases. After the turning point, it starts diminishing with a rate of 0.01 percent for each unit increase in the pay ratio. However, this specific concavity occurs only when excluding the financial industry from the sample. In other words, financial industry causes alterations to the relationship between return on assets and wage gap.

Table 15 - Firm and year fixed effects excluding financial industry (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	-0.252	4.514	0.580*	-5.422
	(0.698)	(0.223)	(0.045)	(0.606)
PAYRATIO2	0.00975	-0.120	-0.0135*	0.143
	(0.538)	(0.181)	(0.042)	(0.589)
DIVYIELD	0.169	-51.42***	-1.209	5.284
	(0.905)	(0.000)	(0.457)	(0.681)
BETA	-1.301	-2.500	-2.734***	-1.464
	(0.422)	(0.735)	(0.000)	(0.862)
NETDEBT	-1.073	-59.48*	-10.29**	-175.3
	(0.766)	(0.012)	(0.002)	(0.184)
MARKETCAP	0.1000	2.491	0.382*	4.113
	(0.225)	(0.105)	(0.044)	(0.381)
TOTALASSETS	-0.771	-10.38	2.683	53.92
	(0.719)	(0.555)	(0.245)	(0.307)
WCAPITAL	-0.0620	-0.00868	-0.158	-4.668
	(0.661)	(0.991)	(0.350)	(0.469)
N	3694	3697	2593	2938
R-sq	0.004	0.058	0.061	0.000
adj. R-sq	0.002	0.056	0.058	-0.002

----
p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

When using the year fixed effects estimator, and, even when financial section is excluded, the concavity between institutional ownership and wage gap holds again. The coefficients of interest are very similar to those presented at the previous tables and the p-values are identical. Institutional ownership initially rises with pay ratio as it signifies better performing firms, but after a certain point the wage gap becomes an identifier of income inequality with the institutions starting disinvesting in these companies, in this way shaping an inverse U-shaped parabola. The results can be observed at Table 16. This concavity is significant when using both the total as well as subsamples, such as this one. Nonetheless, it exists only when using year within estimator. All firms equally across time are affected by pay ratio fluctuations. However, when time invariant characteristics are included (firm fixed effects), the wage gap coefficients become insignificant. Such characteristics, could be, for instance management practices specific to each firm. To elaborate more on, the management's discretion when constructing the pay ratio in order to reduce its negative effects seems to be the most rational reason (Boone et. al, 2019). In any case, the most important assumption made in this paper, which is the non-linear behavior of the pay ratio becomes more and more apparent as I move on with the regression models, even if it predominantly occurs in the year within estimator.

Table 16- Year fixed effects excluding financial industry (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	2.712***	0.106	-0.248	-5.239
	(0.000)	(0.955)	(0.297)	(0.541)
PAYRATIO2	-0.0735***	-0.0139	0.00803	0.138
	(0.000)	(0.766)	(0.201)	(0.555)
DIVYIELD	-10.45***	-17.22***	-1.866*	11.56
	(0.000)	(0.000)	(0.049)	(0.249)
BETA	1.605*	4.654*	-1.417***	-6.668
	(0.017)	(0.023)	(0.000)	(0.070)
NETDEBT	-4.720	-6.583	1.439	-480.2
	(0.170)	(0.317)	(0.470)	(0.336)
MARKETCAP	-0.286	0.896	0.687***	-12.96
	(0.109)	(0.071)	(0.000)	(0.478)
TOTALASSETS	-6.852***	1.089	-3.543**	217.4
	(0.000)	(0.747)	(0.002)	(0.359)

WCAPITAL	-0.298	0.413	0.414*	-23.60
	(0.256)	(0.442)	(0.020)	(0.330)
N	3694	3697	2593	2938
R-sq	0.168	0.035	0.092	0.009
adj. R-sq	0.167	0.033	0.089	0.006

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In the Tables 17 and 18, I use predictive models instead of contemporaneous, on the grounds that one-period lagged wage gap also affects the dependent variables. The picture is very similar to the one already described. Insignificance when using firm and year fixed effects and significance when neglecting time-invariant features. In the year within estimator shown at Table 18 concavity exists even using lagged independent variables. The coefficients of pay ratio along with its quadratic term are again statistically significant at 95% confidence level and their values are 2.4 and -0.06 respectively.

Table 17- Firm and year fixed effects excluding financial industry (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	0.475	-4.577	-0.512	-2.380
	(0.321)	(0.155)	(0.343)	(0.234)
PAYRATIO2L1	-0.00355	0.115	0.0327	0.0514
	(0.761)	(0.134)	(0.496)	(0.297)
DIVYIELDL1	-1.952	14.04	-5.562***	-28.11
	(0.103)	(0.218)	(0.000)	(0.060)
BETAL1	-0.00468	28.84**	1.230*	14.04*
	(0.995)	(0.001)	(0.014)	(0.022)
NETDEBTL1	1.700	58.20*	1.825	54.68
	(0.524)	(0.049)	(0.483)	(0.189)
MARKETCAPL1	-0.0617	-6.367*	0.149	-0.108
	(0.445)	(0.014)	(0.425)	(0.909)
TOTALASSETSL1	-3.574	-52.23	-5.362	-34.24
	(0.115)	(0.074)	(0.111)	(0.142)

WCAPITALL1	-0.00475	-0.0144	-0.0574	0.288
	(0.964)	(0.991)	(0.623)	(0.823)
N	2916	2919	2037	2324
R-sq	0.007	0.072	0.057	0.026
adj. R-sq	0.004	0.069	0.053	0.023

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 18- Year fixed effects excluding financial industry (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	2.455***	-1.362	-0.778	3.042
	(0.000)	(0.462)	(0.111)	(0.132)
PAYRATIO2L1	-0.0606***	0.0335	0.0513	-0.0949
	(0.000)	(0.472)	(0.376)	(0.088)
DIVYIELDL1	-12.47***	-2.298	-2.555*	5.721
	(0.000)	(0.544)	(0.015)	(0.512)
BETAL1	1.539*	8.456***	-0.662*	-2.741
	(0.021)	(0.000)	(0.032)	(0.312)
NETDEBTL1	-3.667	3.637	2.963	103.4*
	(0.331)	(0.536)	(0.196)	(0.023)
MARKETCAPL1	-0.407	0.187	0.858***	7.386**
	(0.056)	(0.480)	(0.000)	(0.005)
TOTALASSETSL1	-6.886***	-2.714	-4.130**	-57.81*
	(0.000)	(0.372)	(0.002)	(0.012)
WCAPITALL1	-0.179	1.033**	0.396*	2.777
	(0.510)	(0.008)	(0.028)	(0.163)
N	2916	2919	2037	2324
R-sq	0.188	0.028	0.084	0.034
adj. R-sq	0.186	0.025	0.081	0.031

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In Tables 19 and 20, I show the two fixed effects estimators using contemporaneous models in the firms whose pay ratio belongs to the highest 30th percentile of the pay ratio distribution. Once again, when firm fixed effects are included in the model, the coefficients of interest become insignificant and I cannot to conclude to any important results as regards the wage gap effect. These coefficients are shown in Table 19.

Concavity, on the other hand, continues to have a strong presence even when creating percentiles. In the year within estimator, I observe significant coefficients of both the pay ratio and its quadratic term. Their values are slightly different compared to those presented before. In essence, institutional ownership increases 1.5% per unit increase in the wage gap with that rate being decreased by 0.04% per each unit increase in the pay ratio and after a certain level it starts decreases by 0.04% as the wage gap continues rising. The above-mentioned results are depicted in Table 20.

The overall impression that concavity indeed exists is enhanced even more given the statistical significance observed in the total sample as well as in all of the subsamples so far. On the other hand, although the managers' discretion is thought as the most rational explanation regarding the insignificance of my coefficients in the firm and year within estimator, it is yet to be determined what kind of factors precisely cause this insignificance that is repeated in each table. In any case, it appears that the pay ratio effect is significant across firms but not within firms over time.

Table 19 - Firm and year fixed effects Top 30 (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	0.120 (0.884)	3.587 (0.476)	0.502 (0.106)	-8.627 (0.516)
PAYRATIO2	0.00530 (0.778)	-0.0876 (0.446)	-0.0116 (0.105)	0.208 (0.507)
DIVYIELD	7.364* (0.029)	-61.97*** (0.000)	0.742 (0.576)	25.06 (0.468)
BETA	0.702 (0.868)	-14.20 (0.439)	-2.449*** (0.000)	9.446 (0.659)
NETDEBT	-6.592 (0.173)	-54.69* (0.034)	-5.758 (0.151)	-77.12 (0.490)
MARKETCAP	0.164 (0.183)	1.649 (0.140)	0.363* (0.019)	4.097 (0.385)
TOTALASSETS	0.602 (0.818)	-18.20 (0.318)	-1.539 (0.618)	-21.50 (0.784)
WCAPITAL	-0.164 (0.316)	0.354 (0.607)	-0.137 (0.468)	-5.942 (0.432)

N	1561	1558	1320	1422
R-sq	0.023	0.066	0.070	0.000
adj. R-sq	0.018	0.061	0.064	-0.005

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 20- Year fixed effects Top 30 (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	1.566**	1.566	-0.328	-7.422
	(0.002)	(0.452)	(0.103)	(0.391)
PAYRATIO2	-0.0430**	-0.0490	0.0101	0.186
	(0.001)	(0.345)	(0.057)	(0.414)
DIVYIELD	-4.378*	-32.28***	-1.298	27.80
	(0.021)	(0.000)	(0.194)	(0.161)
BETA	3.062**	-5.216	-2.895***	-3.577
	(0.003)	(0.304)	(0.000)	(0.812)
NETDEBT	-7.220	5.316	3.194	-680.4
	(0.094)	(0.431)	(0.136)	(0.322)
MARKETCAP	-0.171	0.597*	0.699***	-15.94
	(0.281)	(0.031)	(0.000)	(0.455)
TOTALASSETS	-6.915***	-4.484	-4.442***	304.6
	(0.000)	(0.265)	(0.000)	(0.345)
WCAPITAL	-0.422	0.869	0.346*	-33.63
	(0.160)	(0.083)	(0.026)	(0.312)
N	1561	1558	1320	1422
R-sq	0.274	0.052	0.189	0.013
adj. R-sq	0.270	0.047	0.184	0.007

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

As regards the predictive models in the highest 30th percentile, I proceed by using year fixed effects estimator. The results are displayed in Table 21. I provide further indication that the relationship between wage gap and institutional ownership is indeed non-linear. Concavity exists since the one-period lagged coefficients of interest are again statistically significant. One unit increase in the pay ratio initially results in an 3% percent increase in institutional ownership. This increase takes place at a constantly decreasing rate (0.27%) until a specific level, the optimal pay ratio. When the optimal pay ratio is reached institutional ownership decreases 0.27% per unit increase in the difference between the CEO total payment and the rank-file employee given that the overall marginal effect becomes negative. In Table 22 I use firm and year fixed effects and the pay ratio coefficient along with the quadratic term are not statistically different from zero. This leads me to the conclusion that pay ratio affects institutional ownership across firms rather than within firms over time. However, it is the year fixed effects estimator that indicated concavity between return on assets and pay ratio when excluding the financial industry.

Table 21- Year fixed effects Top 30 (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	3.044***	-2.956	-0.954	2.747
	(0.000)	(0.233)	(0.052)	(0.532)
PAYRATIO2L1	-0.269*	0.603	0.0921	-0.638
	(0.042)	(0.063)	(0.112)	(0.275)
DIVYIELDL1	-10.70***	-11.30**	-3.010*	2.601
	(0.000)	(0.003)	(0.024)	(0.777)
BETAL1	2.762**	3.762*	-2.045***	-10.33
	(0.009)	(0.017)	(0.000)	(0.148)
NETDEBTL1	-4.986	8.365	4.323	97.48
	(0.265)	(0.250)	(0.082)	(0.064)
MARKETCAPL1	-0.364*	0.212	0.863***	7.135**
	(0.040)	(0.468)	(0.000)	(0.004)
TOTALASSETSL1	-6.559***	-5.374	-4.701**	-58.32*
	(0.000)	(0.158)	(0.001)	(0.021)
WCAPITALL1	-0.167	1.296**	0.324	1.968
	(0.556)	(0.004)	(0.052)	(0.372)
N	1311	1309	1091	1184
R-sq	0.259	0.020	0.160	0.046
adj. R-sq	0.255	0.013	0.154	0.040

----
p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 22- Firm and year fixed effects Top 30 (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	1.037	-0.459	-0.372	-5.238
	(0.432)	(0.938)	(0.583)	(0.315)
PAYRATIO2L1	-0.0503	-0.487	0.0286	0.328
	(0.657)	(0.402)	(0.595)	(0.461)
DIVYIELDL1	0.962	13.84	-5.636***	-40.53**
	(0.709)	(0.547)	(0.000)	(0.001)
BETAL1	1.300	34.56	0.0245	14.70
	(0.485)	(0.107)	(0.972)	(0.298)
NETDEBTL1	-1.782	46.33	4.949	89.73
	(0.590)	(0.250)	(0.074)	(0.123)
MARKETCAPL1	0.0250	-4.290*	0.281**	0.514
	(0.784)	(0.019)	(0.003)	(0.664)
TOTALASSETSL1	-1.979	-29.77	-8.070	-67.98
	(0.396)	(0.305)	(0.080)	(0.173)
WCAPITALL1	0.00285	0.401	0.0626	0.919
	(0.978)	(0.764)	(0.570)	(0.577)
N	1311	1309	1091	1184
R-sq	0.008	0.089	0.078	0.054
adj. R-sq	0.001	0.083	0.071	0.048

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

The final regressions will take place using the lowest thirty percent percentile and they will be run with the exact same way. Contemporaneous and predictive models via employing year and firm and year within estimators. Tables 23 and 24 present the contemporaneous models. In both of the contemporaneous models the coefficients I am interested in are statistically insignificant even when using only year fixed effects. The existence of concavity between institutional ownership and pay ratio in the highest thirty percentile, in the total sample and when excluding financial section does not take place here. The reason why institutional ownership remains unaffected by wage gap alterations is unknown. Probably there is a factor that does not affect the firms in this percentile, yet significantly affects the rest of the sample. In this survey, I don't elaborate further on this potential factor since I am mostly interested in the relationship between the wage gap and institutional ownership.

Table23- Firm and year fixed effects Low 30 (contemporaneous model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIO	493.8	-1215.0	107.7	1426.6
	(0.480)	(0.823)	(0.912)	(0.734)
PAYRATIO2	962.1	-1804.3	125.4	2986.2
	(0.475)	(0.859)	(0.946)	(0.709)
DIVYIELD	-7.840	-43.22**	7.007	52.53
	(0.098)	(0.004)	(0.233)	(0.304)
BETA	-3.896	21.80	-0.366	-12.07
	(0.068)	(0.119)	(0.783)	(0.393)
NETDEBT	-22.49	-794.7	-151.0	355.9
	(0.734)	(0.126)	(0.074)	(0.560)
MARKETCAP	-9.195	447.9*	37.03	31.08
	(0.659)	(0.040)	(0.289)	(0.709)
TOTALASSETS	224.2*	139.0	165.7	158.6
	(0.032)	(0.846)	(0.103)	(0.730)
WCAPITAL	-4.386	-9.205	-0.147	-19.04
	(0.239)	(0.678)	(0.975)	(0.448)
N	630	621	225	333
R-sq	0.109	0.095	0.180	0.154
adj. R-sq	0.098	0.083	0.150	0.133

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Table 24 Year fixed effects Low 30 (contemporaneous model)

	(1)	(2)	(3)	(4)
	institown	sreturns	ROA	ROE

PAYRATIO	-1123.7	-1640.0	912.1	4662.9
	(0.302)	(0.364)	(0.281)	(0.380)
PAYRATIO2	-2338.1	-2900.3	1899.2	9369.9
	(0.264)	(0.389)	(0.246)	(0.366)
DIVYIELD	-16.84***	-10.48*	2.420	8.942
	(0.000)	(0.028)	(0.198)	(0.220)
BETA	0.774	12.63***	-0.419	-2.871
	(0.540)	(0.001)	(0.414)	(0.254)
NETDEBT	-25.44	-56.02	-45.54	-123.0
	(0.582)	(0.565)	(0.093)	(0.124)
MARKETCAP	-10.70*	23.75	19.01**	61.94**
	(0.019)	(0.076)	(0.002)	(0.002)
TOTALASSETS	44.27	13.18	-13.20	-39.53
	(0.129)	(0.832)	(0.509)	(0.559)
WCAPITAL	-0.247	-6.671	-2.249	-6.647
	(0.877)	(0.129)	(0.060)	(0.087)
N	630	621	225	333
R-sq	0.164	0.071	0.214	0.100
adj. R-sq	0.153	0.059	0.185	0.078

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

Tables 25 and 26 are the two last tables in this paper, in which I use predictive models in the lowest 30 percentile. In Table 25, as expected in the firm and year within estimator there is no indication of concavity between institutional ownership and wage gap. However, there is potential convexity between the stock returns and the pay ratio. The pay ratio coefficient is negative whereas the quadratic term coefficient is positive. In particular, in the beginning stock returns decrease at a 94-percentage rate per unit rise in the pay ratio. In other words, stock returns decrease at decreasing rate until the optimal pay ratio is reached. When the optimal pay ratio is attained, stock returns start increasing at a 20 percent rate. This is the first case so far that there are insinuations about convexity between the pay ratio and the stock returns. The potential existence of convexity is justified though and is in compliance with the hypotheses that have taken place in this paper. If pay ratio signifies profitability it is rational for the stock returns to fall. When the optimal pay ratio is attained, any further increase stops being an outcome of better performance but a result of income inequality. Investors then start shunning such companies thereby causing the returns to rise. Nonetheless, the p-value of the quadratic term coefficient is almost significant, namely 0.057, meaning that there is not enough proof of convexity. I anticipate that this relationship might become significant when using year fixed effects, in which I drop time-invariant firm characteristics.

Table25- Firm and year fixed effects Low 30 (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	0.521	-93.99*	-9.143	-0.957
	(0.972)	(0.030)	(0.091)	(0.969)
PAYRATIO2L1	0.652	19.88	1.245	-1.702
	(0.844)	(0.057)	(0.283)	(0.748)
DIVYIELDL1	-7.696	12.74	-4.599	-33.12**
	(0.182)	(0.602)	(0.133)	(0.008)
BETAL1	0.505	30.19	2.689	6.099
	(0.764)	(0.139)	(0.075)	(0.176)
NETDEBTL1	-117.5	944.0	152.5	451.1
	(0.291)	(0.297)	(0.357)	(0.241)
MARKETCAPL1	-54.73*	-554.6	38.33	61.46
	(0.029)	(0.057)	(0.118)	(0.463)
TOTALASSETSL1	247.5*	-563.5	-243.1	-541.9
	(0.045)	(0.641)	(0.198)	(0.176)
WCAPITALL1	-4.313	-8.286	1.744	-27.24
	(0.525)	(0.865)	(0.899)	(0.508)
N	450	445	157	235
R-sq	0.087	0.201	0.264	0.163
adj. R-sq	0.071	0.187	0.224	0.134

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In Table 26, I observe relationships between pay ratio and the dependent variables that have not been observed in any other table up to now. To begin with, although the relationship of institutional ownership and the pay ratio wasn't present at the contemporaneous model, it takes place in the predictive one. Institutional ownership initially increases by 19.4% per unit increase in the pay ratio and constantly decreases by 4%. Once the optimal ratio has been attained it does no longer increase, but diminishes. The coefficients are higher compared to previous tables. One reason for that could be that raises in the pay ratio are of greater importance when they occur in low wage gap firms, providing proof that this wage gap initially is not a distress factor for firms and the assumption that the lower the pay ratio the better seems to hold across firms over time.

Moreover, and, as expected, the convexity between stock returns and the pay ratio implied by the firm and year within estimator, becomes statistically significant across firms. This convexity is in compliance with the concavity describing institutional ownership and wage gap. As institutional ownership increases, stock returns start falling at a decreasing rate indicated by the squared term coefficint. After a certain level, however, institutional ownership starts falling, causing the returns to raise again. More specifically, returns drop by 63.5 percent as the pay ratio rises and then they start rising by 11.5 percent for any further increase in the wage gap, thereby shaping a U-shaped parabola. Yet it remains unexplained, why this convexity occurs only in this specific subsample and not in the other ones or even at the total sample.

The relationship between the wage gap and the return on assets has been really controversial so far and was highly dependent on the estimating method, that is firm and year fixed effects and only year fixed effects, the percentile the regression took place, the respective industry and the type of model (contemporaneous and predictive). This table introduces another type of relationship between these two variables. I observe convexity, with the return on assets initially decreasing at a decreasing rate as pay ratio rises and then rising approximately 4 percent after having reached the optimal pay ratio. Although the existence of convexity was unexpected, it is in compliance with the existence of an optimal pay ratio. Still, it remains unfathomable why this relationship was unobservable in the previous regression models and what factor contributes in shaping this relationship in this percentile. Whatever factor this might be, it affects only firms with low pay ratios. Last but not least, this convex relationship is not in compliance with the existence of concavity shown in Table 15. Although concavity existed under different circumstances, that is, firm and year fixed effects, contemporaneous model and after having excluded the financial industry from the sample, I didn't expect such severe alterations in the relationship between these two variables. It is essential further investigation takes place in order to determine the exact relationship between pay ratio and return on assets. Nonetheless, it is rational to conclude that whatever that relationship is, it does not appear as a linear one.

Table26- Year fixed effects Low 30 (predictive model)

	(1) institown	(2) sreturns	(3) ROA	(4) ROE
PAYRATIOL1	19.40*	-63.49***	-18.36**	1.883
	(0.026)	(0.001)	(0.007)	(0.956)
PAYRATIO2L1	-4.083*	11.54**	3.720*	0.481
	(0.033)	(0.003)	(0.012)	(0.948)
DIVYIELDL1	-22.83***	3.719	-0.416	-2.309
	(0.000)	(0.586)	(0.860)	(0.727)
BETAL1	0.606	12.15**	0.596	1.680
	(0.621)	(0.005)	(0.258)	(0.270)

NETDEBTL1	-22.76	88.76	15.52	-1.916
	(0.702)	(0.490)	(0.639)	(0.988)
MARKETCAPL1	-10.29**	-2.879	13.54***	28.80**
	(0.004)	(0.573)	(0.000)	(0.001)
TOTALASSETSL1	37.13	-40.23	-33.82	-30.46
	(0.375)	(0.631)	(0.160)	(0.752)
WCAPITALL1	0.112	3.608	-0.345	0.454
	(0.968)	(0.553)	(0.726)	(0.933)
_cons	85.83***	-6.152	0.696	14.85
	(0.000)	(0.253)	(0.703)	(0.119)
N	450	445	157	235
R-sq	0.207	0.091	0.181	0.069
adj. R-sq	0.193	0.074	0.137	0.036

p-values in parentheses
* p<0.05, ** p<0.01, *** p<0.001

VI. Conclusion

In recent years, it has been apparent that more and more investors seem to consider nonmonetary values when building their portfolios (Hong and Kacperczyk, 2009). Pay inequality between managers and workers has received increasing attention from academics, regulators, and the media. Moreover, a good many scientists argue that social norms play a vital role in shaping the economic behavior of many agents. These norms, sometimes, can be more important than the profit motivation (Becker, G., 1957). Many firms set large wage differentials between workers and managers, with the former sometimes suffering from what is known as behindness aversion. Subsequently, pro-social investors might shun these companies, since they might exhibit income inequality. However, quite low wage differentials might be unfair for the managers and they can also be viewed as low salary growth expectations by employees, insinuating that there might be an optimal wage gap. The existing literature, in many cases, associates the pay ratio with higher profits and better performance. However, they also point out that financial markets do not heed this statement and as shown in many papers such as these of Montone and Dittman in 2023 and Pan and Siegel in 2022 with companies that exhibit income inequality being shunned by investors. That is, only if there is a pro-social perception as regards the pay ratio, would it be possible to make reference of concavity and optimal pay ratio. This pro-social concept was introduced by Card and Saez in 2012. They provided proof that high pay ratios are associated with higher salary growth expectations and they can indeed be viewed favorable by employees. In this paper I tried to elaborate further on this aspect and prove that investors take into consideration the arguments demonstrated by Card and Saez, insinuating that the pay ratio affects companies in a non-linear way and, in particular, a quadratic one. For my survey, I employed four dependent variables in which I empirically tested the pay ratio effect. These variables were institutional ownership, stock returns, return on equity and return on assets.

With regard to return on equity I did not find any statistically significant evidence that it is affected by the pay ratio in each and every regression I did run. As regards the return on assets, the linear and the quadratic model showed controversial results. In particular, the relationship between return on assets and pay ratio was a concave when using contemporaneous model, firm and year fixed effects and after having excluded the financial industry from the sample. However, when running regressions using predictive model year fixed effects in the lowest thirty percentile of the pay ratio distribution, the relationship turned into a convex one. In the rest of the subsamples, I created and in the total sample the pay ratio effect was not statistically different from zero. The overall relationship between return on assets and pay ratio depends highly on the industry and time invariant characteristics. Although the precise relationship between these too variables was not identified, it appears as a non-linear one.

Regarding the stock returns, the pay ratio effect was statistically insignificant except one case. More specifically, the one in which I used a predictive model using year fixed effects in the lowest 30th percentile. In this specific case I had indication of convexity between these two variables. Nonetheless, this convexity did not appear in any other subsample. It is still unknown why convexity exists only in this specific percentile and it is not repeated in higher ones. It seems like there is a specific factor that affects only low pay ratio firms as opposed to high pay ratio ones.

In addition, the most important indication of the non-linear behavior of the pay ratio appears when regressed against institutional ownership. In both predictive and contemporaneous models there was a strong presence of concavity. Given its significance in the total sample I identified the turning point of the inverse U-shaped parabola which also signifies the optimal pay ratio. This point is estimated to be at the 35th percentile of the pay ratio distribution.

All in all, the overall statement in which I conclude is that the assumption that the lower the pay ratio, the merrier does not seem to hold. Very low pay ratios are associated with worse performance, lower salary growth expectations and cause the managers to suffer utility losses. However, concavity existed only when using year fixed effects. Time invariant features skewed the regressions leading them to insignificant results. The most notable of these features seem to be managerial practices utilized when constructing the pay ratio (Boone et. al, 2021). This leads me to the conclusion that the concave relationship exists across firms but not within firms over time.

Finally, with regard to any future research, the precise relationship between return on assets and pay ratio should be identified. Furthermore, there are time invariant firm characteristics that skewed the results when using firm and year fixed effects. In particular, year fixed effects and firm and year fixed effects showed different relationships between pay ratio and return on assets, namely convexity and concavity. Future research could focus on what type of factors caused these severe alterations between the estimating methods that led to controversial results. Last but not least, statistical significance between stock returns and the pay ratio occurred only in specific subsamples and, in fact, the lowest 30th percentile. Future papers could try and identify what kind of factors affect only this specific percentile, but not the rest of the sample.

References

Abowd, John M., Kramarz, Francis, Margolis, David N., 1999. High wage workers and high wage firms. Econometrica 67, 251–333

Akerlof, George, and Janet Yellen (1990). The Fair-wage Effort Hypothesis and Unemployment. Quarterly Journal of Economics 105(2), 255-84

Albuquerque, Rui, Yrjö Koskinen, and Chendi Zhang, 2019, Corporate social responsibility and firm risk: Theory and empirical evidence, Management Science 65, 4451–4469

Baker, Malcolm, Wurgler, Jeffrey, 2007. Investor sentiment in the stock market. J. Econ. Perspect. 21, 129-157.

Bartling, Bjorn and Ferdinand von Siemens (2010b). The Intensity of Incentives in Firms and Markets: Moral Hazard with Envious Agents. Labour Economics 17, 598-607

Becker, G., 1957. The Economics of Discrimination. University of Chicago Press, Chicago.

Boone, Audra, Starkweather, Austin, White, Joshua T., 2021. Spinning the CEO Pay Ratio Disclosure. Working paper

Card, David, Alexandre Mas, Enrico Moretti, and Emmanuel Saez, 2012. Inequality at Work: The Effect of Peer Salaries on Job Satisfaction. American Economic Review 102, 2981-3003.

Carhart, Mark M., 1997, On persistence in mutual fund performance, Journal of Finance 52, 57– 82

Charness, Gary, and Matthew Rabin (2002). Understanding Social Preferences with Simple Tests. Quarterly Journal of Economics 117(3), 817–869.

Cohn, Alain, Lasse J. Jessen, Marko Klasnja, and Paul Smeets, 2019. Why do the rich oppose redistribution? An experiment with America's top 5%, Working paper, Maastricht University

Cronqvist, Henrik, Heyman, Fredrik, Nilsson, Mattias, Svaleryd, Helena, Vlachos, Jonas, 2009. Do entrenched managers pay their workers more? J. Finance 64, 309–339.

Crystal, Graef S., 1991. In search of excess: The overcompensation of American executives. Norton, New York.

Danziger, Leif, and Eliakim Katz (1997). Wage Secrecy as a Social Convention, Economic Inquiry 35, 59-69.

Dittmann, Ingolf, Maurizio Montone, and Yuhao Zhu, 2023. Wage gap and stock returns: Do investors dislike pay inequality? Journal of Corporate Finance 78, 102322.

Fama, Eugene F., and Kenneth R. French, 1992. The cross-section of expected stock returns. Journal of Finance 47, 427-465.

Futrell, Charles M. (1978). Effects of Pay Disclosure on Satisfaction for Sales Managers: A Longitudinal Study. Academy of Management Journal 21 (March), 140-144

Geczy, C., Stambaugh, R., Levin, D., 2003. Investing in socially responsible mutual funds. Unpublished Working Paper, University of Pennsylvania, Wharton.

Hartzmark, Samuel M., and Abigail B. Sussman, 2019. Do investors value sustainability? A natural experiment examining ranking and fund flows, Journal of Finance 74, 2789–28

Hong, Harrison, and Marcin Kacperczyk, 2009. The price of sin: The effects of social norms on markets. Journal of Financial Economics 93, 15-36.

Michael J. Brennan, Tarun Chordia, Avanidhar Subrahmanyam, 1998. Alternative factor specifications, security characteristics, and the cross-section of expected stock returns. Journal of Financial Economics 49, 345-373

Norton, Michael I., and Dan Ariely, 2011. Building a better America—One wealth quintile at a time, Perspectives on Psychological Science 6, 9–12.

Pan, Yihui, Elena Pikulina, Stephan Siegel, and Tracy Yue Wang, 2022. Do equity markets care about income inequality? Evidence from pay ratio disclosure. Journal of Finance 77, 1371-1411.