The influence of CEO age, gender, and education level on corporate risk-taking

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ABSTRACT: *In this paper I investigate the influence of Chief Executive Officer (CEO) age, gender, and education level on corporate risk-taking for a sample of 145 companies that are listed on the Brussels and Amsterdam stock exchange. Corporate risk-taking is measured by using the annualised standard deviation of stock returns, also known as stock volatility. In this paper I find that younger CEOs and those with postgraduate qualifications are associated with higher levels of corporate risk-taking. Furthermore, I find inconclusive results with regards to the relationship between the presence of a female CEO and the level of corporate risk-taking.*

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Keywords
CEO characteristics, CEO age, CEO gender, CEO education, corporate risk-taking, stock volatility

1. INTRODUCTION

In a company, the Chief Executive Officer (CEO) is the executive manager that is ranked the highest in the organisation. The responsibility of a CEO is to have the final say in major corporate decisions. As the CEO is finally responsible for the well-doing of the company, and he/she often takes important decisions, the risk-taking behaviour of a CEO is very important for a company. In research conducted by Bandiera, Hansen et al. (2017), they show they influence of the CEO on firm performance by measuring firm performance before and after the appointment of a new CEO. Although they were unable to rule out time-varying unobservable variables, they found significant differences in firm performance after a new CEO was appointed. The risk-taking behaviour of a CEO is highly influenced by certain characteristics of the CEO, as his/her characteristics determine what decisions he/she will make. Thus, the characteristics and personality of a CEO can have a big influence on the company. During the last few years, this relationship has been extensively investigated by many different researchers. The result of their research in many cases show significant influences of CEO characteristics on corporate decisions.

In this paper I will investigate several characteristics of CEOs and the influence of these characteristics on the risk-taking behaviour of companies. The characteristics that I will be analysing are age, gender, and education level. In my research I will try to provide evidence on the relationship between the aforementioned characteristics and the risk-taking behaviour of the companies. The main research question I will try to answer is 'What are the influences of CEO age, gender, and education on corporate risk taking?'. I will do this by analysing the stock volatility of the company, which represents the overall total risk of a company. Furthermore, I will calculate the unsystematic risk (company risk). These measures of risk are based on the market model, which states that the return on a security depends on the return of the market portfolio and the extent of the security's responsiveness to the market. This measure of risk is based on previous research by (Anderson and Fraser 2000, Low 2009, Pathan 2009) who used total risk and company-specific risk (unsystematic risk) as measures of corporate risk-taking. These risk variables will be further elaborated in the third section of this paper. After determining the total risk and the company-specific risk, I will try to determine the relationship between the different characteristics of CEOs and the corporate risk-taking.

The goal of this research is to determine how characteristics of a CEO might influence the company risk. Although research has already been conducted on characteristics of a CEO, most papers focus on single characteristics and do not compare the influence of different characteristics. As in most of these papers different measures for risk are used, it is difficult to compare these results. In this paper however, I will use various methods to determine risk, but these same values of risk will be compared to all characteristics. This enables me to determine if some characteristics have a higher influence on the corporate risk-taking behaviour than others. In research done by Farag and Mallin (2016) the influence of demographic characteristics of CEOs on the corporate risk taking of companies in the Shanghai and Shenzhen region has been investigated. They tried to determine the influence of CEO age, gender, education level, professional experience and CEO board experience on the corporate risk taking. During their research, they found significant relationships between several characteristics and higher degrees of risk taking. However, they used a sample of companies registered on the Shanghai and Shenzhen stock exchange. Therefore, their findings can only be considered as valid in China, as the companies they investigated are mainly Chinese.

In this paper, I will follow Farag and Millin (2016) to investigate the relationship between CEO age, CEO gender, and CEO education level on corporate risk taking for listed companies on the stock exchange of Amsterdam and Brussels; the Euronext. This research will therefore elaborate on the research by Farag and Mallin and contributes to the existing literature by expanding the sample to companies listed on the Amsterdam and Brussels stock market. I choose to investigate companies that are listed on these stock markets because few scientific papers can be found on this region with regards to CEO characteristics and corporate risk-taking behaviour.

In the remainder of this paper I will elaborate how I performed my research. In the next section, section 2, I will elaborate on the theoretical perspectives of the research and will I develop my hypotheses based on the existing literature base. In section 3 I will elaborate on my sample selection, the measures of risk I used, and will I provide the summary statistics of the sample. The empirical findings will be presented in section 4. In section 5 I will elaborate the main limitations to my research and in section 6 I will provide a critical conclusion.

2. LITERATURE REVIEW

There are several theoretical perspectives explaining the influence of CEO characteristics on their decisions. One of these theories is the upper echelons theory, which states that 'organizational outcome-strategic choices and performance levels-are partially predicted by managerial background characteristics' (Hambrick and Mason 1984). Further research by Hambrick (2007) elaborated on this theory, claiming that directors experience, characteristics and values are influencing their perceptions and thus their decisions. This implies that different managers will make different decisions in similar situations, based on their characteristics and personalities. Thus, this theory might explain why different characteristics of CEOs might lead to differences in the corporate risk-taking behaviour. Another theoretical perspective is the human capital theory by Becker (1964). Terjesen, Sealy et al. (2009) used the human capital theory to argue that the individual's skill, education and experience frame the cognition of individuals. In his human capital theory, Becker (1946) attempted to explain facets of human behaviour through a set of assumptions. The choices of individuals are characterised by utility maximisation, a forward-looking stance, consistent rationality, and stable and persistent preferences. Thus, different CEOs may bring different experiences and backgrounds to a company. And in turn, these characteristics can influence the corporate risk-taking behaviour of a company. The final theoretical perspective is based on the resource dependence theory. This theory suggests that external resources influence the organisations behaviour. For CEOs this implies that they should link the company to other companies. By doing this, the CEO could bring information, communication channels, expertise, resources, and support from the external environment to the company. As CEOs have different characteristics, such as age, gender, and education level, different CEOs will bring different resources to the company. Therefore, the characteristics of a CEO might influence the risk-taking behaviour of a company.

2.1 CEO Age

There is are several views regarding the influence of CEO age on corporate risk-taking behaviour. First, there is are several papers suggesting that there is a negative relationship between CEO age and corporate risk-taking behaviour. For example, Bertrand and Schoar (2003), who claim that older CEOs are more likely to use traditional management styles and are adopting less aggressive investment strategies. Furthermore, they claim that an older CEO has more influence in the board. This power comes from the older CEO's experience and knowledge and enables older CEOs to

project power over the other board members. This causes the entire board to make more risk averse decisions, which would not happen with a younger CEO. Moreover, there is also a lot of research suggesting that younger managers make riskier investment than older managers. This may be due to their focus on short-term objectives in the hope to building a reputation (Beber and Fabbri 2012). Another explanation is found by Graham, Harvey et al. (2013),who found that younger CEOs are more risk-tolerant than older CEOs. Furthermore, they found that younger CEOs are often running fast growing companies.

Contradicting to these findings, there is also a lot of research predicting that younger CEOs are more risk averse than older CEOs. This risk aversion is can be explained by the greater career concerns the young CEOs are facing, making them adopt more conservative investment policies (Zwiebel 1995). If a young CEO makes a mistake, it very likely to influence his or her further career, whereas older CEOs often have a good reputation that is not likely to be damaged by one mistake. Furthermore, Zwiebel (1995) developed a model of the career and reputation concerns influencing investment choices. In this model is shown that younger CEOs are more likely to undertake projects that are easier for the market to evaluate and thus bare less risk.

Although there are conflicting perspectives in the current literature, I think that the literature arguing that CEO age is negatively related to corporate risk taking is more convincing. Their literature is more recent than the contradicting side, and I think the rationality behind their research is more convincing. Therefore, my first hypothesis is:

H1: There is a negative relationship between CEO age and corporate risk-taking.

2.2 CEO Gender

A problem that is often occurring with research on this topic, is the lack of CEOs that are woman. This causes most of the relationships that are found to be based on very small samples and often have a very low significance level. However, the existing literature is suggesting that female CEOs are more risk averse than male CEOs. According to Sunden and Surette (1998) this is an explanation for the low proportion of women that are active in boards. Female CEOs being more risk averse is confirmed by research of Huang and Kisgen (2013), who found that female CEOs are less likely to undertake acquisitions and rely on long term debt. Moreover, they also found that female CEOs are more likely to exercise stock options earlier than male CEOs. Another paper that confirms that female CEOs are more risk averse claims that "firms run by female CEOs have lower leverage, less volatile earnings, and a higher chance of survival than firms run by male CEOs.' (Faccio, Marchica et al. 2011). However, there is also literature that found that a higher proportion of female board members can be associated with increased risk-taking (Berger, Kick et al. 2014). Furthermore, Adams and Funk (2012) found that female CEOs are taking on more risk than male CEOs. Hence, they argue that it is not true that having a woman in the board of directors is leading to a more risk averse board. The stream in the literature that is suggesting that female CEOs are associated with higher levels of risk taking is based on research done on female board members and not on CEOs. Therefore, I think this stream in the literature is less convincing that the opposing stream, which suggests that female CEOs are more risk averse. Thus, my second hypothesis is:

H2: There is a negative relationship between the presence of a female CEO and corporate risk-taking.

2.3 CEO Education Level

The final characteristic that I will be investigating is the CEO Education level. On this topic there are mixed results in the existing literature. Davydov (2014) found that firms with CEOs having a degree in law are associated with fewer events of operational risk. Furthermore, CEOs that have MBA degrees are better able to manage credit risk. Contradicting, Beber and Fabbri (2012) found that CEOs with an MBA degree might be overconfident and may be willing to take more risk. Davydov (2012) concluded that "the quality of CEO education matters, and in many cases, it is associated with a simultaneous reduction in firm risk and increase in firm value". However, there is also research done by Daellenbach, McCarthy et al. (1999) in which no relationship was found between CEO education and the level of R&D spending. Even though there are contradicting findings in the current literature, the majority of the papers suggest that there is a relationship between CEO education level and corporate risk taking. The main theme in most of the papers is that CEOs with higher education have better risk-taking skills and are more confident with taking risk. Therefore, my final hypothesis is that:

H3: There is a positive relationship between CEO education and corporate risk-taking.

3. MODEL, SAMPLE SELECTION, AND SUMMARY STATISTICS

In this section I will explain my methods of analysis, which data I will use and how this data will be obtained. Furthermore, I will elaborate on how I will measure corporate risk-taking and how I will control for several firm characteristics that might influence the corporate risk-taking. Finally, I will also elaborate on which sample I used and why.

3.1 Methods

Before the relationship between characteristics of CEOs and corporate risk taking can be determined, I will first need to determine the various measures that can be used to identify risk. Following previous research by Farag and Mallin (2016) and Serfling (2014), I will use total risk and company specific risk (unsystematic risk) as measures of corporate risk taking. These measures of risk are described in more detail in section 3.4. Furthermore, I will need to specify the meaning of the different CEO characteristics and elaborate on the possible influence of these characteristics on the corporate risk taking. Moreover, I will explain the way in which the characteristics will be measured. This will be done in section 3.5.

When all the data is gathered, I will perform a correlation analysis to see if there are variables that are showing signs of coherence. If this is the case, I will need to make adjustments in my general model to account for this coherence. After this I will perform a regression analysis to determine the strength of the relationship and its significance. These methods are also based on the research by Farag and Mallin (2016). This regression analysis is based on the model which is described in the next section. Furthermore, I will do some additional research to investigate the differences between companies listed on either the AEX or BSE. This is also done for the CEO characteristics of the respective companies.

3.2 Model

The model is based on previous research by Serfling (2014), in his research he presents a model in which total risk (stock volatility) and unsystematic risk (company risk) are explained by CEO age and several control variables. As I am following his model, I will also use the same control variables. However, I will add two more independent variables to test my hypotheses. These variables are CEO gender and CEO education. The models I will be using in my analysis are:

$$TotalRisk_i = \alpha_0 + \beta_1 CEOAge_i + \beta_2 CEOGender_i + \beta_3 CEOEducation_i + \beta_4 TotalAssets_i + \beta_5 MarketToBook_i + \beta_6 ReturnOnAssets_i + \beta_7 CashHoldings_i + \beta_8 SalesGrowth_i + \beta_9 FirmAge_i + \varepsilon_i$$

$$UnsystematicRisk_i = \alpha_0 + \beta_1 CEOAge_i + \beta_2 CEOGender_i + \beta_3 CEOEducation_i + \beta_4 TotalAssets_i + \beta_5 MarketToBook_i + \beta_6 ReturnOnAssets_i + \beta_7 CashHoldings_i + \beta_8 SalesGrowth_i + \beta_9 FirmAge_i + \varepsilon_i$$

3.3 Sample Selection

I will be collecting data on CEO age, CEO education level, CEO gender, and corporate risk-taking for companies listed on the Euronext stock exchange of Amsterdam and Brussels. I will collect the data for the year 2016, to make my research as recent as possible. Due to time limitations I will not be able to collect data for several years. The original sample consists of 287 companies. Based on Serfling (2014) I will exclude utilities (SIC 4900-4999) and financial firms (SIC 6000-6999) from my research, as they are using different corporate governance characteristics and have a different regulatory framework. The financial data of the companies will be obtained via ORBIS, where I will also find the respective CEO of a company. The other characteristics of the CEO will be obtained via either Linked-In or Facebook. Missing financial data will be obtained via yahoo finance. Missing data for CEO characteristics will be obtained via Bloomberg. If financial data of a company is unavailable, the company will be removed. I will also remove a company from the sample if two or more CEO characteristics are unknown. This brings the total sample back to 145 companies.

3.4 Measures of Risk

I decided to use to use total risk and the company-specific risk as overall measures of risk, based on previous research by Serfling (2014) and by Farag and Mallin (2016). In their papers investigating CEO characteristics and risk-taking they use the natural logarithm of these measures in a regression analysis to measure the strength and the significance of the relationship between their characteristics of interest and the corporate risk-taking. Furthermore, in their research on CEO tenure and risk-taking, Chen and Zheng (2014) argue that stock volatility is a better measure for risk, as it is less likely to be influenced by ambiguity than other measures of risk. Measures like R&D expenditure and financial leverage might be misinterpreted and are therefore more affected by ambiguity. Thus, stock volatility and unsystematic risk are more suitable for measuring risk than other measures provided in previous research.

As mentioned before, I will use stock volatility as a measure of total risk. The total risk variable measures the overall variability in stock return, which is reflecting the perception of the market regarding the company's financial position (Pathan 2009). Stock volatility is determined by calculating the annualised standard deviation of monthly stock returns for the year 2016. Farag and Mallin (2016) and Serfling (2014) use daily stock returns instead of monthly stock returns, but due to time limitations this I am unable to do this. Furthermore, I will calculate the unsystematic risk (company specific risk) of the market model. Unsystematic risk is calculated as the annualised standard deviation of the residuals of the market model. To determine the market-value-weighted index, I will use the AEX and BSE as benchmarks for the Amsterdam and Brussels stock exchanges respectively.

3.5 CEO characteristics

The data I will collect regarding the CEOs consists of the age, the gender, and the educational levels of the CEOs. The CEO age and gender will be identified for each company for the year 2016. For the regression analysis, the natural logarithm of CEO age is used. In his paper on CEO age and corporate risk-taking Serfling (2014) shows that the natural logarithm provides a more linear measure of CEO age. Therefore, it is beneficial to use the natural logarithm of CEO age when performing a regression analysis. To measure CEO Education, I will follow Farag and Mallin (2016), and create a dummy variable. This dummy variable will take the value 1 if a CEO holds a post graduate degree (masters and/or PhD), and 0 otherwise. For CEO gender I will also make use of a dummy variable. This variable will take the value of 0 if the CEO is a man, and 0 if she is a woman.

3.6 Control Variables

As the model is based on the previous research by Serfling (2014), I will also use the same control variables. These variables are firm characteristics that could be correlated with the CEO characteristics and the stock volatility. This data is also gathered via ORBIS on the companies for the year 2016. The control variables that are used are: total assets, market to book ratio, company age, return on assets, cash holdings, and sales growth. The value of the total assets is the book value of the assets (in million euro). The mean value (standard deviation) of total assets is 10.95 (44,66) billion Euro. Market to book ratio is measured as the market value of the firm (in euros) divided by the value of the total assets (in euros). The mean value of the market-to-book ratio is 1.251 (1.25). The company age is the number of years between the initial public offering and 2016. The mean firm is 58,5 (59,1) years old. Return on assets is the income before extraordinary items, divided by the value of the total assets. The mean value of return on assets is 0.871 (13.56). Cash holdings is calculated as the book value of cash and short-term investments, divided by the value of the total assets. The average value of cash holdings is 15.75% (8.25%). Finally, sales growth is the percentage increase of annual sales between the years 2015 and 2016. The mean sales growth is 19.69% (157.93%).

3.7 Descriptive statistics

Table A presents the summary statistics of the main variables that are used in the empirical analysis. Furthermore, in table A can be observed that not for every CEO characteristic 145 observations are found. This is caused by difficulties with obtaining the data regarding the CEOs. The mean value of total risk measured by the annualised standard deviation of the monthly stock returns is 29.92%, the company-specific risk, which is measured by the annualised standard deviations of the residuals of the market model has a mean of 34.73%. In his research Serfling (2014) reports a mean volatility (total risk) of 45,88% and a standard deviation of 40.33%. The deviation in mean and standard deviation is likely to be caused by the smaller sample size and smaller time period that is used in this paper. Serfling (2014) analysed 2356 unique firms over a time period of 18 years, whereas I only observed 154 companies for one year. The mean value of CEO age is 53.99, and the age ranges from 28 till 82. In my sample there are 6 female CEOs, which from only 3,8% of the entire sample. In my sample there are 6 CEOs that do not have a post-graduate degree (Master or PHD), they form 3,8% of the sample. My sample consists of 74 companies listed on the AEX (51,9%) and 71 companies listed on the BSE (48,1%).

Table 1: Descriptive Statistics for the pooled sample

This table reports summary statistics for 154 listed firms on Brussels stock exchange and Euronext Amsterdam for 2016. In this table the summary statistics are presented for the full sample. Total_Risk is calculated by taking the annualised standard deviation of daily monthly stock returns. Unsystematic_Risk (company specific) is calculated by taking the annualised standard deviation of the residuals of the market model for the year 2016. _Age is the CEO age measured in years. CEO_Gender is measured using a dummy variable, this variable takes the value 1 if the CEO is female, and the value 0 if the CEO is male. CEO_education is also measured using a dummy variable, taking the value 1 if the CEO has a post-graduate degree, and 0 if the CEO does not have a post-graduate degree. AEX_or_BSE also is measured using a dummy variable, this variable takes the value 0 if the company is listed on the AEX, and 1 if the company is listed on the BSE. The value of the total assets is the book value of the assets (in million euro). Market to book ratio is measured as the market value of the firm (in euros) divided by the value of the total assets (in euros). The company age is the number of years between the initial public offering and 2016. Return on assets is the income before extraordinary items, divided by the value of the total assets. Cash holdings is calculated as the book value of cash and short-term investments, divided by the value of the total assets. Finally, sales growth is the percentage increase of annual sales between the years 2015 and 2016.

	N	Minimum	Maximum	Mean	Std. Deviation
Measures of Risk					
Total Risk	145	14.74%	120.90%	29.92%	20.78%
Unsystematic risk	145	11.61%	108.32%	34.73%	19.28%
CEO Characteristics					
AEX_or_BSE	145	0	1	0.49	0.502
CEO_AGE	143	28	82	53.99	7.988
CEO_GENDER	145	0	1	0.04	0.2
CEO_EDUCATION	130	0	1	0.95	0.211
Firm Characteristics	136				
Total Assets	138	0.003	390167.13	10946.037	44659.221
Market-to-Book	138	0	8.293	1.251	1.25
Return on Assets	138	-64.884	44.264	0.871	13.564
Cash Holdings	140	0.00%	97.39%	15.75%	8.25%
Sales Growth	132	82.39%	1776.44%	19.69%	157.93%
Firm Age	145	1	351	58.5	59.113

Table 2: Correlation matrix

In this table all the correlations between the variables used in my analysis are reported. For each variable Pearson's coefficients and the significance of the correlation are calculate using SPSS. In this table I denote: * for $p \leq 0.05$, ** for $p \leq 0.01$, and *** for $p \leq 0.001$ to indicate the level of significance.

		LOG_Total_Risk	LOG_Unsystematic_Risk	LOG_CEO_AGE	CEO_GENDER	CEO_EDUCATION	Firm Age	Total assets EUR 2016	Market-to-Book	Cash/Total Assets	ROA using Net income % 2016	Sales growth Rate
LOG_Total_Risk	Pearson Correlation	1										
	Sig. (2-tailed)											
LOG_Unsystematic_Risk	Pearson Correlation	.973**	1									
	Sig. (2-tailed)	0.000										
LOG_CEO_AGE	Pearson Correlation	-0.102	-0.133	1								
	Sig. (2-tailed)	0.227	0.113									
CEO_GENDER	Pearson Correlation	-0.087	-0.082	-0.077	1							
	Sig. (2-tailed)	0.300	0.327	0.363								
CEO_EDUCATION	Pearson Correlation	0.164	0.138	-.201*	0.048	1						
	Sig. (2-tailed)	0.062	0.117	0.023	0.585							
Firm Age	Pearson Correlation	-.197*	-.242**	0.076	-0.059	0.061	1					
	Sig. (2-tailed)	0.017	0.003	0.365	0.482	0.487						
Total assets EUR 2016	Pearson Correlation	-0.078	-0.071	0.020	-0.038	0.051	0.112	1				
	Sig. (2-tailed)	0.358	0.398	0.816	0.654	0.566	0.186					
Market-to-Book	Pearson Correlation	-0.065	-0.058	-0.042	0.147	0.065	-0.092	-0.094	1			
	Sig. (2-tailed)	0.446	0.502	0.627	0.085	0.470	0.281	0.271				
Cash/Total Assets	Pearson Correlation	.172*	.189*	-0.007	0.030	-0.008	-.274**	-0.117	.206*	1		
	Sig. (2-tailed)	0.042	0.025	0.939	0.721	0.925	0.001	0.170	0.016			
ROA using Net income % 2016	Pearson Correlation	-.265**	-.267**	-0.016	.168*	-0.053	0.150	-0.028	-0.039	-.384**	1	
	Sig. (2-tailed)	0.002	0.002	0.852	0.049	0.554	0.080	0.747	0.654	0.000		
Sales growth Rate	Pearson Correlation	0.085	0.103	-0.077	-0.020	0.012	-0.092	-0.031	-0.006	.275**	0.019	1
	Sig. (2-tailed)	0.333	0.241	0.384	0.820	0.900	0.296	0.722	0.943	0.001	0.831	

Table 3: Bivariate analysis of the relationship between CEO Age, Education, and Gender and corporate risk-taking

This table presents the univariate analysis of the relationship between CEO Age, Education, and Gender and corporate risk-taking. I denote: * for p ≤ 0.05, ** for p ≤ 0.01, and *** for p ≤ 0.001 to indicate the level of significance.

CEO Characteristics	Panel A: Total risk		Panel B: Unsystematic risk	
	Mean	t-stat	Mean	t-stat
CEO Age				
Age ≥ Median	-1.075	1.228	-1.235	1.379
Age < Median	-0.980		-1.123	
CEO Gender				
Male	-1.023	1.203	-1.175	1.302
Female	-1.225		-1.375	
CEO education				
PG degree	-1.023	-1.747	-1.181	-1.419
Non-PG degree	-1.380		-1.497	

Table 4: Regression models of the relationship between CEO Age, Education, and Gender and corporate risk-taking

In this table the results from the regressions relating CEO age, gender and education and corporate risk-taking measures are reported. In model 1 the dependent variable is Log Total Risk and every variable is included in the model. These variables are the natural logarithm of CEO age, CEO gender, CEO education, firm age, total assets, market-to-book, cash holdings, return on assets, sales growth rate. These variables are also used in the second model, but in model 2 the dependent variable is the natural logarithm of unsystematic risk. In the third and fourth model variables that were highly correlated with the dependent variable are removed. In model 3 the dependent variable is the natural logarithm of total risk, and the independent variables are natural logarithm of CEO age, CEO gender, CEO education, total assets, market-to-book, sales growth rate. In model 4 the dependent variable is the natural logarithm of unsystematic risk, the independent variables are natural logarithm of CEO age, CEO gender, CEO education, total assets, market-to-book, sales growth rate. I denote: * for p ≤ 0.05, ** for p ≤ 0.01, and *** for p ≤ 0.001 to indicate the level of significance.

	Model 1: Total Risk		Model 2: Unsystematic Risk		Model 3: Total Risk (adjusted)		Model 4: Unsystematic Risk (adjusted)	
	Coefficient	Sign.	Coefficient	Sign.	Coefficient	Sign.	Coefficient	Sign.
Constant	-0.502	0.697	0.126	0.924	0.073	0.955	0.779	0.556
Log CEO Age	-0.189	0.547	-0.366	0.254	-0.352	0.267	-0.559	0.09
CEO Gender	-0.151	0.427	-0.155	0.424	-0.202	0.284	-0.206	0.291
CEO Education	0.339	0.07	0.272	0.154	0.314	0.098	0.239	0.223
Firm Age	-0.001	0.032*	-0.002	0.008**				
Total Assets	0	0.637	0	0.736	0	0.441	0	0.491
Market-to-book	-0.01	0.779	-0.002	0.963	-0.015	0.686	-0.006	0.864
Cash Holdings	0	0.963	0	0.873				
Return on Assets	-0.007	0.093	-0.008	0.078				
Sales Growth Rate	0	0.505	0	0.391	0	0.43	0	0.329
R Squared		0.141		0.169		0.064		0.069

4. EMPIRICAL FINDINGS

In this section, I will elaborate on the relationship between CEO age, CEO education, and CEO gender and the measures of risk I used in this study. I will elaborate on what I found in my sample and will discuss any important results. Furthermore, I will try to implications of my findings and will try to validate my results when comparing them to previous research on these topics. In table 2 a correlation matrix is provided and table 3 shows the bivariate analysis of the relationship between CEO Age, Education, and Gender and corporate risk-taking. In table 4 regression models with their respective coefficients and levels of significance are provided.

4.1 CEO Age and corporate risk-taking

Based on the literature review and the empirical results in this literature, the hypothesis has been developed that CEO age is negatively related to corporate risk taking. This implies that younger CEOs prefer more risk than older CEOs. In table 2, the correlation matrix can be observed that there are signs of a small negative relationship between CEO age and corporate risk-taking. The significance level of these correlations however, are fairly low. This suggest that correlation that is found in my sample is likely to be explained by chance. However, when looking at Table 3 it can be observed that there are close to significant differences between older ($\geq$ median) and younger CEOs ($<$ median). This result suggests that there is indeed a negative relationship between CEO age and corporate risk-taking behavior. The difference in means of table 3 shows a negative relationship between CEO age and both total risk and unsystematic risk. This suggests that younger CEOs are likely to make more risky decisions compared to older CEOs. In table 4 it can be observed that the regression coefficient for CEO age on total risk and unsystematic risk is negative. This is the case for both measures of risk, in both models. However, in almost every model this coefficient is not significant. The only model in which this coefficient is close to being significant, is in the model where I have removed several control variables because of their high correlation with the dependent variable.

The models including all control variables show acceptable levels of R-squared. The value of R-squared is an indication for the completeness of the model. If the value of R-squared is close to 1, it means that a high percentage of the variance in the dependent variable can be explained by the model. In the first two models, I report a R-squared of 0.141 and 0.169 for model 1 and 2 respectively. Which means that there is a high likelihood that the dependent variable can indeed be explained by my model.

Even though the relationship is not to be found very significant, there is an indication that there is indeed a negative relationship between CEO age and corporate risk-taking. Both the comparison between older and younger CEOs, and the analysis of the regression show a negative relationship between CEO age and gender. Thus, even though these results are not significant, they are very close to being so. Therefore, I argue that there is enough evidence based on my sample to accept my hypothesis that there is a negative relationship between CEO age and corporate risk-taking.

This acceptance of the hypothesis is in line with the conclusion of Farag and Mallin (2016) and Serfling (2014), who also found evidence for a negative relationship between CEO age and corporate risk-taking. Albeit that their results were more significant than my findings. However, the negative relationship I found was stronger than the negative relationship found by Serfling (2014), who reported a coefficient of -0.183.

4.2 CEO Gender and corporate risk-taking

Based on the existing literature, I developed the hypothesis that there is a negative relationship between a CEO being female and corporate risk-taking. However, I found only six cases of female CEOs this makes the empirical results very insignificant and therefore it is very hard to draw any conclusions for this relationship. However, consistent with my expectations the difference in the means in table 2 could suggest that there is negative relationship between a CEO being female and corporate risk-taking. In table 2 it can be observed that the mean total risk and mean unsystematic risk are lower for female CEOs than for male CEOs. However, these results are way to insignificant to base a conclusion on. This negative relationship also comes forward in the regression models, but again very insignificant. Because the high levels of insignificance in my sample, I am unable to draw a convincing conclusion on the relationship between the presence of a female CEO and corporate risk-taking. My findings regarding this relationship are, albeit insignificant, contradicting to the research done by Farag and Mallin (2016). In their research they found a very significant positive relationship between a CEO being female and corporate risk taking. The higher level of significance can be explained by the much larger sample size that they have obtained, as they investigated more than 8000 companies, whereas I only observed 154. Furthermore, in their sample 5% of the CEOs is female, whereas in my sample female CEOs only form 3,8% of the sample. Unfortunately, I am unable to determine why the results of my research are contradicting with the research by Farag and Mallin (2016).

4.3 CEO Education and corporate risk-taking

Based on the existing literature, my prediction was that there is a positive relationship between CEO education and corporate risk-taking. Even though I did not find a large number of CEOs that did not have a post-graduate degree, I still found close to significant results. In the correlation matrix of table 3 it can be observed that there is an almost significant correlation between the CEO having a post-graduate degree and corporate risk-taking. This positive Pearson correlation is reported for both measures of risk. Furthermore, this correlation is confirmed in the comparison of the means for CEOs with and without a post graduate degree. This comparison can be observed in table 3. For both measures of risk, a close to significant difference is found between the means of the risk measures. For all four models in my analysis, a positive relationship is found between a CEO having a post-graduate degree and corporate risk-taking. This suggests that CEOs having a post-graduate degree can be related to higher levels of corporate risk-taking. These findings are also confirmed in the regression models, provided in table 4. In these tables a very strong positive relationship is reported, for in the first model, which includes all control variables and has the natural logarithm of total risk as dependent variable, an almost significant regression coefficient is found. The insignificance in the other models is likely to be caused by the low amount of cases of a CEO without a post-graduate degree. In this research they form only 3,8% of the sample, and due to the limited sample size, this results in few cases in which a CEO does not have a post-graduate degree. Based on the close to significant differences between the means of CEOs with and without a post-graduate that are reported, I argue that there is enough evidence to accept my hypothesis that there is a relationship between higher educated CEOs and corporate risk-taking.

This relationship is in line with the paper of Farag and Mallin (2016), who also found this relationship. They argue that this relationship is caused by overconfidence of higher educated CEOs. Furthermore, they argue that highly educated CEOs are

less likely to be risk averse and are more likely to be open to new, innovative business ideas. This makes them better informed about their external environment than their lower educated counterparts.

4.4 Further analysis

Whilst comparing the companies listed on the AEX and the BSE, it becomes apparent that these stock markets are very similar. I compared both the characteristics of CEOs and the measures of risk of the companies listed on the AEX with the companies listed on the BSE. However, I did not find any significant differences between the two stock exchanges. The average CEO age is the same, a very similar number of CEOs is female in both samples, and a similar number of CEOs has a post-graduate degree. Also, when the regression analysis is done for one of the samples, no unexpected things happen. In both samples the regression coefficients are in the same direction and the levels of significance are very similar to the levels of significance for the total sample.

As CEO gender and education are nominal variables, the reported regression coefficients can not be compared. One step difference in the natural logarithm of CEO age is not similar to a one step change in CEO gender or education. Therefore, these variables should be compared based on their standardised coefficients, in which there is accounted for this difference in variable. When comparing these standardised coefficients, it becomes apparent that in this model, the biggest determinant of corporate risk-taking is the CEO education. This is the case for both the total risk and the unsystematic risk. For total risk, CEO age has more influence than CEO gender, but for unsystematic risk the influence of CEO gender is higher than the influence of CEO age.

5. LIMITATIONS

As reported in the previous chapter, many of the findings in this paper are very insignificant. This can have numerous explanations, but I will report the most important limitations in this chapter. Moreover, I will comment on this study how it could have been made more reliable.

The first limitation is the sample size. Due to the very limited sample size, the CEO gender and CEO education have very few cases, making the results likely to be insignificant. Furthermore, a larger sample size would significantly improve the regression models. A larger sample size could increase the external validity and the accuracy. Furthermore, it would reduce the variance in the chosen variables. Another limitation is the short time period which has been observed. Most papers take at least a period of several years, in which they measure stock volatility based on daily stock fluctuations. In this paper however, I only looked at the year 2016 and used monthly stock fluctuations. Based on the way the stock volatility is calculated, the more observations, the lower the standard deviation. This limitation might therefore explain the differences in the reported mean values of the risk measures. Enlarging of the time period in which stock data is observed would also reduce the number of outliers, as there will be more compensation for external factors influencing the stock volatility.

Another big limitation is the fact that I did not use all the control variables that Serfling (2014) used in his model, in my regression model to build my regression models. This caused the models to have lower levels of significance and results in a lower value of R-squared. If a model has a low R-squared it means that a very small part of the variation of the dependent variable can be explained by the model. Furthermore, the control variables help to validate the results that are found in the models and help to account for external factors influencing the dependent variable. Therefore, the inclusion of control variables would have been very beneficial for the reliability of this research. I was unable to

do this, however, due to the availability of the data. Serfling (2014) added a lot of information regarding the portfolio of CEOs. I was unable to do this due to the lack of access to the correct databases

6. CONCLUSION

In this paper I studied 145 companies that are listed on the Amsterdam and Brussels stock exchanges. I investigate the relationship between CEO age, CEO gender, and CEO education on corporate risk taking. In accordance with the current literature, I found a negative relationship between CEO age and corporate risk-taking. Furthermore, I provide evidence for a positive relationship between a highly educated CEO and higher levels of corporate risk-taking. With regards to CEO gender, I am unable to report a relationship. This is caused by the limited sample size and insignificant results that are result of this limited sample size. Whilst comparing the three investigated CEO characteristics, I found that the CEO education is the strongest determinant of corporate risk-taking.

7. DISCUSSION

Previous research indicates that there is a relationship between characteristics of a CEO and the corporate risk-taking. This is explained by the influence of these CEO characteristics on his/her decisions, and therefore the riskiness of these decisions. As CEOs are positioned as the highest executive manager, these decisions are of big impact on the risk-taking of a company. In this paper I investigated CEO age, gender and education and the influence of corporate risk-taking.

Although I did not find a significant relationship between CEO gender and corporate risk taking, I do think my analysis suggests that this relationship could exist. To better estimate the magnitude of this relationship and to increase the significance, the sample size should be increased. Furthermore, it could also be very interesting to investigate why so few cases of female CEOs occur. For future research I would therefore recommend increasing the scope of the research to for example Europe, instead of just the Netherlands and Belgium.

To better investigate the relationship between CEO education and corporate risk-taking, one could try to diversify between different fields of study. As found in my sample, only 3,8% of the CEOs did not have a post-graduate degree. This makes it very difficult to draw any conclusions, unless the sample size is very large. Therefore, diversifying between different fields of education could be very interesting. COEs that have a post graduate degree in law, might react very different to risk when compared to CEOs that have a degree in business administration. Finally, the time scope could be increased to improve the robustness of the research. As I only investigate one year of stock volatility in my research, chances are that there are external factors influencing the stock volatility. The measured stock volatility might therefore not be explained by the CEO characteristics, but by these external factors.

8. REFFERENCES

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