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Master Thesis

Does management compensation affect the usage of financial derivatives? A study on non-financial firms listed on the Oslo Stock Exchange

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Abstract

The purpose of this master thesis is to examine how management compensation affects the usage of financial derivatives. The study focused on non-financial firms listed on the Oslo Stock Exchange with the data collected manually from annual reports for the year 2011. We find evidence that the ownership of stocks options by CEOs of those companies has a significant negative effect on the usage of financial derivatives. We also tested whether the ownership of shares by CEOs or bonus payments received by CEOs affect the use of financial derivative. Although the results were not robust, we observed a positive relation between these variables and the usage of financial derivatives.

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1. Introduction

Managing risk is an important topic in finance. It has been increasingly common among companies to reduce their risk exposure in order to have more stable cash-flows. Depending on their attitudes toward risk, firms often use financial derivatives as a risk management instrument. The risk firms often face is associated with foreign exchange, interest rate and commodity prices. Most common derivatives firms use to reduce these types of exposure are forwards/futures, options and swaps (Bank for International Settlements 2013).

Although risk management is important for so many firms, research regarding risk management in Norway is limited. Børsum and Ødegaard (2005) summarize a questionnaire conducted by the Norwegian Central Bank in 2004. The questionnaire focused on the usage of currency derivatives by Norwegian companies. However, Børsum and Ødegaard (2005) did not investigate managerial behaviour concerning risk management. In this thesis, we examine how management compensation affects the usage of financial derivatives among companies listed on the Oslo Stock Exchange.

To answer our main research problem we created three different hypotheses, which we then tested. First, we looked at whether stock options had a negative impact on the usage of financial instruments. Theory suggests that a manager who receives compensation based on stock options in relation to the firm value would be more risk seeking and would hedge less (Tufano 1996; Rogers 2002). Second, we considered whether bonus payments based on accounting earnings had an impact on the usage of financial derivatives. Bonus payments based on accounting earnings often face a target and a cap. Normally a cap is restricted to no more than 50% of the fixed salary. Bonus payments with a target and a cap could create incentive and disincentive for hedging activities. Kim, Nam and Thornton (2008) found evidence that managers who were not expecting to reach the cap were hedging less than managers who were expecting to reach the cap. Finally, we examined whether management compensation based on shares had a positive effect on the usage of financial derivatives. Managers who hold shares would have a utility function of the firm value that would be closer to the shareholders utility function. Therefore, they will hedge more (Tufano 1996; Rogers 2002).

Our hypotheses are mainly based on the theory presented by Smith and Stulz (1985). Smith and Stulz (1985) argue that a managerial compensation contract, which may include stock options, ownership stocks and bonus plan, could be one reason why companies may or may not use risk management instruments. Shareholders are interested in maximizing the value of their firm's shares, whereas managers are interested to maximizing their own utility. By relating managerial compensation to some measure of value, managers' financial wellbeing will depend on how the company is doing and thus affect their attitude toward the usage of risk management instruments. In addition, we considered whether firm size, capital structure, industry and CEOs education background affects the use of financial derivatives.

We find a significant negative relation between CEOs who hold stock options and the usage of financial derivatives. There was a positive relation between CEOs who hold shares and the use of financial derivatives. However, the result was not significant. Both of the coefficients to the variables had signs that we were expected. Bonus payments had a positive relation on the usage of financial derivatives, but it was not significant.

The remainder of this paper is divided into five sections. In section I, we consider theory and existing research on different compensation schemes and the effects they have on the usage of financial derivatives. In section II, we present our main hypothesis. In section III, we describe our data and the methodology. In section IV, we deliver our main results and a robustness check. Finally, in section V, we present our conclusion.

2. Theory and literature review

According to Stulz (2003), derivatives markets can be traced back to the 17th century, when Holland had its own market for tulip options and Japan had a futures market for rice. However, it was not until late in the 20th century that the derivatives markets really took off. Today derivatives markets are widely known and companies use derivatives to reduce their exposure to risk.

Research on the use of risk management by firms has been done for many years, and we can divide the evidence into two different types. The first type is evidence based on surveys, and the second type is evidence based on analysis of firm-specific data. Regardless of the types, research indicates that companies that use derivatives have higher value and lower cash-flow volatility (Stulz 2003, 630).

Dolde (1993) created a questionnaire, which he sent out to all Fortune 500 firms. Out of all companies which responded (244 companies in total), approximately 85% used some sort of derivatives to manage financial risks. Also, larger firms had a significantly higher probability of using derivatives. However, smaller firms that used derivatives usually hedged a greater portion of their exposures. Other well-known surveys on financial risk management are the Wharton studies done by Bodnar, Hayt and Marston (1995; 1998). The studies focused on the usage of derivatives among non-financial firms in the US. These findings support the results done by Dolde (1993), that the use of derivatives is more common for larger firms. Only 13% of the firms with a market value below 50 million USD used financial derivatives.

Since requirements regarding reporting standards for firms have increased in the last years, it is now possible to read about the use of derivatives in the annual reports published by firms. Géczy, Minton and Schrand (1997) used this method to study publicly traded Fortune 500 firms. Their results indicated that 56% of companies in their sample used some sort of derivatives

2.1. Shareholder theory and empirical evidence

Classical finance theories suggest that risk management does not create value. According to Modigliani and Miller (1958), risk management is irrelevant to firms because shareholders can do it on their own. This theory assumes that the capital market is perfect and there are no contracting costs or taxes. However, Modigliani and Miller (1963) recognize the tax benefit of interest rate paid on debt. The firm value will increase with increasing leverage because of the advantage of a debt tax shield. Kraus and Litzenberger (1973) draw attention to bankruptcy costs. These authors recognize the advantage of leverage but also bring up the costs associated with leverage, bankruptcy and the financial distress cost of debt. The marginal benefit of debt will then be a decreasing function of debt. Smith and Stulz (1985) argue that a transactional cost of bankruptcy encourages firms to hedge. Hedging reduces the likelihood of a firm ending up in a situation of financial distress, which gives the firm an opportunity to increase debt and take advantage of a debt tax shield.

Smith and Stulz (1985) also argue that risk management has an impact on tax payments. In a situation with a convex tax function, a firm can use financial derivatives to reduce the expected tax liabilities by smooth the taxable income.

Graham and Rogers (2002) tested Smith and Stulz (1985) argument about the convex tax payment. They did not find any evidence that supported this argument. However, they did find that hedging increased debt capacity, reduced cost of financial distress and that a firm's size has impact on the hedging activity. Allayannis and Weston (2001) managed to test whether financial derivatives created value for firms facing currency exchange risk. They discovered that derivative users had on average 4.87% higher value (measured by Tobin's Q) than non-users. This study was done by investigating 720 large non-financial firms in US between 1990 and 1995. Bartram, Brown and Conrad (2011) found that users of financial derivatives had lower estimated values on both total and systematic risk. They also uncovered that lower systematic risk reduced the cost of debt.

2.2. Management theory and empirical evidence

Principal-agent problem can be one explanation for firms' hedging activity. The principal in this case is a shareholder in a firm and the agent is a manager of a firm. A manager will maximise his own utility at the expense of the firm value. This problem could arise when information asymmetry occurs and principals and agents have different interests (Holmstrom 1979). Managers often face a greater risk aversion compared to shareholders. That is because a greater part of their welfare is invested in the firm. A typical shareholder, however, holds a diversified portfolio and only fraction of his wealth is invested in any single public company. Shareholders will therefore be less risk-aversive compared to firm managers. As a consequence, profitable but risky projects may not always be realized. Managers will then have a concave utility function of a firm value (risk aversion) compared to a shareholder, who holds a diversified portfolio, will have a linear utility function of the firm value (risk natural). Contract theory suggests that shareholders should structure a compensation contract that is convex in relation to the firm value. This will neutralise the effect of managers' risk aversion. Convex contracts could include stock option and bonus plans (Hemmer, Kim and Verrecchia 1999).

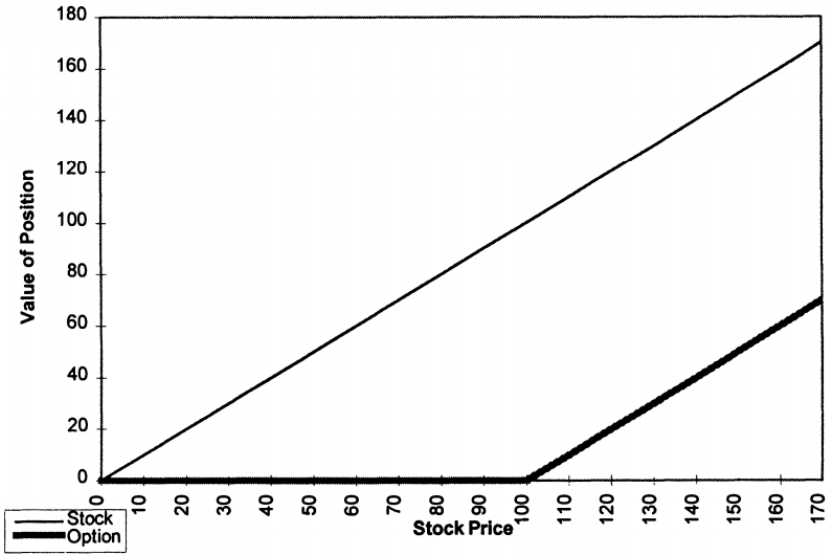
Smith and Stulz (1985) illustrate a hedging decision process for managers. Managers with a concave utility function of the firm value would only bear risk if he/she were rewarded by higher expected return. If there is no cost related to hedging and expected return is equal, the firm will completely hedge. A manager with a convex utility function of the firm value has a higher expected utility by not hedging at all. A manager will then behave as a risk-seeker. Risk-seeking behaviour could also be described by the Black and Scholes option-pricing model. The Black and Scholes option-pricing model describes that the value of an option increases when the underlying stock appreciates in value or when the volatility of the stock increases. A manager with a large proportion of stock options will then be willing to increase the volatility of the firm without increasing expected return (risk-seeking behaviour).

Tufano (1996) shows graphically the value and utility of a stock and option position as a function of a firm's stock price (please see the next page). Figure 1 shows only the stock payoff and stock option payoff with an exercise price of

$100. Figure 2 shows the expected utility for risk-averse managers with a concave utility function of the firm value $(\text{Utility} = \sqrt{Value\ of\ postion})$. If we assume a stock could take values of $50 or $150 with equal probability, the firm could also enter into hedging contract that locked in the stock price at $100. S(UH) and O(UH) stand for the expected utility of the unhedged stock and the option position. S(H) and O(H) stand for the expected utility of the hedged stock and the option position. By comparing a situation where a manager holding a stock with a hedged position, S(H), and holding a stock in an unhedged position, S(UH), it is clear in the Figure 2 that the manager generates higher utility by holding a stock in a hedged position. In a situation where a manager holds a stock option, a hedged position, O(H), would make the stock option worthless, whereas an option in an unhedged position, O(UH), would have value. In that case a stockholder may then prefer to hedge, but an option holder may not.

Figure 1

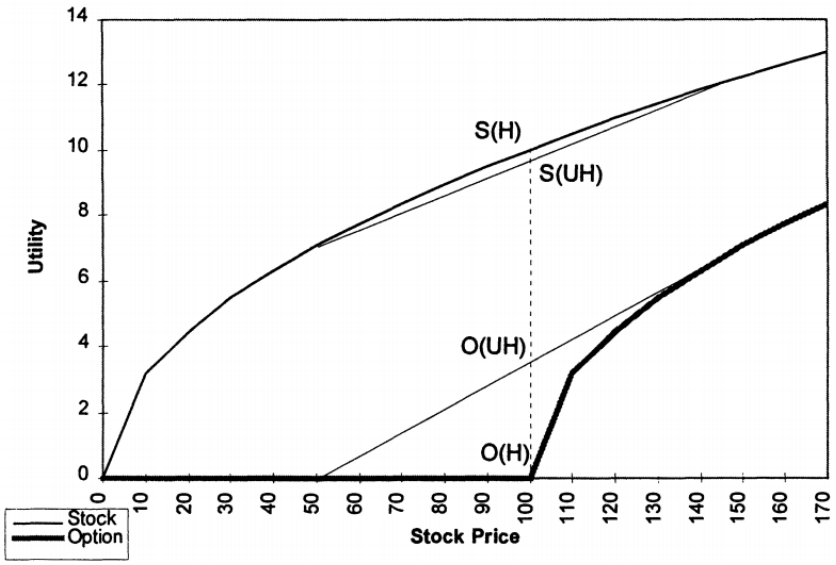
This figure shows the value of a stock and the underlying call option with an exercise price of $ 100.



Source: Tufano 1996.

Figure 2

This figure shows the expected utility when the utility function is $U = W^{1/2}$ (risk aversion). Suppose that, the stock is worth either \$50 or \$150, each with equal probability. The firm could also enter into a hedging contract that locks- in the stock price at \$100. The expected utility for holding an option in an unhedged position, O(UH), would be greater than holding an option in a hedged position, O(H). In a hedged position, the option will not pay off since the hedged position locks in the stock price at \$100, the same as the exercise price. In an unhedged position, there is a 50% probability that the stock is worth \$150; and since the exercise price is \$100 the option will be worth \$50. The expected utility for a stock in an unhedged position would be $S(OH) = ½ (50^{1/2} + 150^{1/2})$ and this is less than $S(H) = 100^{1/2}$. Holding a stock creates an incentive to hedge, whereas holding an option creates an incentive to not hedge.



Source: Tufano 1996.

Firms often compensate manger with a long-term incentive plan or a compensation plan with stock option component. In a long-term incentive plan manager often get an immediate distribution of shares and they will get more shares if the manager stays with the company for a number of years. Bonus plans where payout depends on accounting earrings is also a common way for compensation. A bonus plan will only make a payment when the manager has exceeded a certain target. This compensation method has some similarities to a call option. The option only pays off when the share price is higher than the exercises price and the bonus plan only makes payments when the earnings exceed the target. This compensation plan will then face a convex utility function

of the firm value and managers would hedge less. Kim, Nam and Thornton (2008) argues that a typical bonus plan has a target but also a cap. The bonus plan will then have both a convex and a concave region. The convex region would be close to the target value while the concave region would be close to the cap. If the manager expects to easily to reach the bonus payoff cap, he or she will face a concave utility function. Managers who do not expect to reach the target will face a convex utility function. Managers who expect to reach the bonus payoff cap will then hedge more than managers that do not expect to reach the target.

Tufano (1996) examined the gold mining industry in North America and found that managers who held more stock options did less in regards to risk management than managers that held more stocks. Rogers (2002), who studied the effect an executive portfolio structure has on risk management, also found evidence that managers with personal risk at stake did more to protect the firm. Kim, Nam and Thornton (2008) examined a bonus plan with a target and a cap, that resulting in a convex region and a concave region. He found that a manager who expected to be in the convex region had a negative relation on the usage of risk management derivatives. On the other hand, a manager who expected a concave region had a positive relation on the usage of risk management derivatives.

3. Hypotheses development

Research regarding Norwegian firms' usage of risk management tools is limited. However, Børsum and Ødegaard (2005) contribute with some interesting findings regarding the currency derivative usage among Norwegian firms. They discovered that larger firms use more financial derivatives than smaller firms. Also, they found that Norwegian firms act more and less in the same way as international firms in regards to the use of derivatives. However, Børsum and Ødegaard (2005) did not investigate the important role managerial behaviour could have on risk management decisions.

The main research question for this master thesis is: Does management compensations affect the usage of financial derivatives among companies listed on the Oslo Stock Exchange. We develop three hypotheses that we test:

Hypothesis 1: Management compensation based on stock options has a negative effect on the use of financial derivatives.

Theory suggests that a manager with a convex compensation component in relation to the firm value would be more risk seeking and would hedge less. Tufano (1996) and Rogers (2002) found evidence for that.

Hypothesis 2: Management performance-based compensation based on accounting earnings has an effect on the use of financial derivatives.

A bonus based on accounting earnings often faces a cap. This bonus will both have a convex and a concave region in relation to the firm value. Kim, Nam and Thornton (2008) found evidence that managers who were expecting to be in the convex region were hedging less than managers who were expecting to be in the concave region.

Hypothesis 3: Management compensation based on stocks has a positive effect on the use of financial derivatives.

Managers who hold stocks in the firm have a utility function of the firm value that will be closer to the shareholders. Hence, they will hedge more. The results of Tufano (1996) and Rogers (2002) provide support for this claim.

4. Data and Methodology

To answer our research question we decided to focus on non-financial firms trading on the Oslo Stock Exchange. We ended up examining 171 companies in total. Financial firms are not included because of their nature, where they often deal with financial instruments as their core business. Firms in financial distress are also not included because of inflated debt ratio. The data was collected from annual reports for the year 2011. Since all of the firms listed at the Oslo Stock Exchange have to follow international financial reporting standards (IFRS), they are required to report their usage of financial derivatives, discuss risk management, executive compensation and executive holding of shares and stock options. Hence, by studying annual reports we managed to collect the relevant data we needed.

4.1. Dependent variables

Since the main focus of this study is to observe how management compensation affects the financial derivative usage, we created a dependent variable called "users" of financial derivatives. By studying the annual reports we could decide whether firms used financial derivatives or not. The variable takes a value of 1 if a firm uses financial derivatives and 0 otherwise.

Additionally, in order to test the robustness of our analysis we decided to implement a method used by Bartram, Brown and Condrad (2011). The idea of this method is to create a variable based on the intensity of the derivative usage. Firstly, the risk exposure is divided into three different groups; foreign exchange risk, interest rate risk and commodity price risk. Thereafter, the three groups are divided into three sub-groups; forward/futures, swaps and options, which are the most common types of financial derivatives (Bartram, Brown and Condrad 2011). By adding up the factors we got a score which we used to identify the extent of derivative usage. By doing so, we managed to create two new dependent variables, "hedging intensity 1" and "hedging intensity 2," which we used to control for our main regression. The variable "hedging intensity 1" had a score range from 0 to 3, which was based on the three main groups of risk exposure. If a company, for example, used derivatives to hedge foreign exchange risk and interest rate risk, the score would be two. The variable "hedging intensity 2" had

scores range from 0 to 9. Here we also included the sub-groups. For example, if a company used forward/futures and options to hedge against foreign exchange risk, forwards/futures to hedge against commodity price risk and swaps to hedge against interest rate risk, the score would be four.

4.2. Independent variables

The data concerning management compensation was collected from annual reports. A bonus payment refers to when a CEO receives a bonus payment based on financial performance of the firm. Management compensation of shares is classified as if the CEO holds shares in the company or not. Management compensation of stock options is classified as if the CEO holds stock options in the company or not. All of the three variables are dummy variables which will take the value of "1" if the CEO receives/holds bonus payments, shares or stock options and "0" otherwise.

In order to avoid omitted variable problems in the cross sectional regressions we had to include some control variables. Control variables should be variables that may have an impact on the usage of financial derivatives. Based on earlier research, we decided to include four different control variables, such as industry, firm size, capital structure and education. Data on firm size and capital structure was collected from DataStream whereas the rest of the data was collected from the annual reports.

As Jin and Jorion (2006) point out, firms in certain industries might be more likely to hedge. The reason is based on the fact that the size of the risk exposure varies across industries and some risk exposures are easier to hedge than others. We used the Global Industry Classification Standard (GICS) in order to determine the industry. By removing the financial sector, we ended up with nine different sectors. All of the industry variables are dummy variables.

Previous studies show that firm size has an explanatory effect on the usage of financial derivatives. Nance, Smith and Smithson (1993) lists up four arguments for why it is important to control for firm size. (1) Firms in financial distress could face legal cost with bankruptcy; this cost is relative decreasing to the firm size. This suggests that smaller firms should hedge more. (2) Smaller firms are more

likely to face progressive tax compared to larger firms. This also suggests that smaller firms should hedge more. (3) When the firm size increases, the number of people in the management often increases as well. Therefore, the knowledge about risk management can increase which could lead to higher hedging activity. (4) The derivative market transaction cost is facing a scale of economics structure; this implies that larger firms hedge more. Since there are several reasons for why firm size matters, our expectations of the sign is ambiguous. Firm size is measured by book value of total assets.

A firm with leverage pays interest on its debt, by doing that it pays less in tax than a firm with the same free cash flow. Since debt has a tax benefit, debt will increase the value of the firm. However, increase in firm debt increases the likelihood of financial distress. By using risk management derivatives, a firm can reduce the likelihood of financial distress by issuing more debt (Smith and Stulz 1985). Capital structure is measured by the book value of debt ratio (book value of total leverage divided by book value of total asset). We expect that the sign of the capital structure variable is positive.

Dionne, Chun and Triki (2012) are one of the first to actually examine the relation between risk management policy/activity and directors financial knowledge. They provide evidence regarding financially educated directors and its relation to hedging activity. Due to the fact that educational background of directors can affect risk management policy of a company, we decided to include a variable which captured educational background of a CEO. The variable is a dummy variable that takes the value of "1" if the CEO in the company has a background in finance and "0" otherwise. Based on the research by Dionne, Chun and Triki (2012), we should expect that CEOs with a finance background/education should have more knowledge about financial derivatives and risk exposures. Therefore, they should hedge more than CEOs with other educational backgrounds. Information about CEO educational background was collected from annual reports and Thomson Reuters.

4.3. Derivative usage

In Table 1 a summary of the derivative usage is presented. Out of the 171 firms in our sample, we found that 64% of the firms used derivatives. Overall, financial derivatives used to hedge against foreign exchange risk are most common (53%). Interest rate derivatives are the second most common (53%) and only 14% of the firms in the sample used commodity price derivatives. Among the foreign exchange derivative users 98% of them used forwards/futures, whereas swaps are the most frequently used derivatives among the interest rate derivative users (100%). As for commodity price derivative users, forward/future contracts are the most common derivative (76%).

Table 1 – Statistics of financial derivative usage

Table 1 displays the total number of firms and the percentage users of financial derivatives in each of the industries. It also presents the percentage number of firms that use financial derivatives to hedge for foreign exchange risk, interest rate risk and commodity price risk. The percentage number of forward/futures, swap and option are calculated based on the users of foreign exchange, interest rate and commodity price derivatives.

			Foreign Exchange risk				Interest rate risk				Commodity price risk			
Industry	**Number of firms**	**Users of derivatives**	**% users of FX derivatives**	**% Forward/Future of FX users**	**% Swap of FX users**	**% Option of FX users**	**% users of IR derivatives**	**% Forward/Future of IR users**	**% Swap of IR users**	**% Option of IR users**	**% users of Users of CP**	**% Forward/Future of CP users**	**% Swap of CP users**	**% Option of CP users**
Consumer discretionary	9	89 %	44 %	100 %	25 %	0 %	67 %	0 %	100 %	0 %	22 %	100 %	0 %	0 %
Consumer Staples	17	88 %	82 %	100 %	14 %	0 %	59 %	0 %	100 %	0 %	6 %	100 %	0 %	0 %
Energy	58	66 %	57 %	97 %	21 %	27 %	52 %	0 %	100 %	7 %	9 %	60 %	20 %	60 %
Health care	17	29 %	24 %	100 %	0 %	25 %	12 %	0 %	100 %	0 %	0 %	0 %	0 %	0 %
Industry	33	85 %	70 %	96 %	17 %	22 %	58 %	5 %	100 %	11 %	24 %	63 %	25 %	38 %
Information Technology	22	27 %	27 %	100 %	17 %	17 %	9 %	0 %	100 %	0 %	0 %	0 %	0 %	0 %
Materials	12	50 %	42 %	100 %	40 %	40 %	42 %	20 %	100 %	0 %	42 %	100 %	0 %	20 %
Telecommunication services	1	100 %	100 %	100 %	100 %	0 %	100 %	100 %	100 %	100 %	0 %	0 %	0 %	0 %
Utilities	2	100 %	100 %	100 %	50 %	50 %	100 %	0 %	100 %	0 %	100 %	100 %	0 %	100 %
Total	**171**	**64 %**	**54 %**	**98 %**	**21 %**	**21 %**	**45 %**	**4 %**	**100 %**	**6 %**	**13 %**	**78 %**	**13 %**	**39 %**

4.4. Descriptive statistics

Table 2 presents an overview of the descriptive statistics for the entire sample, whereas Table 3 reveals the characteristics for firms using financial derivatives and for firms that do not use them at all.

Comparing the mean of the debt ratio we can see that the firms which use financial derivatives have a higher on average debt ratio (58.8% compared to 37.8%). According to our difference of means test, the mean for users and non-users are also statistically significant (see Appendix 1). This is consistent with our expectations and the theory provided earlier in our thesis. Also, the total assets are higher for the firms using financial derivatives compared to the firms that do not use financial derivatives.

The variables concerning management compensation for users and non-users of financial derivatives reveal some interesting findings. As for the share and stock option variables the pattern is clear. It seems like users of financial derivatives hold more shares (83.5% compared to 64.5%) and fewer stock options (46.8% compared to 72.6%) than non-users of financial derivatives. According to our difference of means test, this is also statistically significant (see appendix 1). However, for the bonus payment variable there are no extraordinary differences between users and non-users of financial derivatives. When comparing our education and the industry variables for users and non-users, there are also no clear patterns.

Table 2 – Descriptive Statistics – Overall

Table 2 presents the descriptive statistics for the entire sample size. Total assets are measured in billions (NOK).

		Users and non-users						
		Mean	Median	Max	Min	Std. Dev.	Sum	Obs
Derivative usage	Users	0,637	1	1	0	0,482	109	171
	Hedging intensity 1	1,123	1	3	0	1,013	192	171
	Hedging intensity 2	1,421	1	7	0	1,564	243	171
Compensation	Bonus payment	0,754	1	1	0	0,432	129	171
	Shares	0,766	1	1	0	0,425	131	171
	Stock option	0,561	1	1	0	0,498	96	171
Education	Finance	0,415	0	1	0	0,494	71	171
Financial information	Debt ratio	0,512	0,560	0,951	0,008	0,208	87,482	171
	Total assets	12,731	1,943	762,903	0,012	61,116	2 176,948	171
Industry	Consumer discretionary	0,053	0	1	0	0,224	9	171
	Consumer Staples	0,099	0	1	0	0,300	17	171
	Energy	0,339	0	1	0	0,475	58	171
	Health care	0,099	0	1	0	0,300	17	171
	Industry	0,193	0	1	0	0,396	33	171
	Information Technology	0,129	0	1	0	0,336	22	171
	Materials	0,070	0	1	0	0,256	12	171
	Telecommunication services	0,006	0	1	0	0,076	1	171
	Utilities	0,012	0	1	0	0,108	2	171

Table 3 – Descriptive Statistics – Users vs. Non-users

Table 3 presents the descriptive statistics for derivative users and non-users. Total assets are measured in billions (NOK).

		Users							Non-users						
		Mean	Median	Max	Min	Std. Dev.	Sum	Obs	Mean	Median	Max	Min	Std, Dev,	Sum	Obs
Derivative usage	Users	1	1	1	1	-	109	109	0	0	0	0	0	0	62
	Hedging intensity 1	1,761	2	3	1	0,693	192	109	0	0	0	0	0	0	62
	Hedging intensity 2	2,229	2	7	1	1,425	243	109	0	0	0	0	0	0	62
Compensation	Bonus payment	0,771	1	1	0	0,422	84	109	0,726	1	1	0	0,450	45	62
	Shares	0,835	1	1	0	0,373	91	109	0,645	1	1	0	0,482	40	62
	Stock option	0,468	0	1	0	0,501	51	109	0,726	1	1	0	0,450	45	62
Education	Finance	0,440	0	1	0	0,499	48	109	0,371	0	1	0	0,487	23	62
Financial information	Debt ratio	0,588	0,604	0,951	0,166	0,151	64,073	109	0,378	0,380	0,776	0,008	0,227	23,409	62
	Total assets	19,480	4,782	762,903	0,042	75,838	2 123,292	109	0,865	0,396	8,766	0,012	1,511	53,656	62
Industry	Consumer discretionary	0,073	0	1	0	0,262	8	109	0,016	0	1	0	0,127	1	62
	Consumer Staples	0,138	0	1	0	0,346	15	109	0,032	0	1	0	0,178	2	62
	Energy	0,349	0	1	0	0,479	38	109	0,323	0	1	0	0,471	20	62
	Health care	0,046	0	1	0	0,210	5	109	0,194	0	1	0	0,398	12	62
	Industry	0,257	0	1	0	0,439	28	109	0,081	0	1	0	0,275	5	62
	Information Technology	0,055	0	1	0	0,229	6	109	0,258	0	1	0	0,441	16	62
	Materials	0,055	0	1	0	0,229	6	109	0,097	0	1	0	0,298	6	62
	Telecommunication services	0,009	0	1	0	0,096	1	109							
	Utilities	0,018	0	1	0	0,135	2	109							

4.5. Correlation matrix

In order to compare the correlations between the dependent and explanatory variables, we used the Spearman correlation matrix. From the correlation matrix, we discovered that holding shares had a significantly positive correlation on the use of financial derivatives and stock options had a significant negative correlation on use of financial derivatives. This is in line with theory and our hypothesis. There was no significant correlation between bonus payment and users of derivatives. Financial information such as debt ratio and total asset, are significantly positive correlated, whereas five out of nine industry variables were correlated to derivative usage (see Appendix 2).

5. Empirical results

The analysis is presented in a multivariate framework. A multivariate regression takes into consideration the relation between variables. The correlation matrix suggests, for example, that firm size is significantly correlated with both "derivative usage" and "bonus payment." By running a multivariate regression we can adjust for the effect firm size has on bonus payment. Therefore, in order to test our hypotheses, we ran seven different regressions. In the first regression we only included the compensation variables. Thereafter, we included all of the control variables, which had an effect on the compensation coefficients. In the next two regressions we subtracted some of the control variables in order to look at the effect they had on the compensation coefficients. In the end, we ran three different regressions, which included one of the compensation variables at a time. Since the dependent variable, user, is a dummy variable that takes the value of 1 if a firm report usage of financial derivatives and 0 otherwise, we tested our equations in a binary logistic regression. Interpretation of coefficient values in a binary logistic regression is difficult. That is because they cannot be interpreted as the marginal effect. Nevertheless, it can tell us the sign of the effect of the variable. Since the coefficients are difficult to interpret, we calculated the marginal effect. The marginal effect is the partial derivative with respect to the variable. It provides an estimation of the change in probability of the dependent variable to a change in the independent variable. In Panel A we present the results from our two first regressions.

Panel A – Binary logistics regressions

*Panel A presents results from two binary logistics regressions. The dependent variable is users, which is a dummy variable that takes the value of 1 if a firm used financial derivatives and 0 otherwise. The independent variables are Bonus payment, Shares and Stock option, which are dummy variables that take the value of 1 if a CEO receives bonus payments, shares or stock options and 0 otherwise; EduFinance, which is a dummy variable that takes the value of 1 if the CEO has a financial education background and 0 otherwise; log Debt ratio and log Total Assets, which are natural logarithms of the debt ratio and the total assets. The last variables are all dummy variables that take the value of 1depending on the industry the firm is in and 0 otherwise. Totally there were nine industry variables, but we had to exclude the two last industry variables, Telecommunication services and Utilities, because of the low number of observations. ** or *** mean that the coefficient is statistically significant at the 5% or 1% levels, respectively.*

Panel A: Dependent variable: Users								
	Panel A - 1				Panel A - 2			
Independent Variables	Marginal Effect	P-value M.E.	Coefficients	P-value Coeff.	Marginal Effect	P-value M.E.	Coefficients	P-value Coeff.
Bonus payment	0,0882	0.364	0.3771	0.356	0.1051	0.453	0.5705	0.424
Shares	0,2476***	0.008	1.0390***	0.008	0.1401	0.300	0.7423	0.268
Stock option	-0.2716***	0.000	-1.2461***	0.001	-0.2119**	0.035	-1.3019**	0.040
EduFinance					0.0252	0.794	0.1485	0.795
log Debt ratio					0.2046**	0.050	1.1976**	0.027
log Total Assets					0.2637***	0.000	1.5434***	0.000
Consumer Staples					0.1574	0.156	1.248	0.311
Consumer discretionary					0.2333***	0.001	3.0849	0.206
Energy					-0.0275	0.872	-0.1589	0.871
Health care					0.2458***	0.001	2.7269**	0.039
Industry					0.2529***	0.004	2.1642**	0.034
Information Technology					0.0320	0.869	0.195	0.875
Materials					0.1335	0.280	1.0212	0.425
Constant			0.2352	0.586				
	Number of obs. = 168		*LR chi2(3) = 19.48*		*Number of obs. = 168*		*Wald chi2(13) = 43.05*	
	Log likelihood = -100.88125		*Prob > chi2 = 0.0002*		*Log likelihood = -43.655205*		*Prob > chi2 = 0.0000*	
			Pseudo R2 = 0.0880					

The focus of our research was to test whether CEO compensations affected the financial derivative usage. The results in Panel A indicate that compensation based on bonus payment was not statistically significant but had a positive sign. As specified in our hypotheses, we were unsure about which effect the variable could have (positive or negative), since theory points in both directions. Since there is a positive sign, it indicates that many CEOs were facing a cap on their bonuses. The variable "Shares" (CEOs holding shares in a firm) had a positive

coefficient as expected from theory. In Panel A – 1, where we did not include the control variables, "Shares" was statistically significant and positive. However, in Panel A – 2, when we included the control variables, the variable was not statistically significant. Hence, we saw the effect control variables had on our compensation variable, "Shares". As for CEO holdings of stock options we find evidence for a significant negative marginal effect related to usage of financial derivatives. A marginal effect with a coefficient -0,2119 (Panel A – 2) means that the likelihood for usage of financial derivatives decreases with 21,19% if a CEO goes from not holding stock option to holding stock options. This is consistent with previous theory and research (Tufano 1996). Our variable for whether the CEOs education background affected the usage of financial derivatives (EduFinance) was not statistically significant. Hence, we could not determine that a CEO with a finance education tends to use more financial derivatives than other CEOs.

The capital structure, measured as the logarithm of the debt ratio, is statistically significant and positive. This is consistent with previous theory, which states that an increase in the firms' debt ratio should positively affect the derivative usage (Smith and Stulz 1985). The theory regarding firm size and its relation to risk management was somewhat unclear. However, in our research we find that firm size, measured as the logarithm of total assets, has a positive effect on the usage of financial derivatives (statistically significant). This indicates that larger firms have a higher probability of using financial derivatives than smaller firms. As for the industry variables, we found that two of the variables (Health care and Industry) were positively statistically significant with usage of financial derivatives. Hence, this shows that it is important to control for industry.

Panel B reveals the results from two other logistic regressions. In the first regression (Panel B - 1) we excluded the firm size variable and the education variable. As the results indicated, both bonus payment and stock option were statistically significant. Also the debt ratio variable and five of the industry variables were statistically significant. In the second regression (Panel B - 2) we also excluded the debt ratio variable, leaving only the compensation variables and industry variables. Although the regression did not control for firm size and the

firms' capital structure, the results indicated that all of the compensation variables were statistically significant.

Panel B - Binary logistics regressions

*Panel B presents results from two binary logistics regressions. The dependent variable is users, which is a dummy variable that takes the value of 1 if a firm used financial derivatives and 0 otherwise. The independent variables are Bonus payment, Shares and Stock option, which are dummy variables that take the value of 1 if a CEO receives bonus payments, shares or stock options and 0 otherwise; log Debt ratio, which are the natural logarithms of the debt ratio. The last variables are all dummy variables that take the value of 1depending on the industry the firm is in and 0 otherwise. Totally there were nine industry variable, but we had to exclude the two last industry variables, Telecommunication services and Utilities, because of the low number of observations. ** or *** mean that the coefficient is statistically significant at the 5% or 1% levels, respectively.*

Panel B: Dependent variable: Users								
	Panel B - 1				Panel B - 2			
Independent Variables	Marginal Effect	P-value M.E.	Coefficients	P-value Coeff.	Marginal Effect	P-value M.E.	Coefficients	P-value Coeff.
Bonus payment	0.3430***	0.005	1.4696***	0.007	0.2151*	0.059	0.9300*	0.055
Shares	0.0670	0.570	0.2958	0.562	0.2567**	0.013	1.1025**	0.012
Stock option	-0.2444***	0.008	-1.1533**	0.013	-0.2385***	0.003	-1.1370***	0.006
EduFinance								
log Debt ratio	0.4285***	0.000	1.9367***	0.000				
log Total Assets								
Consumer Staples	0.3437***	0.000	2.5723***	0.010	0.2019*	0.090	1.1335	0.211
Consumer discretionary	0.3292***	0.000	2.7647**	0.046	0.1747	0.283	0.9705	0.415
Energy	0.3181***	0.007	1.6238**	0.022	-0.0347	0.775	-0.1572	0.772
Health care	0.1337	0.424	0.6749	0.486	-0.3940**	0.020	-1.6682**	0.033
Industry	0.3981***	0.000	2.6482***	0.001	0.1964**	0.039	1.0297*	0.099
Information Technology	-0.0810	0.700	-0.3524	0.691	-0.4795***	0.001	-2.0899***	0.006
Materials	0.2834***	0.001	1.902**	0.047	-0.0948	0.597	-0.4109	0.580
	Number of obs. = 168		*Wald chi2(11) = 47.92*		*Number of obs. = 168*		*Wald chi2(10) = 41.60*	
	Log likelihood = -70.817337		*Prob > chi2 = 0.0000*		*Log likelihood = -83.64307*		*Prob > chi2 = 0.0000*	

Panel C reveals the results from the regressions, which we used to analyze the compensation variables separately. As for the two first regressions (Panel C – 1 and 2), neither the "Bonus payment" nor the "Shares" variable were statistically significant. However, the sign of the coefficients was equal to what we discovered in both Panel A and B. In the last regression (Panel C – 3) we once again saw that "Stock option" was statistically significant and negative.

Panel C - Binary logistics regressions

*Panel C presents results from two binary logistics regressions. The dependent variable is users, which is a dummy variable that takes the value of 1 if a firm used financial derivatives and 0 otherwise. The independent variables are Bonus payment, Shares and Stock option, which are dummy variables that take the value of 1 if a CEO receives bonus payments, shares or stock options and 0 otherwise; log Debt ratio, which are natural logarithms of the debt ratio. The last variables are all dummy variables that take the value of 1depending on the industry the firm is in and 0 otherwise. Totally there were nine industry variable, but we had to exclude the two last industry variables, Telecommunication services and Utilities, because of the low number of observations. ** or *** mean that the coefficient is statistically significant at the 5% or 1% levels, respectively.*

Panel C: Dependent variable: Users												
	Panel C - 1				Panel C - 2				Panel C - 3			
Independent Variables	Marginal Effect	P-value M.E.	Coefficients	P-value Coeff.	Marginal Effect	P-value M.E.	Coefficients	P-value Coeff.	Marginal Effect	P-value M.E.	Coefficients	P-value Coeff.
Bonus payment	0.0394	0.744	0.2153	0.737								
Shares					0.1344	0.317	0.7040	0.287				
Stock option									-0.1859*	0.057	-1.0959*	0.061
EduFinance	0.0117	0.905	0.0660	0.905	0.0069	0.942	0.0398	0.942	0.0137	0.890	0.0775	0.890
log Debt ratio	0.2535**	0.019	1.4248***	0.008	0.2275**	0.033	1.3069**	0.016	0.2200**	0.034	1.2442**	0.017
log Total Assets	0.2667***	0.000	1.4987***	0.000	0.2736***	0.000	1.572***	0.000	0.2717***	0.000	1.5369***	0.000
Consumer Staples	0.2106***	0.006	1.8213*	0.085	0.1622	0.126	1.2616	0.279	0.2308***	0.001	2.1864**	0.041
Consumer discretionary	0.2526***	0.000	3.3526	0.106	0.2367***	0.000	2.9898	0.150	0.2620***	0.000	3.9539	0.129
Energy	0.0314	0.813	0.1771	0.816	-0.0637	0.698	-0.3556	0.691	0.1286	0.242	0.7783	0.276
Health care	0.2590***	0.000	2.7286**	0.034	0.2382***	0.001	2.4226**	0.045	0.2907***	0.000	3.6738***	0.002
Industry	0.2919***	0.000	2.5117***	0.003	0.2456***	0.005	2.0054**	0.041	0.3197***	0.000	2.9465***	0.001
Information Technology	0.0821	0.598	0.5137	0.644	0.0181	0.921	0.1064	0.923	0.1700*	0.071	1.2671	0.209
Materials	0.0981	0.493	0.6475	0.568	0.0548	0.752	0.3429	0.773	0.1775*	0.065	1.4654	0.229
	Number of obs. = 168		*Wald chi2(11) = 43.29*		*Number of obs. = 168*		*Wald chi2(10) = 42.32*		*Number of obs. = 168*		*Wald chi2(10) = 44.56*	
	Log likelihood = -46.422399		*Prob > chi2 = 0.0000*		*Log likelihood = -45.906985*		*Prob > chi2 = 0.0000*		*Log likelihood = -44.6812*		*Prob > chi2 = 0.0000*	

The main finding from our regressions above is that CEOs holding stock options in a firm negatively affects the usage of financial derivatives. In all of the regressions we discovered that the "Stock option" variable was statistically significant and negative. This is robust evidence, which is consistent with previous theory and research (Tufano 1996; Rogers 2002). Although, we find significant coefficients for the "Bonus Payment" and "Shares" variables in some of the regressions, this is still not robust.

6. Robustness test

In order to test the robustness of our findings we implemented the method used by Bartram, Brown and Condrad (2011). By doing so, we managed to create two new dependent variables, "Hedging intensity 1" and "Hedging intensity 2", which took into account the hedging intensity of a firm. Since the variable "Hedging intensity 1" could take the values from 0 to 3 and the variable "Hedging intensity 2" could take the values from 0 to 9, we used an ordered logistics regression. The results from the regressions are shown in panels D and E.

In Panel D the dependent variable was "hedging intensity 1". The first regression (Panel D – 1) only included our compensation variables. As we can see from the results both the variable "Shares" and "Stock option" were statistically significant and the sign of the coefficients were consistent with our main regression (Panel A). However, when we included all of the control variables in the regression (Panel D – 2), the compensation variables were not statistically significant. This again reveals that some of the control variables affect the usage of financial derivatives.

In Panel E we used "hedging intensity 2" as the dependent variable. As from the results, we observed that when we included the control variables (Panel E – 2) the compensation variable "Stock option" was statistically significant and negative. Overall, the results from Panel E are consistent with those presented previously.

Panel D – Ordered logistics regressions

*Panel D presents results from two ordered logistics regressions (Panel D – 1 and Panel D – 2). The dependent variable is hedging intensity 1, which is a variable that can take the values from 0 to 3 and captures the hedging intensity of a firm. The independent variables are Bonus payment, Shares and Stock option, which are dummy variables that take the value of 1 if a CEO receives bonus payments, shares or stock options and 0 otherwise; EduFinance, which is a dummy variable that takes the value of 1 if the CEO has a financial education background and 0 otherwise; log Debt ratio and log Total Assets, which are natural logarithms of the debt ratio and the total assets. The last variables are all dummy variables that take the value of 1depending on the industry the firm is in and 0 otherwise. Totally there were nine industry variable, but we had to exclude the two last industry variables, Telecommunication services and Utilities, because of the low number of observations. ** or *** mean that the coefficient is statistically significant at the 5% or 1% levels, respectively.*

Panel D: Dependent variable: Hedging intensity 1				
	Panel D - 1		Panel D - 2	
Independent Variables	**Coefficients**	**P - value**	**Coefficients**	**P - value**
Bonus payment	0.2782	0.426	0.0533	0.906
Shares	0.9465***	0.008	0.5215	0.275
Stock option	-0.7588**	0.011	-0.5876	0.126
EduFinance			0.3771	0.306
log Debt ratio			1.4606***	0.003
log Total Assets			1.5105***	0.000
Consumer Staples			-1.3460	0.152
Consumer discretionary			-1.9766*	0.069
Energy			-2.0769**	0.017
Health care			0.0637	0.954
Industry			-0.3989	0.659
Information Technology			-2.4240**	0.020
Materials (omitted)			0	
Limit points				
Cut 1	-0.0466		-2.5102	
Cut 2	1.0604		0.0655	
Cut 3	3.0361		3.7636	
	Number of obs. = 168	*LR chi2(3) = 15.19*	*Number of obs. = 168*	*LR chi2(12) = 192.45*
	Log likelihood = -207.8202	*Prob > chi2 = 0.017*	*Log likelihood = -119.1876*	*Prob > chi2 = 0.0000*
		Pseudo R2 = 0.0353		Pseudo R2 = 0.4467

Panel E - Ordered logistics regressions

*Panel E presents results from two ordered logistics regressions (Panel E – 1 and Panel E – 2). The dependent variable is hedging intensity 2, which is a variable that can take the values from 0 to 9 and captures the hedging intensity of a firm. The independent variables are Bonus payment, Shares and Stock option, which are dummy variables that take the value of 1 if a CEO receives bonus payments, shares or stock options and 0 otherwise; EduFinance, which is a dummy variable that takes the value of 1 if the CEO has a financial education background and 0 otherwise; log Debt ratio and log Total Assets, which are natural logarithms of the debt ratio and the total assets. The last variables are all dummy variables that take the value of 1depending on the industry the firm is in and 0 otherwise. Totally there were nine industry variable, but we had to exclude the two last industry variables, Telecommunication services and Utilities, because of the low number of observations. ** or *** mean that the coefficient is statistically significant at the 5% or 1% levels, respectively.*

Panel E: Dependent variable: Hedging intensity 2				
	Panel E - 1		Panel E - 2	
Independent Variables	**Coefficients**	**P - value**	**Coefficients**	**P - value**
Bonus payment	0.3012	0.383	-0.1990	0.646
Shares	0.9278***	0.009	0.5650	0.225
Stock option	-0.7982***	0.007	-0.7855**	0.027
EduFinance			0.4687	0.179
log Debt ratio			1.3358***	0.004
log Total Assets			1.5355***	0.000
Consumer Staples			-0.9944	0.230
Consumer discretionary			-1.4900	0.127
Energy			-1.2453*	0.097
Health care			0.9220	0.370
Industry			-0.1179	0.882
Information Technology			-1.5283	0.106
Materials (omitted)			0	
Limit points				
Cut 1	-0.0665		-2.0021	
Cut 2	1.0189		0.5237	
Cut 3	2.0442		2.5186	
Cut 4	3.2637		4.5055	
Cut 5	3.9067		5.4832	
Cut 6	5.0400		7.4111	
	Number of obs. = 168	*LR chi2(3) = 15.19*	*Number of obs. = 168*	*LR chi2(12) = 199.16*
	Log likelihood = -207.8202	*Prob > chi2 = 0.017*	*Log likelihood = -158.8071*	*Prob > chi2 = 0.0000*
		Pseudo R2 = 0.0353		Pseudo R2 = 0.3854

7. Conclusion

The aim of this paper is to examine whether management compensation affects the usage of financial derivatives. The data was collected manually from annual reports of 171 non-financial firms listed on the Oslo Stock Exchange in 2011. In order to capture the effects management compensation had on the usage of financial derivatives we ran a multivariate regression. In our main regression, where the dependent variable was users or non-users of financial derivatives, we used a binary logistics regression. As for the robustness test, where the dependent variables captured the hedging intensity, we run an ordered logistics regression.

Our research provides evidence that CEOs holding stock options have a statistically significant negative effect on the usage of financial derivatives. In all the regression specifications we ran, the stock options dummy was highly significant. Thus our results confirm those of Tufano (1996) and Rogers (2002) on a different sample and in a different time period. This suggests that the risk management incentives' stemming from stock options is a strong and quite robust one.

Although, the results concerning derivative usage and CEOs who hold shares in the company was not robust, we observed a positive link between them. As for bonus payment we observed a positive relation between the variable and the usage of financial derivatives. However, the result was not robust. One potential reason we did not find any robust results concerning the effect bonus payment and shares could have on financial derivative usage, could be that we were not able to collect data on the size of management compensation from firms' annual reports. As for bonus payment, we did not take into consideration that some firms have a limit on how much bonus a CEO can receive, which again can affect the hedging decision.

We also found it interesting to control for the education background of the CEO. Our expectations were that CEOs with a financial education should have more knowledge about risk management and therefore use more financial derivatives. Although we observed a positive relation, our result was not significant. Furthermore, our research suggests that also other firm characteristics, such as firm size and capital structure, affect the hedging activity. An increase in the

firms' debt ratio increased the probability of hedging. Our results also suggest that firm size affects the derivative usage. We observed a significant positive relation between firm size and the usage of financial derivatives.

With regards to further research -- though the data collection is time consuming -- it may be useful to look at whether the usage of financial derivatives varies across time as our analysis is based on one year's worth of data. Historical data may provide more clarity on the usage of financial derivatives across different time periods, good and bad years, booms and recessions.

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9. Appendix

Appendix 1 – Difference of Means

*The table presents the difference of Means t-Test (Two-Sample assuming unequal variance). The test compares the mean for the variables; bonus payment, shares, stock option, education finance and debt ratio for users and non-users of financial derivatives. *** mean that the coefficient is statistically significant at the 1% level.*

	Bonus Payment		**Shares**		**Stock option**		**Education Finance**		**Debt ratio**	
	Users	*Non-users*	*Users*	*Non-users*	*Users*	*Non-users*	*Users*	*Non-users*	*Users*	*Non-users*
Mean	0,771	0,726	0,835	0,645	0,468	0,726	0,440	0,371	0,588	0,378
Variance	0,178	0,202	0,139	0,233	0,251	0,202	0,249	0,237	0,023	0,052
Observations	109	62	109	62	109	62	109	62	109	62
Hypothesized Mean Difference	0		0		0		0		0	
df	120		103		139		129		92	
t-Stat	0,641		2,675		-3,457		0,888		6,511	
P-value	0,523		0,009	***	0,001	***	0,376		0,000	***

Appendix 2 – Correlation Matrix

The table presents the Spearman correlation matrix between our dependent variables (Users, Hedging intensity 1 and Hedging intensity 2) and our independent variables.

		Derivative usage			Compensation			Education	Financial information		Industry								
		Users	Hedging int. 1	Hedging int. 2	Bonus payment	Shares	Stock option	Finance	Debt ratio	Total Assets	Consumer d.	Consumer S.	Energy	Health care	Industry	Info. Tech.	Materials	Tele. Serv.	Utilities
Derivative usage	Users	1																	
	Hedging intensity 1	0,873***	1																
	Hedging intensity 2	0,864***	0,981***	1															
Compensation	Bonus payment	0,05	0,069	0,074	1														
	Shares	0,215***	0,232***	0,228***	0,166**	1													
	Stock option	-0,25***	-0,198***	-0,204***	0,208***	0,013	1												
Education	Finance	0,068	0,102	0,117	0,067	0,045	0,099	1											
Financial information	Debt ratio	0,437***	0,453***	0,432***	-0,157**	0,254***	-0,184**	0,14*	1										
	Total assets	0,683***	0,78***	0,79***	0,166**	0,153**	-0,081	0,068	0,319***	1									
Industry	Consumer discretionary	0,123	0,055	0,048	0,074	0,068	-0,056	0,12	0,089	0,081	1								
	Consumer Staples	0,169**	0,127*	0,101	0,053	0,045	0,018	0,037	0,01	0,134*	-0,078	1							
	Energy	0,026	0,048	0,077	0,007	-0,071	-0,039	-0,102	0,05	0,258***	-0,169**	-0,238***	1						
	Health care	-0,237***	-0,257***	-0,248***	0,053	-0,047	0,136*	0,037	-0,23***	-0,382***	-0,078	-0,11	-0,238***	1					
	Industry	0,215***	0,19**	0,165**	-0,237***	0,06	-0,135*	-0,081	0,242***	0,038	-0,115	-0,162**	-0,35***	-0,162**	1				
	Information Technology	-0,292***	-0,294***	-0,285***	0,138*	0,089	0,093	0,066	-0,131*	-0,298***	-0,091	-0,128*	-0,275***	-0,128*	-0,188**	1			
	Materials	-0,079	0,012	-0,006	-0,056	-0,173**	0,058	0,001	-0,123	-0,016	-0,065	-0,091	-0,197**	-0,091	-0,134*	-0,106	1		
	Telecommunication services	0,058	0,072	0,126	0,044	0,042	0,068	0,091	-0,039	0,131*	-0,018	-0,025	-0,055	-0,025	-0,038	-0,029	-0,021	1	
	Utilities	0,082	0,179**	0,178**	0,062	0,06	-0,123	0,019	0,046	0,119	-0,026	-0,036	-0,078	-0,036	-0,053	-0,042	-0,03	-0,008	1

*,** or *** mean that the correlation is significant at the 10%, 5% or 1% levels, respectively (2-tailed)

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Preliminary Thesis Report

The usage of derivatives among companies listed on the Oslo Stock Exchange

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Introduction

Managing risk is an important topic in finance. It has been increasingly common among companies to reduce their risk exposure in order to have more stable cash-flows. Depending on their attitudes toward risk, firms often use financial derivatives as a risk management instrument. The reasons for using risk management instruments are based on economies of scale arguments, financial distress, ownership structure and liquidity issues. Firms often face risk associated with foreign exchange, interest rate and commodity prices. The most common derivatives firms use to reduce these types of exposure are forwards/futures, options and swaps.

Stulz (2003) explains that managerial compensation contract, which may include stock options, ownership stocks and cash bonuses, could be one reason why companies may or may not use risk management instruments. Shareholders are interested in maximizing the value of their firm's shares. By relating managerial compensation to some measure of value, managers' financial wellbeing will depend on how the company is doing and thus affect their attitude toward the usage of risk management instruments.

Given the fact that risk management is important for so many firms, this master thesis will examine how executive compensation affects the usage of financial derivatives among companies listed on the Oslo Stock Exchange. To answer our main research problem we have created three different hypotheses which we will test. Firstly, we look at whether stock options have a negative impact on the usage of financial instruments. Secondly, we consider whether cash bonuses have a negative impact on the usage of financial derivatives. Thirdly, we look at whether management compensation based on stocks has a positive effect on the usage of financial derivatives. Our hypotheses are mainly based on the theory which Smith and Stulz (1985) present, which states that managerial compensations is important in the use of risk management instruments. In addition, we will ponder whether education level of a CEO affects the use of financial derivatives. To test these hypotheses we will gather relevant information from annual reports.

In this preliminary report, we first consider the theory regarding different compensation schemes and existing research on the usage of financial derivatives. Then we present the research methodology and discuss practical implications of this master thesis.

Theory

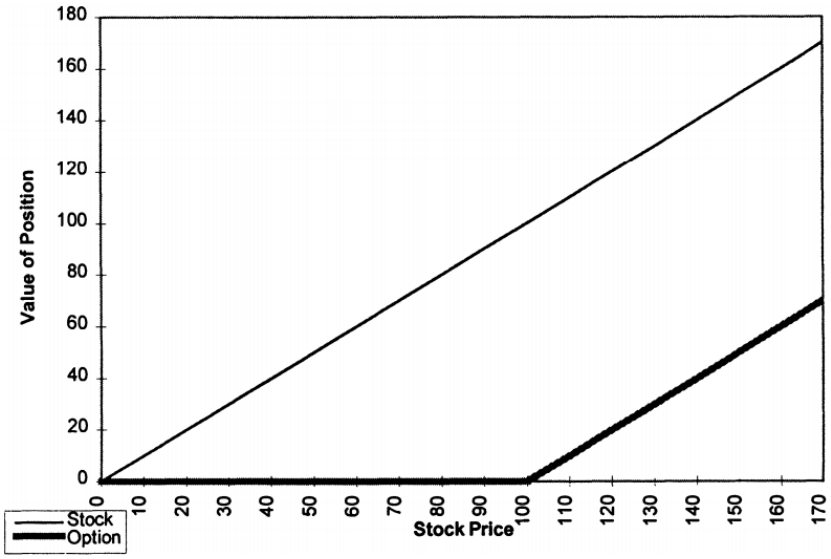
Classical finance theories suggest that risk management does not create value. According to the Modigliani and Miller paradigm (1958), risk management is irrelevant to the firm because shareholders can do it on their own. However, this assumes that the capital market is perfect and there is no difference between the cost of risk management within the firm and outside the firm. For risk management to increase the firm's value, it must be more expensive for the firm to take on risk rather than hedge (Stulz 2003).

Stulz (2003) discusses main reasons why risk management is important for firms.
Firstly, firms with higher debt-ratio and in financial distress have a higher probability of not having enough cash flow to pay the debt. This will again increase the probability of bankruptcy. One common way to reduce the probability of bankruptcy is for firms to use risk management instruments.
Secondly, risk management also has an impact on tax payments. By not using risk management instruments, the probability of paying higher taxes increases. Thirdly, the usage of management instruments allows companies to increase their debt level. This will again affect their tax-shield, which will increase. Finally, investors who have a large portion of the company's shares would like the company to reduce their exposure towards risk.

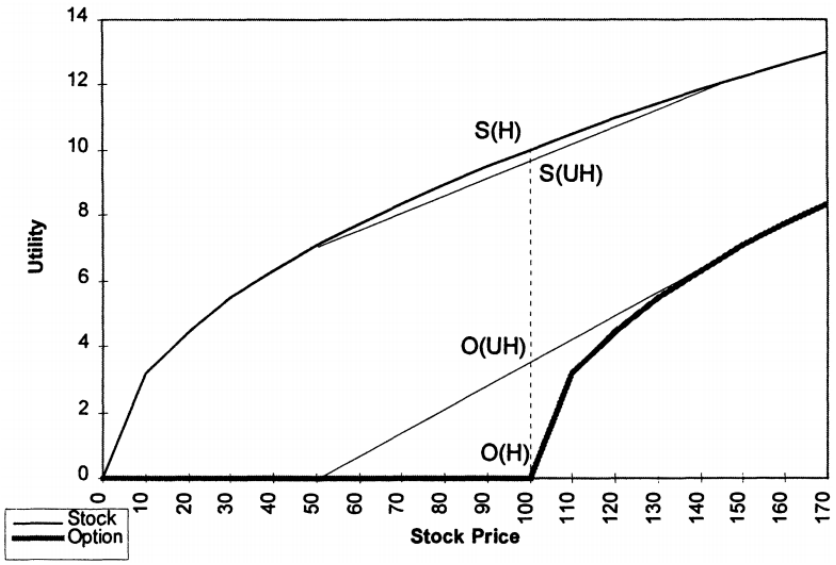
The theories concerning corporate managers' risk aversion can also explain the usage of financial instrument for hedging purposes. Executives in the company want to maximize their own utility/welfare. Executive compensation will then have an impact on their risk aversion. Smith and Stulz (1985) model predicts that managers with greater stock ownership would prefer more risk management. On the other hand, a manager with stock options prefers less risk management. That is because stocks provide linear payoffs as function of the stock price, stock option provide convex payoffs as function of the stock price.

Tufano (1996) shows graphically the value and the utility of stock and option position, as a function of the firm's stock price (please see the next page). The first panel shows only the stock payoff and stock option payoff with exercise price of $100. The second panel shows the expected utility for risk-averse managers

$(U = \sqrt{W})$. If we assume the stock could take the values \$50 or \$150 with equal probability, the firm could also enter into hedging contract that locked-in the stock price at \$100. S(UH) and O(UH) stand for the expected utility of the of the unhedged stock and option position. S(H) and O(H) stand for the expected utility of the of the hedged stock and option position. The stock holder may prefer to hedge, but the option holder may not.



Source: Tufano 1996. Figure 1



Source: Tufano 1996. Figure 2

Research problem and motivation

Research problem

The main research question for this master thesis is: How does executive compensation affect the usage of financial derivatives among companies listed on the Oslo Stock Exchange.

We will answer our research question by mainly looking at how management remuneration affects the use of derivatives among companies listed on the Oslo Stock Exchange. In addition, we will also consider other factors relevant to the derivatives' use. Overall, we propose four hypotheses which we plan to test:

Hypothesis 1: *Management compensation based on stock options has a negative effect on the use of financial derivatives.*

The Black and Scholes option pricing model (1973) suggests that higher volatility creates higher value for the option. By using financial derivatives for hedging, the cash-flow will be less volatile and then the option will have less value. In that case executives have less incentive to hedge (Smith and Stulz 1985).

Hypothesis 2: *Management performance-based compensation based on cash bonus has a negative effect on the use of financial derivatives.*

Cash bonuses based on the firm financial statements work really similar to call options. Bonuses will only be paid if the executive manager achieves a number of goals. This is similar to a call option where one gets paid when the stock against which the call option is written achieves higher value than the strike price (Stulz 2003).

Hypothesis 3: *Management compensation based on stocks has a positive effect on the use of financial derivatives.*

Ownership of shares in the firm ties executives' welfare more closely to shareholders' welfare. Executives will then more likely maximize firm value.

Since hedging creates value, the usage of financial derivatives is likely to increase (Stulz 2003). An undiversified financial position for risk-averse executives could also result in increased hedging. (Smith and Stulz 1985)

Hypothesis 4: *Education of a CEO affects the use of financial derivatives.*

Knowledge/education level of the CEO can explain why some firms use more financial derivatives than others.

Brief literature review

According to Stulz (2003), derivatives markets can be traced back to the 17th century, when Holland had its own market for tulip options and Japan had a futures market for rice. However, it was not until late in the 20th century that the derivatives markets really took off. Today derivatives markets are widely known and companies use derivatives to reduce their exposure to risk.

Research on the use of risk management by firms has been done for many years, and we can divide the evidence into two different types. The first type is evidence based on surveys and the second type is evidence based on analysis of firm-specific data. Regardless of the types, research indicates that companies that use derivatives have higher value and lower cash-flow volatility (Stulz 2003, 630).

Dolde (1993) created a questionnaire, which he sent out to all Fortune 500 firms. Out of all companies which responded (244 companies in total), approximately 85% used some sort of derivatives to manage financial risks. Also, larger firms had a significantly higher probability of using derivatives. However, smaller firms that used derivatives usually hedged a greater portion of their exposures. Other well-known surveys on financial risk management are the Wharton studies done by Bodnar et al. in 1995 and 1998. The studies look at the usage of derivatives among non-financial firms in the US. The findings support the research done by Dolde in 1993, where the use of derivatives is more common for larger firms. However, only 13% of the firms with a market value below 50 million USD used them.

Since the requirements regarding reporting standard for firms have increased, it is now possible to read about the use of derivatives in the annual reports published by firms. Géczy, Minton, and Schrand (1997) used this method to study publicly traded Fortune 500 firms. Their results indicated that 56% of companies in their sample used some sort of derivatives.

Stulz (2003) argues that ownership variables affect the extent of hedging. This argument is supported by studies done by Tufano (1996) and Rogers (2002). Tufano (1996) examined the gold mining industry in North America and found that managers that held more stock options did less in regards to risk management than managers that held more stocks rather than options. Rogers (2002) who studied the affect executive portfolio structure had on risk management, also found evidence which is consistent with these results.

Research on risk management is more common in foreign countries than in Norway. However, Børsum and Ødegaard (2005) summarize a questionnaire conducted by the Norwegian Central Bank in 2004. The questionnaire focused on the usage of currency derivatives by Norwegian companies. They found out that the results from the Norwegian companies were consistent with other empirical findings. Almost every company, which had currency exposure, used some sort of currency hedging, where the most common hedging method was derivatives. Also larger firms in Norway tended to use more derivatives.

Methodology

To answer our research question we decided to focus on non-financial firms at the Oslo Stock Exchange, which are approximately 170 companies in total. Instead of using a questionnaire, we will test our hypotheses by looking at annual reports of these companies for the year 2011. More specifically, we will analyse sections of annual reports concerning a) financial derivatives; b) executive compensation; and c) discussion of risk management. Since all of the companies have to follow international financial reporting standards (IFRS), there should be no problem in finding relevant information in annual reports. IFRS was first introduced on January 1, 2005 for all companies listed on stock exchanges in the EEA (EØS). According to this standard, companies must report their exposure to risk, the use of financial derivatives, management compensation, etc. In addition, we will research educational backgrounds of companies' CEOs.

In our master thesis we will run a cross-sectional regression. On the left-hand side we will try to measure the use of financial derivatives. On the right-hand side we will look at executive compensation (stock option, ownership stock and cash bonus compensation) and the education level of the CEO as the endogen variables. The compensation variables will be dummy variables in our regression.

We will also include some control variables in the regression, so we do not get omitted variable problems. Control variables should be variables that may have an impact on the usage of financial derivatives. For example, we will include firm size and industry in our regression, since these are variables which we know we will find. We need to control for firm size (measured by total assets), since larger firms likely use more risk management than smaller firms. Also, firm size may affect education level of the CEO. We believe that the larger the company, the higher the education level of the CEO (something that needs to be tested). If we do not include firm size as a control variable, our regression will be biased as the education level of the CEO and the firm size probably correlate. We will also include a control variable which reflects the industry of specific companies. That is because education levels of the CEO and executive compensation schemes may vary across different industries.

We will be running a regression similar to:

Use of financial derivatives_i = $\alpha + \beta$*(executive compensation_i) + γ *(vector of control variable_i) + ε_i

Where "i" refers to firm i.

During our work with the master thesis, we may modify our regression and hypotheses depending on the information gathered from the annual reports, research articles and other sources.

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