The Effect of Derivative usage according to IFRS 7 and IAS 39 on Executive Compensation:

Evidence from Europe

MASTER THESIS

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Executive summary

The objective of this research is to examine the relation between the use of derivatives and executive compensation for European listed companies in the period 2010-2011.

Based on theoretical prediction I expect that the use of derivatives is negatively associated with executive's cash compensation. However I expect that executives might manage earnings through the use of derivatives to increase their cash compensation. Further I predict the use of derivatives to be negatively associated with stock option compensation, but positively associated with restricted stock compensation.

The data on executive compensation and derivatives was hand collected from the annual reports retrieved from the company's website for the years 2010 and 2011.

The study distinguishes various compensation components: cash compensation, stock option and restricted stock compensation. I also distinguish between foreign currency, interest rate and commodity derivatives.

The main tests provide conflicting evidence that cash compensation is more or less positively associated with the use of derivatives. The evidence shows that executives manage earnings through the use of derivatives in order to increase their cash compensation. This is in contrast to prior research. Thus this study has implications and recommends further research on the association between derivative usage and cash compensation moderated by earnings management. Furthermore, this research finds evidence that the use of derivatives reduces the executive stock option compensation. This confirms the agency theory and the findings of Smith and Stulz (1985), Tufano (1996) and Rajgopal and Shevlin (2002) suggesting that stock option compensation reduces incentives for managers to hedge price risk because stock option compensation increases in value with stock price volatility. Finally, the results show that compensation based on restricted stock is negatively and very little affected by derivative usage. A possible explanation for this is that executives tend to be indifferent to the use of derivatives when it comes to their compensation of restricted stock for the selected European listed companies.

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1. Introduction

The purpose of this master thesis is to examine the relation between the level of executive compensation and the use of derivatives. More specifically this study examines the relation between the use of derivatives according to IFRS 7/IAS 39 and the level of executive compensation of European listed companies. "Derivative usage" in this study refers to the derivatives held by the companies to manage market risks. These derivatives are distinguished in interest rate, foreign exchange and commodity derivatives and .The level of compensation is divided in short term compensation (salary and bonuses) and long term compensation (stock holdings and stock options). The study focuses on a randomly drawn set of 191 European companies listed in the EuroStoxx 800 for the period 2010-2011. This period was chosen because the aim is to test risk management behavior regarding the use of derivatives after the global financial crisis.

Complex financial securities known as derivatives that are intended to reduce risk are being used more frequently (Perfect and Howton 2000). According to the Bank of International Settlement (BIS), the notional value of outstanding derivatives held in Europe was $11 billion at the end of June 2014, indicating the importance and rise of derivatives. The financial press also routinely reports that options, futures contracts, derivatives and other financial securities are being increasingly used by private firms and municipalities. For example the recent collapse of the very renowned Enron was attributed to its reckless use of derivatives. Many other companies such as Barings, Dell Computer, Gibson Greetings, Proctor and Gamble, Orange County have experienced difficulties in the use of derivatives (Perfect and Hawton 2000).

Agency theory suggests that managers have their own private motives to increase their personal wealth through corporate risk management (Allayannis and Weston 2001). Executive stock option compensation increases with stock-price volatility (Murphy 1999), giving executives incentives to engage in riskier investments. Hedging activities can lead to increased firm risk as executives over hedge (or speculate) with financial securities that have their stock value tied to risks present in the general economy (Perfect and Hawton 2000), further enhancing the agency conflict. On the other hand compensation based on restricted stock in the form of shareholdings is dependent on the shareholders wealth, hence executives in this case have greater incentives to manage the firm's

risks (Haushalter, 2000) through optimal hedging activities/ derivative usage. Thus executives have incentives to use derivatives in order to increase managerial wealth and compensation (Barton et al. 2001).

The Enron scandal highlights the misalignment with executive compensation and the use of derivatives, the importance of the agency conflict and transparencies of the financial reporting. This lead to regulators improving the accounting standards on derivatives, which resulted in IFRS 7 and IAS 39. IFRS 7 Financial Instruments: Disclosures was originally issued in August 2005 and applies to annual periods beginning on or after 1 January 2007. This standard requires disclosure of information about the significance of financial instruments to an entity, and the nature and extent of risks arising from those financial instruments both in qualitative and quantitative terms. IAS 39 is the standard that describes the recognition and measurement of financial instruments. These standards should increase the transparency on the use of derivatives.

Prior research on the relation between executive compensation and derivative usage finds mix evidence. For example Barton et al. (2001) who investigates whether managers view derivatives and discretionary accruals as partial substitutes for smoothing earnings, and finds confirming results. One of the manager's incentives mentioned to maintain a desired level of earnings volatility through hedging is increasing managerial compensation and wealth. The results show that contrary to their expectations (based on the theory of earnings management) cash compensation is negatively associated with the use of derivatives and in accordance with their expectations stock and options have a positive association. Supanvanij and Strauss (2010) investigate whether derivative usage may be a determinant of CEO compensation. The results show that long-term CEO compensation is positively related to hedging and that the short term compensation is negatively associated with hedging, consistent with the results of Barton et al. (2001). However in contrast to Barton et al. (2001), Supanvanij and Strauss (2010) find exercisable options compensation to be negatively related to hedging. These results are similar to Rajgopal and Shevlin (2002) indicating that executive stock options sensitivity to stock return is negatively associated with the extent of hedging.

Further, research on the relation between executive compensation and the use of derivatives In Europe, is very limited. The main reason for this is that the data on European listed companies is not directly available, but rather retrieved through hand collection, which is time consuming.

Given the rise in derivatives, the mixed evidence on the relation between executive compensation and derivative usage, and the limited research on European listed companies it is interesting to examine what the relation is between derivatives held by companies and executive compensation in Europe. Therefore the following research question is formulated.

RQ: What is the association between derivative usage and executive compensation?

To address the research question, I first hand collected the financial data on derivatives and executive compensation, then retrieved the remaining data from the WRDS databases. The dependent variables, executive compensation, are segregated in cash compensation, stock option compensation and restricted stock compensation. The effect of the use of derivatives is measured by the separate use of foreign currency derivatives, interest rate derivatives and commodity derivatives and the total of derivatives. Theoretically there may exist an endogeneity problem between the executive compensation and derivative usage, therefore I first conducted a 2 SLS, but when I tested the endogeneity concern using the Wu-Hausman test, the results showed that no endogeneity exists. As a consequence a simple OLS regression was used to conduct the research. The sample consist of 191 unique European listed firms for the period 2011-2011. However after the data preparation process the sample was further reduced. The final sample of the 4 hypotheses of this study varies between 104 and 236 firm-year observations representing 52 and 118 unique firms respectively.

The results of this study show that contrary to what was expected cash compensation is more or less positively affected by the use of derivatives. The evidence shows that firms who uses derivatives and manages earnings lead to an increase in cash compensation. Further this research finds evidence that the use of derivatives reduces the stock option compensation of the executives and that compensation based on restricted stock is negatively and very little affected by the use of derivatives.

First, this study contributes to the existing literature regarding Executive compensation and risk management through the use of derivatives. Because this study focuses on the period 2010-2011 to provide results of risk management behavior after the global financial crisis and the results further contribute to the European setting. Second, the study provides more detailed insights in the effect of the use of derivatives on executive compensation, by distinguishing derivatives in foreign currency, interest rate, commodity and the total derivatives. Third, while studies (Barton et al. 2001, Supanvanij and Strauss 2010) mostly measure derivatives using the disclosed notional amount, for there was not much financial information disclosed or available, I use the fair value amount of the derivatives as a measure and thereby further contributing to the evidence on derivatives found up till now. Finally, the results of this study extends the findings of Barton et al. (2001) by providing evidence on the moderating effect of earnings management on the relation between executive compensation and the use of derivatives.

The thesis is structured as follows: Chapter 2 discusses the theoretical background on derivatives and executive compensation, the motives for hedging and some empirical evidence, and at last prior literature on the relation between executive compensation and derivative usage. Chapter 3 develops the 4 hypotheses of this study followed by chapter 4 in which the research design is described, consisting of the theoretical constructs, the control variables, the research models and the sample. Chapter 5 provides the empirical results and analysis of the research. Finally, chapter 6 concludes.

2. Theoretical background

This chapter discusses the literature review and theories related to derivatives and executive compensation. The first paragraph presents the definition of derivatives, the types of derivatives and exposed risks, and the accounting rules on derivatives. The second paragraph provides the motives for the use of derivatives (hedging) and some empirical evidence. Paragraph 2.3 elaborates on the agency theory. Paragraph 2.4 describes the components of executive compensation. Paragraph 2.5 discusses prior literature on the relation between executive compensation and derivatives. This chapter concludes with a summary.

2.1 Derivatives

A firm is exposed to a variety of risks. This study focuses on the market risks, namely interest rate risk, foreign currency risk and commodity risk. Derivatives are financial instruments used to manage these market risks whose value changes in response to the change in an underlying variable such as interest rates, foreign exchange rates, commodity prices, which could have a negative effect on assets, liabilities or expected future cash flows (IAS 39.9). Derivative instruments are contracts whose value is derived from one or more underlying financial instruments, indices or prices that are defined in the contract. Below are the most common used type of derivative contracts (IAS39);

Forwards: contracts to purchase or sell a specific quantity of a financial instrument, a commodity or a foreign currency at a specified price determined at the outset, with delivery or settlement at a specified future date.

Interest rate swaps and forward rate agreements: contracts to exchange cash flows as of a specified date or a series of specified dates based on a notional amount and fixed and floating rates.

Futures*:* contracts similar to forward but with the following difference; futures are generic exchange-traded whereas forwards are individually tailored.

Options: Contracts that give the purchaser the right, but not the obligation, to buy or sell a specified quantity of a particular financial instrument, commodity, or foreign currency at a specified price, during or at a specified period of time.

Caps and floors: These are contracts sometimes referred to as interest rate options.

Derivatives are categorized and disclosed by the type of risk exposures. In this thesis I also refer to derivatives per category of risks, as described below;

1. Foreign currency derivatives: The firm is exposed to foreign exchange rate risks on the cash flows when it operates in many countries and currencies. The firm can enter into currency derivative contracts to manage these risks.

2. Interest rate derivatives: to mitigate the effects of fluctuations in interest rates a firm can enter into interest rate derivatives.

3. Commodity derivatives: Firms are also exposed to main industry risks associated with price volatility of commodities such as the highly negative impact of crude oil, natural gas, electrical power on the cash flow. To protect the company's cash flow from the adverse impact of falling commodity prices, commodity derivatives can be used.

Note that stock options are also regarded as (equity) derivatives, but only if these are from another entity (IAS32.11). The focus of this study is on the entity's own stock options regarded as a form of executive compensation and treated as one of the dependent variables in this study. This motivation is based on prior research and most of all several theories on the relation between derivatives and stock option compensation as discussed in paragraph 2.5 and chapter 3.

A derivative is nothing more, or less, than a bet; a promise to pay money determined by the occurrence or nonoccurrence of some future event (Stout 2011). A derivative can be used in two ways; (1) either as a tool for avoiding risk, or (2) it can be used to speculate. In this case an entity accepts risk in order to possibly earn above-average profits. Speculation using derivatives can be extremely risky, since a large adverse movement in an underlying could trigger a massive liability for the holder of a derivative (Stout 2011).

Empirical evidence on derivative contracts

Bodnar et al. (1995) investigated what kinds of derivatives categorized per type of risks companies use to manage their exposures. The survey results show that for interest rate risk management the

dominance of swaps stand out clearly. Forwards dominate the foreign exchange category, but the use of swaps and options is also significant for managing foreign exchange risk. However no contract type dominates for firms hedging commodity exposures. The analysis of the annual reports of the European listed companies over the year 2010-2011, the sample of this thesis, shows consistent results.

Accounting

The accounting standards; IFRS 7 and IAS 39 presents requirements for derivatives reporting in the financial statement. IFRS 7 requires qualitative and quantities disclosures to be presented by category of instrument based on the IAS 39 measurement categories. IAS 39 outlines requirements for the recognition and measurement of financial assets, financial liabilities and some contracts to buy or sell non-financial items, embedded derivatives and hedged instruments. IAS 39 permits hedge accounting under certain circumstances. Hedge accounting is a method of recognizing the gains, losses, revenues and expenses associated with items in a hedging relationship such that these are recognized in net income in the same period when they would otherwise be recognized in different periods, in order to reduce the volatilities of earnings. The standard requires hedge effectiveness to be assessed. All hedge ineffectiveness is recognized immediately in profit or loss. There are 3 categories of hedges, namely fair value hedge, cash flow hedge, hedge of a net investment in foreign operations. A **fair value hedge** is a hedge of the exposure to changes in fair value of a recognized asset or liability that is attributable to a particular risk and could affect profit or loss (IAS39.86). Any gains and losses deriving from this hedge is directly recognized in profit and loss. A **cash flow hedge** is a hedge of the exposure to variability in cash flows that is attributable to a particular risk associated with a recognized asset or liability and could affect profit or loss. The portion of the gain or loss on the hedging instrument that is determined to be an effective hedge is recognized in other comprehensive income (OCI) (IAS39.95). The same accounting rules of a cash flow hedge applies for the **net investment in foreign operations**.

2.2 Motives for hedging

Apart from managing the market risks through derivatives and applying hedge accounting to reduce the volatilities of earning, mentioned in the last paragraph, this paragraph discusses several theories on why firms also use derivatives and or apply hedging and at last some empirical evidence on the theories are discussed.

Financial distress hypothesis

Smith and Stulz (1985) argue that companies use hedging to decrease financial distress costs. Cash flow volatility can lead to situations in which firm's available liquidity is not sufficient to fulfill their fixed debt obligations. Hedging reduces the cash flow volatility leading to a lower expected value of costs associated with financial distress (Smith and Stulz 1985; Shapiro and Titman 1986) which can also increase the optimal debt-equity ratio (debt capacity or leverage).

Tax

Hedging can increase the present value of tax shields by smoothing out earnings, which leads to lower tax payments. It ensures that the largest possible proportion of income over a complete business cycle falls within the optimal range of tax rates. Thus, firms in a higher tax bracket are more likely motivated to use derivatives to help reduce expected taxes (Smith & Stulz, 1985).

Underinvestment problem

Another motive for hedging is the underinvestment problem. Froot et al. (1993) argue that risk management can also increase shareholder value by aligning financing and investment policies. When external capital is costly, firms may undervest and can use derivatives to increase shareholder value by coordinating the need for and availability of internal funds (Bartram et al. 2009).

Managerial incentives

The basic framework of principal–agent models assumes a risk-neutral principal (shareholders) and a risk-averse manager. Smith and Stulz (1985) theorizes that managerial risk aversion is a driver of corporate risk management by arguing that managers whose human capital and wealth are poorly diversified strongly prefer to reduce risk to which they are exposed and if managers

judge that it will be less costly (to them) for the firm to manage this risk than to manage it on their own account, they will direct firms to engage in risk management. The model of Smith and Stulz (1985) predict that managers with greater stock ownership would prefer more risk management, while those with greater option holdings would prefer less risk management, because stocks provide linear payoffs as a function of stock prices whereas options provide convex payoffs. The global convexity of the option contract may induce managers to take on greater risk, because lower risk would reduce the volatility and hence the value of the expected utility of their option contracts. Thus indicating that managers' risk aversion depending on the extent of convexity in the contract may lead him to hedge more or less since compensation is a function of firm value (Tufano 1996).

Empirical evidence

Whereas theory indicates that hedging can increase firm value by reducing expected taxes, expected costs of financial distress, and other agency costs, empirical research based on survey data, has found only weak evidence consistent with theory. For example Bodnar et al. (1995) conducted a survey on derivative usage by US non-financial firms in 1994. According to this survey firms mostly (80%) use derivatives to hedge firm-commitment transaction exposures rather than hedging balance sheet items (44%) and that firms seldom use derivatives to speculate, indicating that the scandals on derivative usage or more an exception than a rule. The majority of the end-user activity is focused on hedging, and in particular, the management of the more clearly definable exposures arising from specific transactions. The greatest concern about derivatives is the accounting treatment, followed by credit risk and liquidity risk. Contrary to the academic literature firms are less concerned about the cost of derivatives. Firms mainly hedge to minimize fluctuations in cash flow (67%) and surprisingly not so much to minimize fluctuations in accounting earnings (28%), followed by only 5% to protect the appearance of the balance sheet. Bartram et al. (2009) conducted a recent extensive study for about 80% of global market capitalization of nonfinancial firms in which they examine what motivates the use of derivative by corporations, using a new database. Also contrary to the well-established theories on the motives for derivative usage, this study finds little support that these theories explain the determinants of corporate derivative usage.

2.3 Agency theory

An agency relationship refers to one party (the principal e.g. the firm) who delegates work to another (the agent e.g. executives). Agency theory is concerned with resolving two problems that can occur in such an agency relationship (Jensen and Meckling 1976). The first is the agency problem that arises when (a) the desires or goals of the principal and agent conflict and (b) it is difficult or expensive for the principal to verify what the agent is actually doing. The problem here is that the principal cannot verify that the agent has behaved appropriately. The second is the problem of risk sharing that arises when the principal and agent have different attitudes toward risk. The problem here is that the principal and the agent may prefer different actions because of the different risk preferences (Eisenhardt 1989). The focus of the theory is on determining the most efficient contract governing the principal-agent relationship given assumptions about people (for example self-interest, bounded rationality, risk aversion), organizations (goal conflict among members) and information. Such a contract could either be behavior-oriented (for example salaries) or an outcome-oriented contract (for example stock options). Hence one way to align the interests between the agents and the principles is by providing the agents with financial incentives. These financial incentives can be in the form of financial compensation. The literature on principal-agent theory suggests that the primary means for the shareholders to ensure that managers take optimal actions is to tie manager's pay to the performance of their firms (measured by earnings, revenues or stock performance), by providing high-powered incentives for managers to maximize the returns to shareholders. Managerial compensation will be correlated with the total return to shareholders, typically through ownership of the firm's stock or options on the firm's stock (Aggarwal 1998).

2.4 Executive compensation

The total pay of a top manager is considered to be the Executive Compensation and can be divided into four basic components: (1) base salary, (2) annual incentive opportunities (bonuses) tied to accounting performance, (3) stock options and (4) long-term incentive plans.

Base salaries represent the fixed component and are typically determined through competitive "benchmarking," based primarily on general industry salary surveys. Even though salaries comprise a declining percentage of total compensation, it is important in the salary-determination process, because salaries are a key component of executive employment contracts. Second, since it is a fixed component, risk-averse executives will naturally prefer a dollar increase in base salary to a dollar increase in 'target bonus' or variable compensation. Finally, most components of compensation are measured relative to base salary levels for example target bonuses (Murphy 1999).

The **bonuses** are a performance-driven component and can be categorized into three components: (1) performance measures, for example net income or revenues, (2) performance standards such as the company's annual budget goals (e.g. a budgeted-net-earnings objective) or the year-to-year growth or improvement (such as growth in sales or EPS) and (3) the structure of the pay-performance relation.

Stock options are contracts in which executives are granted the right, but not the obligation, to purchase a specific number of shares of firm stock at a pre-specified "exercise" (or "strike") price for a pre-specified term (Murphy 1999), with no initial investment required (Devers et al. 2008).

Companies can also compensate executives through **restricted stock** (Murphy 1999), such as stock ownership, where executives have a meaningful stake in the company through holding stock.

The main reason for providing stock options and stock ownership to executives is to align the interest of executives with those of the shareholders and to encourage a long-term perspective in managing the company. Important to note is that stock options are dependent on the firm stock-price performance (Hall and Murphy 2003), whereas compensation based on stock ownership is tied to the shareholders wealth. Secondly stock ownership and stock option pay have asymmetric incentive properties. The characteristics of stock options offers unlimited upside potential while limiting downside risk, in contrast to stock ownership which offers both unlimited upside and downside risks (Sanders 2001). Thus according to Sanders (2001) stock ownership leads to greater risk aversion and stock option pay, to greater risk seeking.

The base salary and bonuses are also known as the cash component (Barton 2001) or short term compensation (Supanvanij and Strauss 2010). The stock options and restricted stock are considered to be long term compensation or stock based compensation.

2.5 Prior literature – relation Executive compensation and Derivative usage

Several studies have examined the determinants of derivatives use and hedging. Geczy et al. (1997) and Berkman and Bradbury (1996) find that managerial motivations are not related to derivative usage. They examine the relation between derivatives use and managerial compensation by regressing derivatives use on several variables including compensation measures.

However Tufano (1996) finds that managerial motives dominate other hedging determinants. When using a similar approach, except his dependent variable is a measure of the proportion of gold whose price a firm hedges. Tufano (1996) gives an empirical examination of risk management practices in the gold mining industry. This study test whether cross-sectional differences in risk management activity can be explained by academic theory. One of these theories brought forth by Smith and Stulz (1985) is that corporate risk management activities might be linked to risk aversion of corporate managers, and the form in which they hold a stake in the firm. Smith and Stulz (1985) focus on managerial risk aversion as a driver of corporate risk management. Managers whose human capital and wealth are poorly diversified strongly prefer to reduce the risk to which they are exposed. If managers judge that it will be less costly (to them) for the firm to manage this risk than to manage it on their own account, they will direct their firms to engage in risk management. Smith and Stulz's (1985) model predicts managers with greater stock ownership would prefer more risk management, while those with greater option holding would prefer less risk management, because stocks provide linear payoffs. The global convexity of the option contract may induce managers to take on greater risk, because lower risk would reduce the volatility and hence the value of the expected utility of their option contracts. The study finds confirming results of this theory, indicating that the managerial risk aversion theory is particularly relevant. His study encompasses only one industry, but one advantage of his methodology is that he measures hedging while other studies use derivative use a proxy for hedging (Perfect and Howton 2000).

Since more information on derivatives is disclosed, more recent studies also use a more viable measure such as the notional amount of derivatives rather than a dummy variable for example Barton et al. (2001). According to Barton et al. (2001) academics and regulators have focused on discretionary accounting accruals as the primary means by which managers smooth their firm's earnings. However, managers also can smooth earnings by using tools, such as financial derivatives, that smooth their firm's cash flows. They theorize that managers can use derivatives and discretionary accruals to control earnings volatility of earnings and cash flows caused by fluctuations in interest rates, foreign currency exchange rates, commodity prices, and other risk factors and hence they expect derivatives and discretionary accruals to serve as partial substitutes for smoothing earning. They measure derivatives using notional amounts and discretionary accruals using the modified Jones (1991) model on a sample of nonfinancial, non-regulated Fortune 500 firms over the period 1994-1996. The results are consistent with the expectations that derivatives and discretionary accruals are partial substitutes for smoothing earnings. Elaborating on this finding they further theorize that managers have incentives to manage earnings volatility through derivatives and discretionary accruals to increase their cash compensation and the value of their stock. Because cash compensation and firm value tend to increase with earnings persistence. The results show that contrary to their expectations (based on the theory of earnings management) cash compensation is negatively associated with the use of derivatives and in accordance with their expectations stock and options have a positive association.

Supanvanij and Strauss (2010) investigate whether derivative usage may be a determinant of CEO compensation and makes an explicit distinction between short term and long term executive compensation, arguing that the academic literature largely ignores the differing effects of short term vs. long term compensation on corporate risk management activities. The sample consists of S&P500 firms during 1994-2000, and explicitly focuses on the transition period of derivative reporting form notional value to fair value. The results show that long-term CEO compensation is positively related to hedging and that the short term compensation which is relatable to the cash compensation mentioned in Barton et al. (2001) is negatively associated with hedging, consistent with the results of Barton et al. (2001). However in contrast to Barton et al. (2001), Supanvanij and Strauss (2010) find exercisable options compensation is negatively related to hedging.

These results are similar to Rajgopal and Shevlin (2002) indicating that executive stock options sensitivity to stock return is negatively associated with the extent of hedging. Rajgopal and Shevlin (2002) examines whether executive stock options provide managers with incentives to invest in risky projects. Their sample consists of oil and gas producers. They find that oil price risk is positively related to stock return volatility. Elaborating on this finding, they perform an additional test to examine a predicted negative association between stock option compensation and the extent on hedging. This expectation is based on the theory that one way to manage price risk is via hedging and the findings of Smith and Stulz (1985) and Tufano (1996) suggesting that stock option compensation reduces incentives for managers to hedge price risk because stock option compensation increases in value with stock price volatility. They find confirming results.

The next chapter discusses a more in depth theoretical reasoning on the relation between the different components of compensation and derivative use resulting in the hypotheses development of this study.

2.6 Summary

Derivatives are financial instrument used to manage market risks and can be categorized into interest rate, foreign exchange and commodity derivatives. When accounting for derivatives, volatilities in the income statement can be reduced by applying hedge accounting, however only when certain conditions are met. Company hedge to avoid financial distress costs, to increase the optimal debt-to-equity ratio, to avoid external capital or reduce the expected value of tax liabilities and to increase managerial wealth and compensation. According to the agency theory there exists a conflict of interest between the firm (principal) and the executives (agents), however these interest can be aligned by providing the executives financial incentives to maintain the company goals. Executive compensation can be divided into (1) cash compensation or short term compensation consisting of the annual salary and bonus (2) and long term compensation or stock based compensation, consisting of stock options, restricted stock. However empirical evidence doesn't fully support that these theories explain the determinants of corporate derivative usage. Prior literature on the relation between executive compensation and derivative usage shows mix evidence when using a dummy variable as a measure for derivative usage, however more recent

studies find that the use of derivatives increases compensation on stock holdings, but there is mixed evidence on the effect on stock option compensation. Also that derivative usage decreases cash compensation, however the explanation for this is inconsistent.

3. Hypothesis development

This chapter develops the hypotheses on the relation between executive compensation and the use of derivatives. The hypotheses are formulated in the alternative form.

Hypothesis 1

Allayannis and Weston (2001) find that the use of derivatives (foreign currency), therefore risk management strategies increase the firm value. To the extent that executive cash compensation is linked to firm performance, derivatives would likely increase executive compensation, assuming that there is no agency conflict present. Agency theory suggests that managers have their own private motives to increase their personal wealth through corporate risk management at the expense of the firms‘s best interests. When agency conflicts exists between shareholders and executives, risk management through derivatives can have a negative effect on the firm performance. Since cash compensation is dependent on the (annual) short-term firm performance, hedging/derivative usage might lead to a decrease in cash compensation.

Another more direct approach is the management risk aversion theory of Smith and Stulz (1985). According to this theory executives whose human capital and wealth are poorly diversified strongly prefer to reduce the risk to which they are exposed. If executives judge that it will be less costly (to them) for the firm to manage this risk than to manage it on their own account, they will direct their firms to engage in risk management. In this case the study of Supanvanij and Strauss (2010) shows that derivatives are more costly in the short run, hence this would lead to a lower cash compensation. Thus managers have more incentives to pursue short-term cash flow objectives of higher risks, instead of hedging/ derivative usage in order to obtain optimal cash compensation,

Based on this reasoning I hypothesize either directly in accordance with the management risk aversion theory or indirectly through firm performance, that:

H1: Cash compensation is negatively associated with the use of derivatives

Hypothesis 2

Barton et al. (2001) theorizes that managers can also smooth earnings by using tools, such as financial derivatives, that smooth their firm's cash flows. Managers can use derivatives and discretionary accruals to control earnings volatility of earnings and cash flows caused by fluctuations in interest rates, foreign currency exchange rates, commodity prices, and other risk factors and hence they expect derivatives and discretionary accruals to serve as partial substitutes for smoothing earning. The study finds confirming results suggesting that derivatives are used as a substitute of accruals to smooth earnings. Earnings is the sum of accruals and cash flows. The relations between accounting earnings and cash compensation are very substantial (Baber et al. 1996) and cash compensation tends to increase with earnings persistence (Baber et al. 1998). Therefore from an earnings management perspective (elaborating on the finding of Barton et al. 2001) managers would likely smooth earnings which leads to earnings persistence and consequently a higher cash compensation by managing the cash flow volatility through the use of derivatives and discretionary accruals. Combined these theoretical arguments suggest that earnings management might have a moderating effect on the relation between cash compensation and the use of derivatives. This hypothesis specifically tests whether earnings management has an indirect (moderating) effect on cash compensation through the use of derivatives and is formulated as follows:

H2: Cash compensation is positively associated with the use of derivatives when firms engage in earnings management.

Hypothesis 3

Stock options provide a direct link between managerial rewards and share-price appreciation, since the payout from exercising options increases dollar for dollar with increases in the stock price. (Murphy 1999). Since the value of options increases with stock-price volatility, executives with options have incentives to engage in riskier investments (Murphy 1999). According to Smith and Stulz (1985) stock option provisions of compensation plans can make the executive's expected utility a convex function of the value of the firm and if this is the case, executives will behave like a risk-seeker. Tufano (1996) argues that the global convexity of the option contract may induce

managers to take on greater risk, because lower risk would reduce the volatility and hence the value of the expected utility of their option contracts. Given that stock options only offer unlimited upside potential while limiting downside risk, option holders face no actual risk to personal wealth, because they have invested noting to acquire the options, they have incentives to limit risk aversion and instead pursue wealth-maximizing strategies (Sanders 2001). Therefore option compensation encourages risk-taking and entrepreneurial activities related directly to the firms activities, which suggests that executive stock options reduce incentives for managers to hedge price risk. Based on these arguments, I hypothesize the following:

H3: Option compensation is negatively associated with the use of derivatives

Hypothesis 4

Restricted stock in the form of stock holdings provides the most direct link between shareholders and CEO wealth, since it rewards shareholder return which includes dividends (Murphy 1999). For executive that hold stocks in a company, the value of their shares changes in direct proportion to shareholder returns, both positively and negatively, meaning that only stock holdings compared to stock options can result in executives suffering real and immediate reductions in their current wealth (Sanders 2001). Thus indicating that the downside risk associated with stock ownership may lead executive to be more risk averse. So executives with more wealth invested in a firm's equity are predicted to have greater incentives to manage the firm's risks (Haushalter, 2000). This theory is also modelled by Smith and Stulz (1985) who predicts that managers with more stocks held in the company would prefer more risk management, for (1) they are risk adverse when they have a large portion of their wealth tied to common shares and (2) their end-of-the period wealth is a more linear function of the value of the firm. This type of compensation is optimal when the incentives of the executives and the shareholders are aligned, by achieving a higher firm value and shareholder value on the long-run (Supanvanij and Strauss 2010). In case of no agency conflict, theory predicts a positive relationship between hedging and compensation. Hence managers are more inclined to hedge to increase their long-term compensation consisting of common shares held. This is hypothesized as follows:

H4: Compensation based on restricted stock is positively associated with the use of derivatives

4. Research design

The focus of this chapter is on developing the research methodology of this study. The first paragraph discusses the variables of interests. The second paragraph discusses the control variables. Paragraph 4.3 presents the regression models used to test the hypotheses. Paragraph 4.4 describes the sample data and the data collection procedure. The chapter is concluded with a summary.

4.1 Theoretical constructs

The dependent variable is Executive compensation. Following methodological approach similar to prior work (such as Dechow et al. 1994, Gaver and Gaver 1998) the focus is on two components of the executive compensation, namely the cash component consisting of salary and bonus, scaled by lagged total assets and the stock-based component consisting of stock options and stock holding. The stock options are the number of options outstanding held by the executives, scaled by the total number of outstanding shares (Supanvanij and Strauss 2010) and the stock holding is measured by the fraction of shares owned by the executives (common shares owned scaled by the total number of outstanding shares). Separate regression analyses will be conducted for the cash component (CAHSCOMP), stock option (OPTIONS) and stock holdings (COMMSHARES). The independent variable regards the use of derivatives, divided in foreign currency, interest rate, the commodity derivatives and the total of derivatives. Prior work measure derivatives use as the disclosed notional amount (Barton et al. 2001, Supanvanij and Strauss 2010), however I use the fair value amount of interest rate derivatives scaled by debt (INTDERIVATIVES), the fair value of foreign currency derivatives scaled by sales (FXDERIVATIVES), the fair value of commodity derivatives scaled by sales (COMMDERIVATIVES) and the fair value of derivatives scaled by total assets (DERIVATIVES). This is because the notional amount is (1) mostly larger than its fair value, (2) it doesn't fairly represents the market value of the derivatives and (3) companies do not always disclose the notional amount, which would lead to a loss of several observations. Hence I consider this a viable measurement.

4.2 Control variables

Based on prior studies (mostly Core et al. 1999) the following control variables will be included in the model to control for factors known to influence the level of executive compensation.

- Firm size: Larger firms with greater growth opportunities will demand higher qualified and more expensive managers. I proxy firm size as the natural logarithm of total assets (LNTOTALASSETS). I predict firm size to be positively related to executive compensation.
- Growth opportunities are measured by the log of the market-to-book ratio (LNmb), computed by using the natural logarithm of the product of the closing price of firm's stock and common shares outstanding divided by the by the common equity (by the end of the fiscal year). I predict LNmb to be positively related to CEO compensation.
- Firm performance: According to the agency theory, the level of pay is an increasing function of the firm performance (Core et al. 1999, Murphy 1999). Firm performance is measured by return on assets (ROA) computed as the ratio of earnings before interest and taxes to total assets. I expect a positive association between ROA and executive compensation.
- Stock performance: Stock performance can also be seen as a measure for firm performance and more importantly the level of stock compensation is mostly dependent on the stock performance. This is measured by cumulative monthly raw returns of the firm for the fiscal year (ret_ann). I expect a positive association between ret_ann and executive stockcompensation.
- Stock return volatility (RETsd): Cyert et al. (1997) find that executive compensation is higher at firms with greater stock return volatility, therefore I expect a positive association with executive stockcompensation. This is computed as the standard deviation of common stock returns over the prior five years.
- Firm risk: Theoretical models (e.g. Banker and Datar 1989) suggest that compensation risk (and the level of expected compensation) may either increase or decrease with firm risk. Firm risk is proxied as a variance measure and computed as the standard deviation of return on assets (roasd) over the five prior years.

- Firm characteristics: I also control for firm characteristics measured by the log of leverage (LNLEVERAGE) computed by the natural logarithm of total liabilities divided by total common equity and the log of the quick ratio (LNQUICKRATIO) computed as the natural logarithm of current assets minus inventories divided by current liabilities at the end of the year.

4.3 Research model

Several studies find mixed evidence on whether derivatives usage is a determinant of executive compensation or vice versa. Hence derivative use is an endogenous variable in this study. To control for this endogeneity problem I first used an instrumental variable approach to accommodate for endogeneity or simultaneity between the firm's decisions to hedge and compensate its executives. Since similar unobservable risk factors jointly affect both variables. When using an OLS framework in this case, there exists some simultaneous equation bias. To avoid this bias and correct for endogeneity problems, I used a two-stage least squares (2SLS) regression analysis (Instrumental Variable Approach regression). For performing the 2SLS I chose peer derivative usage (PEERDER) as the instrumental variable. This variable indicates the mean use of derivatives for a given industry. However after I ran the 2SLS and tested for endogeneity using the Wu-Hausman Test for all the models the results showed that the p-values were too large. This indicates that the null hypothesis being that all variables are exogenous cannot be rejected, providing evidence that there is no endogeneity problem between the variables. Therefore the assumption of using a 2SLS is not met and is rather preferred to conduct an OLS regression, since the instrumental variable approach in this case is inefficient. Hence the chosen method is the OLS regression.

The predictive validity framework ("Libby boxes") presented in Appendix A shows how the conceptual relation examined in this thesis will be operationalized in the research design.

To examine hypothesis 1 I use the following regression model.

(1) LNCASHCOMP = α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **COMMDERIVATIVES** + α_4 **DERIVATIVES** + α_5 LNTOTALASSETS+ α_6 LNmb + α_7 LNROA + α_8 roasd + α_9 LNLEVERAGE + α_{10} LNQUICKRATIO + e

The regression model used for hypothesis 2 is:

(2) LNCASHCOMP = = α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **DERIVATIVES** + α_4 **COMMDERIVATIVES** + α_5 **DummyDACC** + α_6 **FXDERIVATIVES_DummyDACC** + α_7 **INTDERIVATIVES_DummyDACC** + α_8 **COMMDERIVATIVES_DummyDACC** + α_9 **DERIVATIVES_DummyDACC** + α_{10} LNASSETS+ α_{11} LNmb + α_{12} LNROA + α_{13} roasd + α_{14} LNLEVERAGE + α_{15} LNQUICKRATIO + e

Based on the theoretical reasoning, I will use earnings management as a moderating variable in this model, which is measured by the commonly used discretionary accruals (DACC). Following the cross-sectional modified Jones model (1991), discretionary accruals are equal to:

DACC = TA – NDA

(A) TA = NI - OANCF

(B) NDA= $\alpha_1 (1/A_{t-1}) + \alpha_2(\Delta REV_t - \Delta REC_t) + \alpha_3(PPE_t)$

All variables including the intercept are scaled by total assets at the beginning of the year. I will first calculate the total accruals (TA) by simply subtracting operating cash flow from operations (OANCF) from the net income as retrieved from COMPUSTAT. Second, I will calculate the non-discretionary accruals (NDA) by performing the above mentioned regression. ΔREV is the change in net revenues. ΔREC is the change in net receivables and PPE is gross property, plant and equipment. Third, the DACC will be calculated by subtracting the obtained value of the non-discretionary accruals from the total accruals. At last I will create a dummy variable from the retrieved DACC, named DummyDACC. If a firm engages a lot in earnings management, this variable takes a value of "1" and if a firm manages less earnings the variable takes a value of "0". The value of "1" will be computed as firms above the median of the calculated variable DACC and the value of "0" will be computed as firms below the median of DACC.

Regression model 3 examines hypothesis 3:

(3) LNOPTIONS = α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **COMMDERIVATIVES** + α_4 **DERIVATIVES** + α_5 LNTOTALASSETS+ α_6 LNmb + α_7 LNROA + $_{\alpha 8}$ ret_ann + α_9 RETsd + α_{10} ROAsd + $_{\alpha 11}$ LNLEVERAGE + α_{11} LNQUICKRATIO + e

Regression model 4 examines hypothesis 4:

(4) LNCOMMSHARES= α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **COMMDERIVATIVES** + α_4 **DERIVATIVES** + α_5 LNTOTALASSETS+ α_6 LNmb + α_7 LNROA + $_{\alpha 8}$ ret_ann + α_9 RETsd + α_{10} ROAsd + $_{\alpha 11}$ LNLEVERAGE + α_{12} LNQUICKRATIO + e

For hypotheses 1 and 3 I expect α_1, α_1 , $\alpha_3 < 0$ (negative) and significant if Cash compensation and Option compensation is sensitive to derivative usage and for hypothesis 4 α_1, α_1 , $\alpha_3 > 0$ (positive) and significant if stock holding is affected by derivative usage. For hypothesis 2 I still expect the α_1, α_1 , $\alpha_3 < 0$ (negative) and significant, however I expect the interaction effect coefficients α_5, α_6, $\alpha_7 > 0$ (positive) and significant if earnings management has a moderating effect on the relation between cash compensation and the use of derivatives. Per hypothesis separate regressions will be run for the different independent variables.

Appendix B provides a definition of all the variables and their respective measurements.

4.4 Sample

The sample consists of 191 unique European listed companies in the EuroStoxx 800 as of January 2016 for the period 2010-2011 who implemented IFRS 7 and IAS 39. I chose for this period because the aim is to test risk management behavior regarding the use of derivatives after the global financial crisis. The gap between the initial and the final number of unique firms can be explained by the fact that many firms had no data for particular variables, missing observations were dropped and duplicate firm-year observations were dropped further reducing our sample. For hypothesis 2 in estimating the normal and discretionary accruals, industry-years required to contain

at least 10 observation and as a consequence reduced the sample size with 126 firm-year observations and 63 unique firms were removed altogether in the process. The hypotheses are split up in 4 sections, because of multicollinearity problems. The final sample for hypothesis 1 varies from 191 - 235 firm-year observations, representing 96 - 118 unique firms. Hypothesis 2 consists of 104 – 135 firm-year observations, regarding 52 - 68 unique firms. Hypothesis 3 consists of 135 - 220 firm-year observations and 68-110 unique firm. Finally hypothesis 4 contains a final sample of 191 to 235 firm-year observations representing respectively 96 to 188 unique firms. Appendix C provides a summary reconciliation of the initial number of unique firms and the number of firms in the final sample. The data on derivatives and executive compensation is hand collected from the annual reports which are retrieved form the firm's website. The firm's financial data is collected from Compustat Global and the stock information was retrieved from Compustat Global Security Daily.

4.5 Summary

This chapter discussed the theoretical constructs, the control variables, the regression models used to test the hypotheses, the sample data and the data collection process. The dependent variable is Executive compensation, divided into cash compensation, stock options and stock holdings. The independent variable is the use of derivatives, divided into interest rate, foreign exchange, commodity derivatives and the total derivatives. The control variables known to influence executive compensation are firm size, growth opportunities, firm performance, stock performance, stock return volatility, firm risk and firm characteristics measured as leverage and quickratio. The initial sample consists of 191 unique firms, representing 382 firm-year observations, however the sample is further reduced when preparing the data for the regression.

5. Empirical results and analysis

This chapter discusses the empirical results and analysis of the study. Paragraph 5.1 discusses the descriptive statistics of the research models followed by paragraph 5.2 in which the regression diagnostics are described. Paragraph 5.3 discusses the results of the Pearson correlation. In paragraph 5.4 the regression results and analyses are provided. This chapter is concluded with a summary.

5.1 Descriptive statistics

Appendix D provides an overview of the descriptive statistics of executive compensation, the use of derivatives and the control variables. Appendix B describes the definition and construction of these variables. The mean (median) of the annual cash compensation, CASHCOMP, defined as the sum of salary and bonus, scaled by lagged total assets is 16.388 (0.001), indicating that the cash component is considerably large. On average executives held 0.9% of stock options (OPTION) and 1.6% of restricted stock (COMMSHARES) of the total amount of common shares outstanding. The mean of foreign currency derivatives and commodity derivatives used by firms is 36.2% and 1.4% respectively of the total sales. On average the firms used interest rate derivatives 2.9 times the long term debt. Total derivatives used by the firms was 45.7% on average scaled by total assets. Precisely 50% of the firms manage earnings on a higher level (above the median) and on a lower level (below the median). As for the control variables the mean of the market to book ratio is 0.955, the return on assets is 6%, the standard deviation of roa indicating firm risk is 0.028, the leverage is 1.975 and the quickratio is 1.017.

5.2 Regression diagnostics

In order to verify if the data has met all the assumptions of the OLS I first run a few tests. To test the normality assumption I use the Kernel Density estimation (kdensity) which produces a graph as a result. In order to control for heteroscedasticity, the regression standard errors are corrected

using the 'robust' option in STATA and analyzed using a graphical method to plot the residuals versus fitted (predicted) values. When a model contains more than one independent variable, whereby too many variables measure the same thing, multicollinaerity may exists. In this case two or more independent variables should not be too highly correlated (no perfect linear relationship should be present). To check for multicollinearity I use the 'VIF' command in STATA, whereby VIF stands for variance inflation factor. As a rule of thumb the VIF values of the variables should be below 10. To control for multicollinearity separate regressions are run per hypothesis for each of the independent variables. To reduce the undue influence of outliers, all the variables are winsorized at the 1st and 99th percentile before being used in the regression analysis, with ret_ann, RETsd and indicator variables being the exception.

Regression model 1 and 2

The Kernel Density estimation of these models shows that the residuals are not normal. In order to control for normality I took the natural logarithm of the dependent variable, cash compensation and of the following control variables; mb, ROA, LEVERAGE and QUICKRATIO. The natural logarithm of the mentioned control variables are also held in the three other regression models. The VIF values are below 10, indicating that there is no multicollinearity and all the other assumptions are met as well.

Regression model 3 and 4

The Kernel Density estimation for these models also how that the residuals are not normal, therefore I took the natural logarithm of the dependent variables of stock compensation as well. When testing for multicollinarity the VIF value of retsd and ret_ann were very high, 29.30 and 29.70 respectively for model 3 and for model 4, the VIF values were 29.31 and 29.29 respectively. To control for this problem, I removed retsd from both models. The VIF values of both models are now below 10 indicating that there is no more multicollinearity. All the other assumptions of OLS are met for these models.

5.3 Pearson correlation

The correlation coefficients among the dependent variables (executive compensation variables) and the independent variables (derivative use variables) are displayed in Appendix E. Foreign

exchange derivatives is surprisingly not correlated with cash compensation and weakly but positively correlated with stock option compensation and weakly negative correlated with restricted stock compensation, however the correlations are not significant. Interest rate derivatives is significantly negative correlated with cash compensation and restricted stock compensation, however the correlations are weak. Interest rate derivatives and stock option compensation have a weak downhill relation, but not significant. Commodity derivatives has a weak downhill relation with the executive variables and only significant for cash compensation. Total derivatives also has a weak downhill relation with the executive variables and only significant for restricted stock compensation.

5.4 Regression results

Hypothesis 1

For hypothesis 1 I expected cash compensation to be negatively associated with the use of derivatives. The regression results show that the use of foreign currency derivatives (coefficient= -0.01, and p-value=0.87), interest rate derivatives (coefficient= -0.00, and p-value=0.79), commodity derivatives (coefficient= -3.49, and p-value=0.04) and total derivatives (coefficient—0.01, and p-value=0.89) has a negative effect on cash compensation. The results indicate that an increase of foreign currency derivatives, interest rate derivatives and total derivatives decreases cash compensation by more or less 0. But an increase of commodity derivatives leads to a significant decrease of cash compensation by 3.49. Hence only the effect of the use of commodity derivatives is influential and significant. The effect of foreign currency derivatives, interest rate derivatives and the total derivatives is minimal (close to zero) but negative. Overall I can conclude that the hypothesis is supported, although the evidence is a little weak. See Appendix F, table 1 for the regression results.

Hypothesis 2

Hypothesis 2 predicts cash compensation to be positively associated with the use of derivatives when firms engage in earnings management. Firms who engage in earnings management on a

higher level lead to a positive but insignificant effect on cash compensation (DummyDACC). The results show that firms who manages earnings on a higher level and uses derivatives lead to a positive effect on cash compensation. This indicates that firms use derivatives and earnings management to increase their cash compensation. The effect is even significant for total derivatives and interest rate derivatives. Mention worthy is that the moderating effect of foreign currency derivatives and earnings management is very close to zero, indicating a very minimal effect. Therefore the hypothesis is supported.

However contrary to what I predicted, the results of the main dependent variables are not consistent with the results of hypothesis 1. For example the use of foreign currency derivatives in the second model has a significant positive effect on cash compensation, indicating that an increase of foreign currency derivatives leads to a significant increase of 0.09 for cash compensation Further the use of commodity derivatives and total derivatives has a positive, but insignificant effect on cash compensation. This means, contrary to hypothesis 1 that an increase of commodity and total derivatives lead to an increase of cash compensation. A possible explanation for this is that the second model has a higher R^2 (varying between 0.24 – 0.44) compared to the first model (0.23), indicating that the second model has more explanatory power than the first by adding the earnings management variable to it. This provides conflicting evidence to support hypothesis 1, implying that there is not sufficient evidence to fully support hypothesis 1. For the regression results of hypothesis 2, see Appendix F, table 2

Hypothesis 3

For hypothesis 3 I expected option compensation to be negatively associated with the use of derivatives. The regression results show that the use of foreign currency derivatives (coefficient= -0.00, and p-value=0.99), interest rate derivatives (coefficient= -0.01, and p-value=0.60), commodity derivatives (coefficient= -2.49, and p-value=0.00) and the total derivatives (coefficient= -0.07, and p-value=0.07) is as predicted negatively associated with stock option compensation. The results indicate that an increase of derivatives leads to a decrease in option compensation of executives. However only the effect of commodity derivatives is significant and the effect of foreign exchange and interest rate derivatives is minimal (close to zero). But since all

the independent variables have a negative effect, and the p-value of total derivatives is relatively small (implying a potentially significant effect), I can conclude that there is evidence to support this hypothesis. See Appendix F, table 3 for the regression results for this hypothesis.

Hypothesis 4

For hypothesis 4 I expected compensation based on restricted stock to be positively associated with the use of derivatives. The regression results show that the use of foreign currency derivatives (coefficient= -0.02, and p-value=0.43), interest rate derivatives (coefficient= -0.05, and p-value=0.00), commodity derivatives (coefficient= -1.34, and p-value=0.17) has a negative effect on restricted stock compensation and is even significant for interest rate derivatives. This indicates that an increase of foreign currency, interest rate and commodity derivatives leads to a decrease in the restricted stock compensation of the executives. The use of total derivatives (coefficient=-0.01, and p-value=0.32) has nearly no effect on the restricted stock compensation, but it is also insignificant. The results are in contrast to the hypothesis and therefore this hypothesis is rejected. A possible explanation for this is that executives tend to be indifferent to the use of derivatives when it comes to their compensation of restricted stock. See Appendix F, table 4 for the regression results.

5.5 Regression analysis and summary

Some research models showed threats to the assumption of normality and homoscedasticity but this was controlled for. Hypothesis 1 is partially supported. Hypothesis 2 is supported. The evidence on hypothesis 3 is weak, but it is supported. Results indicate that hypothesis 4 is rejected.

Hypothesis 1 and 2

Taken the results from model 1, the first hypothesis is initially supported, indicating that the use of derivatives indeed has a negative impact on cash compensation. However contrary to what was predicted the results of model 2 provide conflicting evidence on hypothesis 1. Compared to model 1, model 2 had a higher explanatory power, hence taken the results together there is not sufficient

evidence to fully support hypothesis 1. This indicates that contrary to prior studies such as Supanvanij and Strauss (2010) and Barton et al. (2001) cash compensation is more or less positively affected by the use of derivatives. A possible explanation for this is that executives don't seem to find derivatives costly on the short run, or as an alternative derivative use isn't negatively affected by the firm performance of the sample group on the short run contrary to what was expected.

The results of model 2 provide sufficient evidence that executives manage earnings through the use of derivatives in order to increase their cash compensation. This can possibly be an alternative explanation for the non-confirming results of hypothesis 1. Hence the results of this hypothesis provide evidence on the theory that managers have incentives to manage earnings volatility through derivatives and discretionary accruals to increase their cash compensation, for cash compensation and firm value tend to increase with earnings persistence. However the results are in conflict with the results of Barton et al. (2001) who didn't find confirming results for this theory.

Hypothesis 3

Further this research finds evidence that the use of derivatives reduces the stock option compensation of the executives. This confirms the theory that executives would rather act as risk-seekers, which enhances the conflict of interest with the company as a whole in order to obtain more stock option compensation. These results further confirm the agency theory. The results of this hypothesis confirm the findings of Smith and Stulz (1985), Tufano (1996) and Rajgopal and Shevlin (2002) suggesting that stock option compensation reduces incentives for managers to hedge price risk because stock option compensation increases in value with stock price volatility. And hence this provides sufficient evidence to reject the conflicting evidence provided by Barton et al. (2001).

Hypothesis 4

Lastly this research provides evidence that compensation based on restricted stock is negatively and very little affected by the use of derivatives. This is in contrast to what was predicted based

on the theory that executives with more wealth invested in a firm's equity are predicted to have greater incentives to manage the firm's risks (Haushalter, 2000) and the theory of Smith and Stulz (1985); that managers with more stocks held in the company would prefer more risk management, for (1) they are risk adverse when they have a large portion of their wealth tied to common shares and (2) their end-of-the period wealth is a more linear function of the value of the firm. A possible explanation for this is that executives tend to be indifferent to the use of derivatives when it comes to their compensation of restricted stock for the selected European listed companies.

6. Conclusion

This study examines the relation between the level of executive compensation and the use of derivatives. Executive compensation is divided into 3 parts, namely cash compensation consisting of annual salary and bonus, stock option compensation consisting of the number of options held by the executives, restricted stock compensation consisting of the number of restricted stock held by the executives. The use of derivatives is measured by foreign currency derivatives, interest rate derivatives, and commodity derivatives and the total of these derivatives. The sample of this study consists of European listed companies for the period 2010-2011. This period was chosen because the aim of the study is to test risk management behavior regarding derivative usage after the global financial crisis.

The research question of this study is as follows:

"What is the association between derivative usage and executive compensation?"

First the literature review and theories related to derivatives and executive compensation were discussed in chapter 2. Followed by chapter 3 in which the hypotheses of the study were developed. Chapter 4 discussed the research methodology of the study and in chapter 5 the empirical results and analysis were presented and discussed extensively.

To answer this question, I developed the following 4 hypotheses:

H1: Cash compensation is negatively associated with the use of derivatives
H2: Cash compensation is positively associated with the use of derivatives when firms engage in earnings management.
H3: Option compensation is negatively associated with the use of derivatives
H4: Compensation based on restricted stock is positively associated with the use of derivatives

The results show that regarding hypothesis 1 an increase of foreign currency derivatives, interest rate derivatives and total derivatives decreases cash compensation by more or less 0, the results

are however insignificant., only an increase of commodity derivatives leads to a significant decrease of cash compensation by 3.49. Though weak, but this hypothesis was initially accepted.

The results of hypothesis 2 show on the contrary that an increase of commodity and total derivatives lead to an increase of cash compensation. Hence, since the model of 2 has more explanatory power than model 1, there is not sufficient evidence to fully support hypothesis 1. The main results of hypothesis 2 show that firms who engage in earnings management and use derivatives lead to an increase in cash compensation, the results are even significant for total derivatives and interest rate derivatives. Therefore hypothesis 2 is supported.

The results of hypothesis 3 indicate that an increase of derivatives leads to a decrease in option compensation of executives. However only the effect of commodity derivatives is significant and the effect of foreign exchange and interest rate derivatives is minimal (close to zero). Hence the hypothesis is supported.

The results of hypothesis 4 show that an increase of foreign currency, interest rate and commodity derivatives leads to a decrease in the restricted stock compensation of the executives. The results are even significant for interest rate derivatives. The use of total derivatives has nearly no effect on the restricted stock compensation, but it is also insignificant. Therefore hypothesis 4 is rejected.

To summarize, the answer to the research question is;

Contrary to prior studies such as Supanvanij and Strauss (2010) and Barton et al. (2001) cash compensation is more or less positively affected by the use of derivatives. This can be explained by the second main result that executives manage earnings through the use of derivatives in order to increase their cash compensation. Further, the use of derivatives reduces the stock option compensation of the executives. And at last, compensation based on restricted stock is negatively and very little affected by the use of derivatives. A possible explanation for this is that executives tend to be indifferent to the use of derivatives when it comes to their compensation of restricted stock for the selected European listed companies.

Contribution and implications

First, this study contributes to the existing literature regarding Executive compensation and risk management through the use of derivatives by examining whether the use of derivatives according to IFRS 7 and IAS 39 may affect executive compensation. This study focuses on the period 2010-2011 to provide results of risk management behavior after the global financial crisis. While most of the research has been conducted in the U.S., the results of this thesis contributes to the European setting.

Second, prior research mostly measure derivatives by total (for example Barton et al.(2001), this study measures derivatives separately by foreign currency derivatives, interest rate derivatives and commodity derivatives and the total of derivatives, to provide more detailed insights in the effect of the use of derivatives on executive compensation within one study.

Third, while previous studies (Barton et al. 2001, Supanvanij and Strauss 2010) mostly measure derivatives using the disclosed notional amount, for there was not much financial information disclosed or available, I use the fair value amount of the derivatives as a measure, because the notional amount is (1) mostly larger than its fair value, (2) it doesn't fairly represents the market value of the derivatives. This approach further contributes to the evidence on derivatives found up till now.

Finally, the results of this study extends the findings of Barton et al. (2001) by providing evidence on the moderating effect of earnings management on the relation between executive compensation and the use of derivatives, indicating that cash compensation can be increased through the use of derivatives moderated by earnings management.

Limitations and Insights for future research

A major limitation of this research is that because of the data was not publicly available in databases, most of the data needed to be hand collected. Since hand collection is very time consuming the sample was limited to 191 unique firms and the sample period to two years. After the data preparation the sample was further reduced. An implication of this is that the sample of

the study may not be representative enough to come to a good conclusion and has a low external validity. Future research should consider expanding the sample and the sample period.

Another limitation of the research is that the study is (deliberately) based on European companies and as a consequence the results of this study cannot be generalized to a non-European context. Future research could use both European and American settings to perform such a study in order to provide more general results and enhancing the external validity.

Finally, given that the study doesn't provide strong evidence, because of mostly insignificant results. This makes it difficult to draw conclusions and as a consequence provides little support for the overall aim of the study. Future research should further expand or develop broader research models to obtain more significant results.

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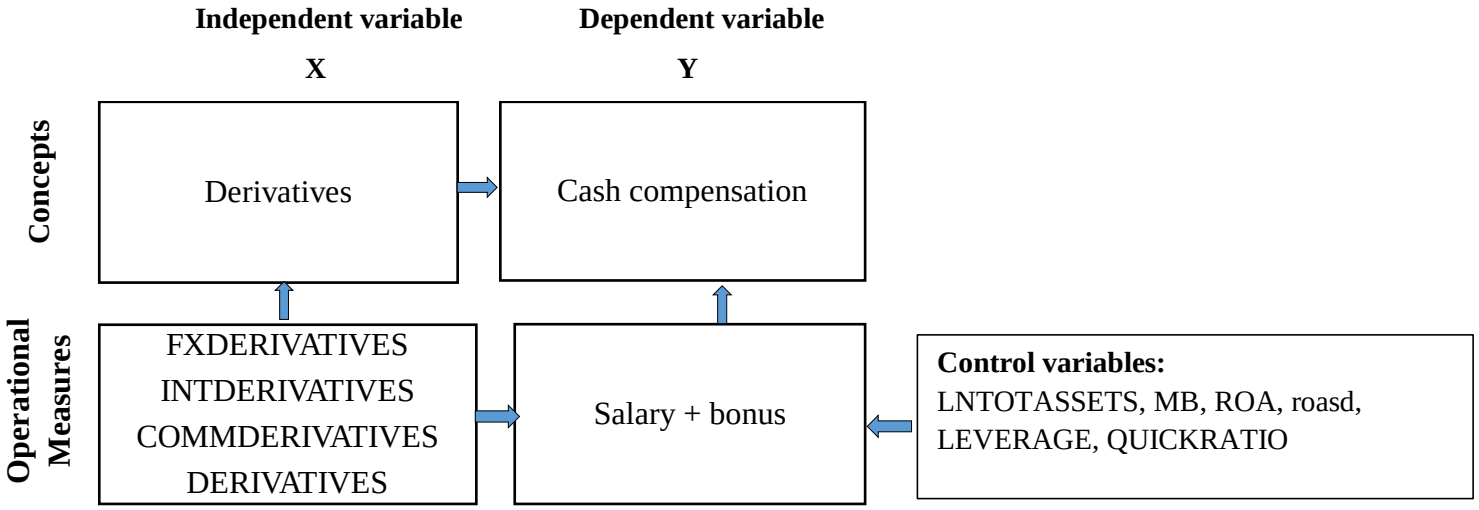
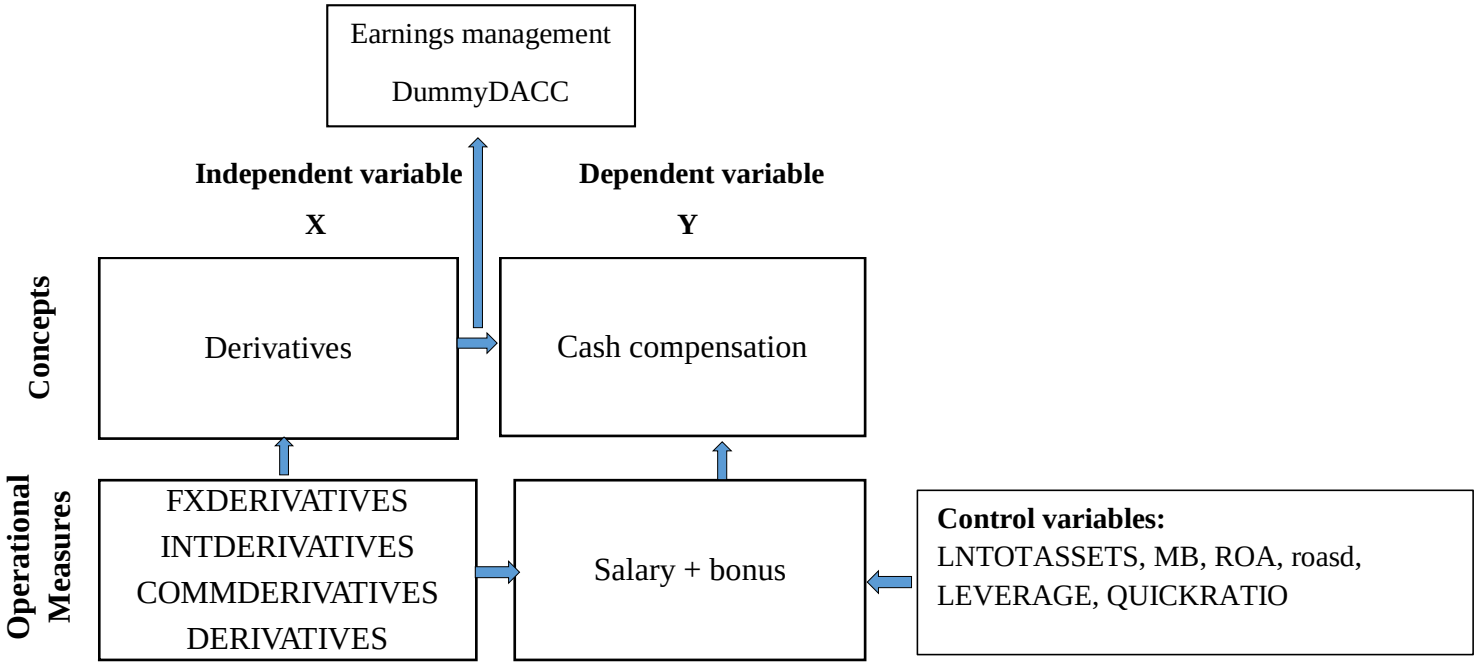
Appendix A Libby boxes

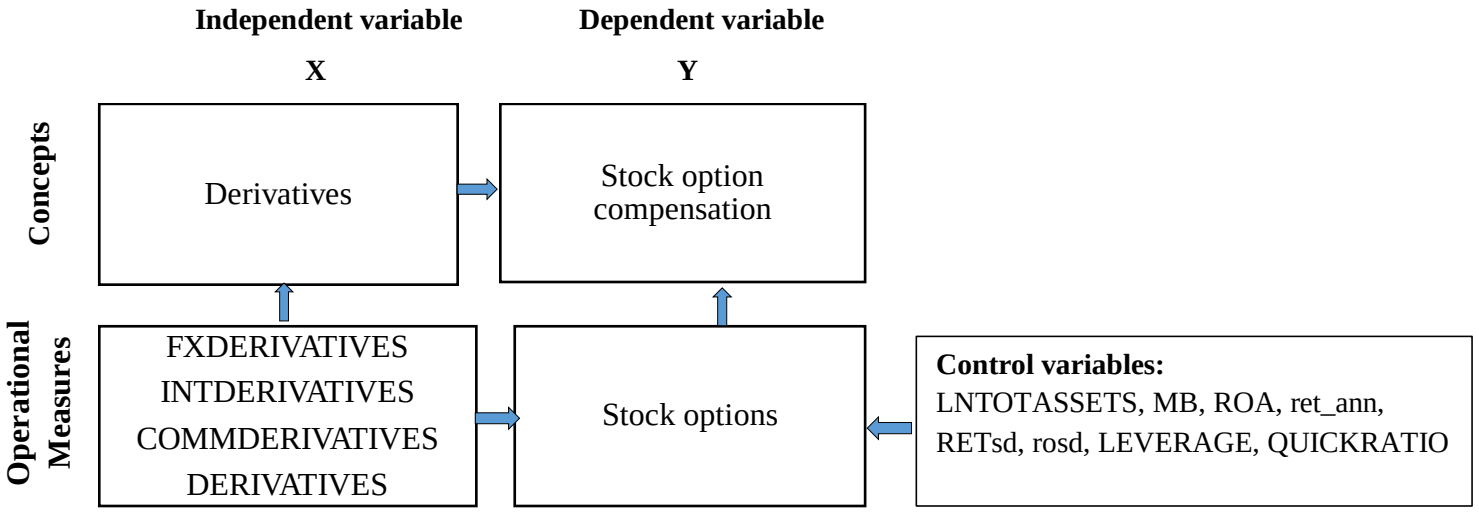
Libby box for hypothesis 1



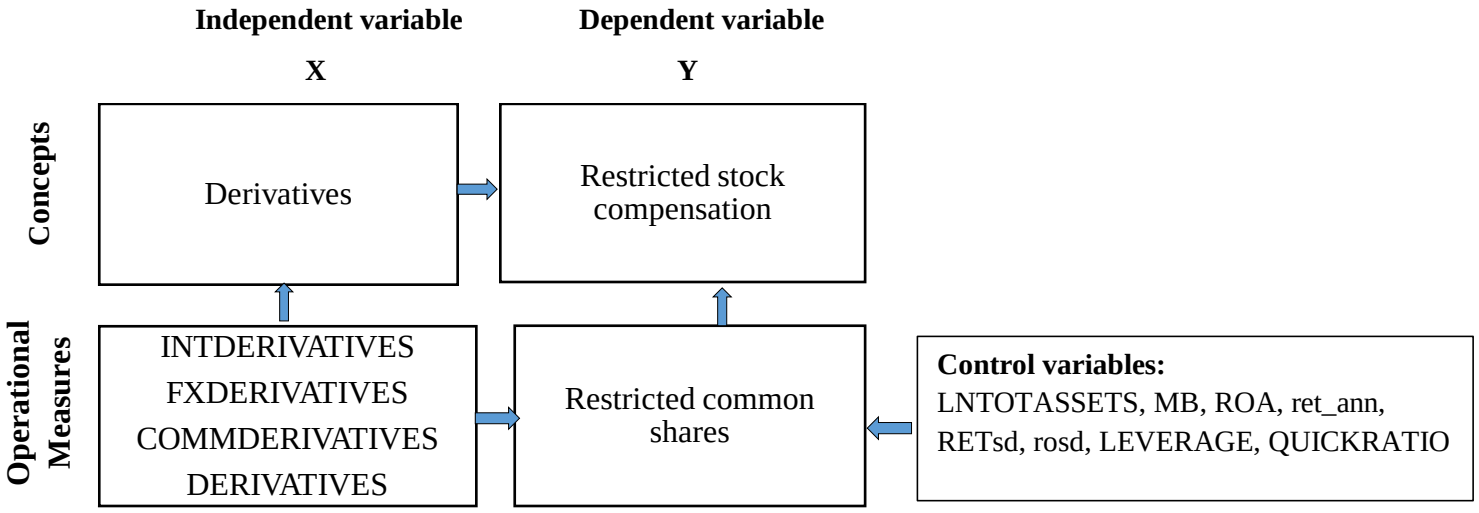
Libby box for hypothesis 2



Libby box for hypothesis 3



Libby box for hypothesis 4



Appendix B Variable definitions

Variable	Definition	Measured as
	Dependent Variables	
LNCASHCOMP	Salary and bonus compensation of the executives	The log of salary and bonus compensation of the executives, scaled by lagged total assets
LNOPTIONS	Stock options held by executives	The log of the number of options held by executives divided by total of common shares outstanding
LNCOMMSHARES	Restricted stock owned by the executives	The log of restricted shares owned by executives divided by total common shares outstanding
	Independent Variables	
INTDERIVATIVES	Interest rate derivatives	fair value amount of interest rate derivatives scaled by long term debt
FXDERIVATIVES	Foreign currency derivatives	fair value of foreign currency derivatives scaled by sales
COMMDERIVATIVES	Commodity derivatives	fair value of commodity derivatives scaled by sales
DERIVATIVES	Total derivatives	Fair value of total derivatives scaled by total assets
DACC	Proxy for earnings management	Calculated using the Modified Jones model as discussed in section 4.4 as total accruals minus non-discretionary accruals

Variable	Definition	Measured as
	independent Variables	
DummyDACC	Earnings management dummy	Firms who manage more earnings measured as firms above the median of DACC =1 and 0 otherwise
FXDERIVATIVES_DummyDACC	Firms who manages earnings and uses foreign exchange derivatives	Interaction effect foreign exchange derivatives and earnings management
INTDERIVATIVES_DummyDACC	Firms who manages earnings and uses interest rate derivatives	Interaction effect interest rate derivatives and earnings management
COMMDERIVATIVES_DummyDACC	Firms who manages earnings and uses commodity derivatives	Interaction effect commodity derivatives and earnings management
	Control Variables	
LNTOTALASSETS	Proxy for the size of the firm	The log of total assets
LNmb	Growth opportunities	The log the closing price of firm's stock multiplied by the total amount of common shares outstanding divided by the book value of the common equity
LNROA	Proxy for firm performance	Log of income before extraordinary items deflated by total assets.
ret_ann	Stock performance	Cumulative monthly raw returns in % of the firm for the fiscal year

Variable	Definition	Measured as
	Control Variables	
retsd	Proxy for stock return volatility	Standard deviation of common stock returns over the prior five years.
roasd	Firm risk	Standard deviation of return on assets over the five prior years
LNLEVERAGE	Proxy for firm characteristics	The log of total liability deflated by total common equity
LNQUICKRATIO	Proxy for firm characteristics	The log of the ratio current assets minus inventories divided by current liabilities at the end of the year.

Appendix C Sample selection process

Panel A: Hypothesis 1	Hypothesis 1A		Hypothesis 1B		Hypothesis 1C		Hypothesis 1D	
	N firms	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*
Number of observation in the initital sample	191	382	191	382	191	382	191	382
Less: missing values for computing FXDERIVATIVES	30	59						
Less: missing values for computing INTDERIVATIVES			56	111				
Less: missing values for computing COMMDERIVATIVES					21	42		
Less: missing values for computing DERIVATIVES							20	40
Less: missing values for computing LNCASHCOMP	4	8	2	5	7	14	8	16
Less: missing values for other variables/duplicate firm year observation	44	87	37,5	75	45	90	45	91
Final sample	**114**	**228**	**96**	**191**	**118**	**236**	**118**	**235**

The tables summarizes the sample selection process of the Hypothesis 1 regarding derivatives and executive cash compensation. The sample period runs from 2010 to 2011. N firms refers to the number of unique firms and year-observation refers to the firm-year observations.

Panel B: Hypothesis 2	Hypothesis 2A		Hypothesis 2B		Hypothesis 2C		Hypothesis 2D	
	N firms	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*
Number of observation in the initital sample	191	382	191	382	191	382	191	382
Less: missing values for computing FXDERIVATIVES	30	59						
Less: missing values for computing INTDERIVATIVES			56	111				
Less: missing values for computing COMMDERIVATIVES					21	42		
Less: missing values for computing DERIVATIVES							20	40
Less: missing values for computing LNCASHCOMP	**4**	8	3	5	7	14	8	16
Less: missing values for DACC model variables	**63**	126	63	126	63	126	63	126
Less: computing interaction variables and other/duplicate firm year observation	**33**	65	**18**	36	32	65	32	65
Final sample	**62**	**124**	**52**	**104**	**68**	**135**	**68**	**135**

The tables summarizes the sample selection process of Hypothesis 2 consisting of executive cash compensation, derivatives and the discretionary accruals. The sample period runs from 2010 to 2011. N firms refers to the number of unique firms and year-observation refers to the firm-year observations.

Panel C: Hypothesis 3	Hypothesis 3A		Hypothesis 3B		Hypothesis 3C		Hypothesis 3D	
	N firms	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*
Number of observation in the initital sample	191	382	191	382	191	382	191	382
Less: missing values for computing FXDERIVATIVES	30	59						
Less: missing values for computing INTDERIVATIVES			56	111				
Less: missing values for computing COMMDERIVATIVES					21	42		
Less: missing values for computing DERIVATIVES							20	40
Less: missing values for computing LNOPTIONS	48	96	40	80			55	111
Less: missing values for other variables/duplicate firm year observation	7	13	6	12	60	120	48	96
Final sample	**107**	**214**	**90**	**179**	**110**	**220**	**68**	**135**

The tables summarizes the sample selection process of the Hypothesis 3 regarding derivatives and executive option compensation. The sample period runs from 2010 to 2011. N firms refers to the number of unique firms and year-observation refers to the firm-year observations.

Panel D: Hypothesis 4	Hypothesis 4A		Hypothesis 4B		Hypothesis 4C		Hypothesis 4D	
	N firms	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*	*N firms*	*Year-observations*
Number of observation in the initital sample	191	382	191	382	191	382	191	382
Less: missing values for computing FXDERIVATIVES	30	59						
Less: missing values for computing INTDERIVATIVES			56	111				
Less: missing values for computing COMMDERIVATIVES					21	42		
Less: missing values for computing DERIVATIVES							20	40
Less: missing values for computing LNCOMMSHARES	40	79	33	65	29	58	46	92
Less: missing values for other variables/duplicate firm year observation	8	16	7	15	23	46	7	15
Final sample	**114**	**228**	**96**	**191**	**118**	**236**	**118**	**235**

The tables summarizes the sample selection process of the Hypothesis 3 regarding derivatives and executive restricted stock compensation. The sample period runs from 2010 to 2011. N firms refers to the number of unique firms and year-observation refers to the firm-year observations.

Appendix D Descriptive Statistics

Descriptive Statistics Regression Variables				
Variable	N	**Mean**	**Median**	σ
CASHCOMP	330	16.388	0.001	129.319
OPTIONS	332	0.009	0.000	0.040
COMMSHARES	331	0.016	0.000	0.066
FXDERIVATIVES	323	0.362	0.000	7.799
INTDERIVATIVES	271	-2.906	0.000	17.803
COMMDERIVATIVES	340	-0.014	0.000	0.117
DERIVATIVES	342	-0.457	0.000	4.241
DummyDACC	172	0.500	0.500	0.501
FXDERIVATIVES_DummyDACC	133	0.419	0.000	4.718
INTDERIVATIVES_DummyDACC	113	-0.214	0.000	3.917
COMMDERIVATIVES_DummyDACC	146	0.000	0.000	0.003
COMMDERIVATIVES_DummyDACC	150	0.197	0.000	2.220
LNTOTALASSETS	382	9.645	9.634	1.403
MB	382	0.955	0.889	0.494
ROA	362	0.060	0.051	0.052
ret_ann	381	6.530	0.000	9.050
retsd	380	2.770	0.000	3.760
roasd	382	0.028	0.022	0.020
LEVERAGE	382	1.975	1.463	1.563
QUICKRATIO	382	1.017	0.916	0.473

N and σ denote the number of firm-year observations and the standard deviation respectively. The sample period is from 2010-2011. All variables are defined in Appendix B.

Appendix E Correlation Table

Correlation Matrix of the Main Dependent and Independent Variables

	Pearson correlation					
	LN CASHCOMP	LN OPTIONS	LN COMMSHARES	FX DERIVATIVES	INT DERIVATIVES	COMM DERIVATIVES
LNCASHCOMP	1					
LNOPTIONS	0.156**	1				
LNCOMMSHARES	0.315***	0.444***	1			
FXDERIVATIVES	0.000	0.033	-0.061	1		
INTDERIVATIVES	-0.112*	-0.061	-0.219***	-0.298***	1	
COMMDERIVATIVES	-0.145***	-0.106	-0.077	-0.153***	0.232***	1
DERIVATIVES	-0.036	-0.070	-0.140**	0.434***	0.384***	0.193***
DummyDACC	-0.074	-0.166	0.061	0.007	-0.061	0.078
FXDERIVATIVES_DummyDACC	0.129	0.110	-0.187*	0.688***	0.025	0.008
INTDERIVATIVES_DummyDACC	0.157*	0.152	-0.253**	0.024	0.980***	0.000
COMMDERIVATIVES_DummyDACC	-0.041	0.089	-0.001	0.015	0.023	0.044
COMMDERIVATIVES_DummyDACC	0.334***	0.148	-0.105	0.450***	0.370***	0.010

*** p < 0.10, **p < 0.05, *** p < 0.01. Only the correlations between the main regression variables are reported**

Correlation Matrix of the Main Dependent and Independent Variables

	Pearson correlation					
	DERIVATIVES	DummyDACC	FXDERIVATIVES_ DummyDACC	INTDERIVATIVES _DummyDACC	COMMDERIVATIVES_ DummyDACC	COMMDERIVATIVES_ DummyDACC
DERIVATIVES	1					
DummyDACC	0.017	1				
FXDERIVATIVES_DummyDACC	0.434***	0.089	1			
INTDERIVATIVES_DummyDACC	0.266***	-0.052	0.027	1		
COMMDERIVATIVES_DummyDACC	0.045	0.013	0.022	0.024	1	
COMMDERIVATIVES_DummyDACC	0.660***	0.088	0.657***	0.378***	0.069	1

*** p < 0.10, **p < 0.05, *** p < 0.01. Only the correlations between the main regression variables are reported**

Appendix F Regression output

Table 1: Results Hypothesis 1

H1: **LNCASHCOMP** = α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **COMMDERIVATIVES** + α_4 **DERIVATIVES** + α_5 LNTOTALASSETS+ α_6 LNmb + α_7 LNROA + $_{\alpha 8}$ roasd $_{+\alpha 9}$ LNLEVERAGE + α_{10} LNQUICKRATIO + e

	H1A		H1B		H1C		H1D	
VARIABLE	βk	p-value	βk	p-value	βk	p-value	βk	p-value
Constant	3.56	0.02	3.28	0.07	2.84	0.05	3.14	0.04
FXDERIVATIVES	**-0.01**	**0.87**						
INTDERIVATIVES			**-0.00**	**0.79**				
COMMDERIVATIVES					**-3.49**	**0.04**		
DERIVATIVES							**-0.01**	**0.89**
LNTOTASSETS	-1.07	0.00	-1.00	0.00	-1.01	0.00	-1.03	0.00
LNmb	0.19	0.64	0.67	0.88	0.13	0.75	0.21	0.61
LNROA	-0.24	0.29	-0.23	0.32	-0.23	0.30	-0.22	0.32
roasd	-4.33	0.60	-13.97	0.11	-2.11	0.79	-3.28	0.69
LNLEVERAGE	-0.45	0.06	-0.51	0.05	-0.37	0.10	-0.40	0.15
LNQUICKRATIO	0.55	0.14	0.42	0.10	0.65	0.07	0.54	0.97
N	**294**		**244**		**305**		**304**	
R^2	0.23		0.21		0,25		0,23	

All The variables used above are defined in Appendix B with their respective measurements. For this hypothesis time-effect is insignificant ant therefore not presented in the table. The N stand for the number of observations used for the regressions. R^2 is the model specification power. Foreign currency derivatives has an insignificant negative (minimal) effect on cash compensation. Interest rate derivatives has practically no effect on cash compensation. Commodity derivatives has a significant negative effect on cash compensation. Total derivatives has an insignificant negative (minimal) effect on cash compensation.

Table 2: Results Hypothesis 2

H2: LNCASHCOMP = = α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **DERIVATIVES** + α_4 **COMMDERIVATIVES** + α_5 **DummyDACC** + α_6 **FXDERIVATIVES_DummyDACC** +α_7 **INTDERIVATIVES_DummyDACC** + α_8 **COMMDERIVATIVES_DummyDACC** + α_9 **DERIVATIVES_DummyDACC** + α_{10} LNASSETS+ α_{11} LNmb + α_{12} LNROA + $_{\alpha 13}$ roasd + $_{\alpha 14}$ LNLEVERAGE + α_{15} LNQUICKRATIO + e

	H2A		H2B		H2C		H2D	
VARIABLE	βk	p-value	βk	p-value	βk	p-value	βk	p-value
Constant	0.07	0.98	-2.78	0.29	0.57	0.81	0.06	0.97
FXDERIVATIVES	**0.09**	**0.00**						
INTDERIVATIVES			**1.75**	**0.13**				
COMMDERIVATIVES					**0.46**	**0.42**		
DERIVATIVES							**0.13**	**0.40**
DummyDACC	0.51	0.29	0.65	0.22	0.31	0.51	0.11	0.78
FXDERIVATIVES_DummyDACC	+0.00	0.92						
INTDERIVATIVES_DummyDACC			1.90	0.02				
COMMDERIVATIVES_DummyDACC					8.73	0.72		
DERIVATIVES_DummyDACC							0.35	0.00
LNTOTASSETS	-0.84	0.00	-0.67	0.00	-0.86	0.00	-0.76	0.49
LNmb	0.22	0.58	0.40	0.37	0.04	0.92	0.27	0.88
LNROA	-0.19	0.64	-0.56	0.14	-0.16	0.66	-0.04	0.08
roasd	26.23	0.06	21.02	0.18	23.95	0.07	20.07	0.11
LNLEVERAGE	-0.55	0.08	-0.34	0.30	-0.59	0.05	-0.43	0.11
LNQUICKRATIO	0.49	0.32	-0.75	0.24	0.025	0.96	0.65	0.97
N	**124**		**104**		**135**		**135**	
R^2	0.33		0.28		0,28		0,44	

All The variables used above are defined in Appendix B with their respective measurements. For this hypothesis time-effect is insignificant ant therefore not presented in the table. The N stand for the number of observations used for the regressions. R^2 is the model specification power. DummyDACC has an insignificant positive effect on cash compensation. The interaction effect of all type of derivatives and the total derivatives is positive on cash compensation and significant for interest rate derivatives en total derivatives,

Table 3: Results Hypothesis 3

H3: **LNOPTIONS =** α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **COMMDERIVATIVE**S + α_4 **DERIVATIVES** + α_5 LNTOTALASSETS+ α_6 MB + α_{67}ROA + $_{\alpha 8}$ ret_ann + α_9 RETsd + α_{10} roasd + $_{\alpha 11}$ LNLEVERAGE + α_{12} LNQUICKRATIO + e

	H3A		H3B		H3C		H3D	
VARIABLE	βk	p-value	βk	p-value	βk	p-value	βk	p-value
Constant	-4.68	0.00	-2.78	0.00	-4.15	0.00	-4.30	0.00
FXDERIVATIVES	**-0.00**	**0.99**						
INTDERIVATIVES			**-0.01**	**0.60**				
COMMDERIVATIVES					**-2.49**	**0.00**		
DERIVATIVES							**-0.07**	**0.07**
LNTOTASSETS	-0.39	0.00	-0.44	0.00	-0.42	0.00	-0.40	0.00
LNmb	0.54	0.06	0.16	0.62	0.48	0.10	0.59	0.04
LNROA	-0.46	0.03	-0.50	0.03	-0.43	0.04	-0.44	0.04
ret_ann	-9.74	0.72	-2.98	0.31	-1.28	0.63	-1.14	0.68
roasd	8.70	0.26	7.85	0.33	4.51	0.56	3.39	0.68
LNLEVERAGE	-0.17	0.95	-0.06	0.83	-0.02	0.95	-0.07	0.79
LNQUICKRATIO	0.89	0.09	0.55	0.35	1.13	0.03	1.08	0.04
N	**214**		**179**		**220**		**135**	
R^2	0.13		0.12		0,15		0,44	

All The variables used above are defined in Appendix B with their respective measurements. For this hypothesis time-effect is insignificant ant therefore not presented in the table. The N stand for the number of observations used for the regressions. R^2 is the model specification power. Foreign currency and interest rate derivatives have an insignificant minimal negative effect on stock options. Commodity and total derivatives have a negative effect on stock options. However the effect of commodity derivatives is only significant.

Table 4: Results Hypothesis 4

H4: **LNCOMMSHARES** = α_0 + α_1 **FXDERIVATIVES** + α_2 **INTDERIVATIVES** + α_3 **COMMDERIVATIVES** + α_4 **DERIVATIVES** + α_{45} LNTOTALASSETS+ $\alpha_{5=6}$ MB + α_7 ROA + $_{\alpha 78}$ret_ann + α_9 RETsd + α_{10} roasd + $_{\alpha 11}$ LNLEVERAGE + α_{12} LNQUICKRATIO + e

	H4A		H4B		H4C		H4D	
VARIABLE	βk	p-value	βk	p-value	βk	p-value	βk	p-value
Constant	-1.62	0.22	-1.87	0.19	-1.26	0.33	-1.41	0.28
FXDERIVATIVES	**-0.02**	**0.43**						
INTDERIVATIVES			**-0.05**	**0.02**				
COMMDERIVATIVES					**-1.34**	**0.17**		
DERIVATIVES							**-0.01**	**0.32**
LNTOTASSETS	-0.51	0.00	-0.53	0.00	-0.55	0.00	-0.53	0.00
LNmb	0.34	0.21	0.35	0.25	0.28	0.32	0.29	0.28
LNROA	-0.11	0.61	-0.23	0.30	-0.11	0.62	-0.12	0.58
ret_ann	2.84	0.00	2.93	0.00	2.88	0.00	2.88	0.00
roasd	-10.95	0.20	-14.14	0.07	-12.10	0.12	-12.74	0.14
LNLEVERAGE	-0.47	0.02	-0.46	0.03	-0.47	0.02	-0.54	0.01
LNQUICKRATIO	0.39	0.32	0.28	0.50	0.57	0.15	0.45	0.24
N	**228**		**191**		**236**		**235**	
R^2	0.16		0.23		0,19		0,19	

All The variables used above are defined in Appendix B with their respective measurements. For this hypothesis time-effect is insignificant ant therefore not presented in the table. The N stand for the number of observations used for the regressions. R^2 is the model specification power. All type of derivatives including the total derivatives have a negative effect on restricted stock compensation. Only the effect of interest rate derivatives is significant.