

Stockholm School of Economics
Department of Finance
Master of Science in Finance
Master Thesis

Corporate Currency Hedging through the Use of Derivatives

An analysis on its effects and determinants on a European sample

Marco Cazzola

Ioannis Ntarlantanis

May 2016

Abstract

According to financial theory, corporate hedging increases shareholders' value in presence of imperfect capital markets. Empirical results backing this hypothesis have always been contradictory, showing different results depending on which kind of companies, industries, countries were analyzed and which proxy variables were deployed to assess this relationship. Numerous limits of empirical studies in this field require a prudent interpretation of results, but in general they show that corporate hedging does not have "one size fits all" solutions. In this paper we firstly present a broad review of previous corporate hedging policies. Secondly, we perform a random effect regression analysis on corporate currency hedging and shareholders' value and cash-flow volatility. In the end, we provide a summary of interviews and point of view of professionals, working in corporate treasuries, in order to shed light on the different facets of currency hedging, with a specific focus on differences between academia and the corporate world.

Keywords: Corporate Risk Management, Foreign Exchange Exposure, Derivatives

Supervisor: Prof. Michael Halling

Acknowledgements

We owe our deepest gratitude to our supervisor, Prof. Michael Halling, who supported and patiently supervised us throughout all the steps of the thesis.

Furthermore, we are especially grateful to Anders Åslund: he has been a source of continuous inspiration and support during the whole thesis development, from the introduction to the conclusion, and his invaluable insights on the topic have allowed us to understand, learn and appreciate the many facets of corporate currency hedging.

Table of Contents

1	Introduction	4
2	Literature Review.....	6
2.1	Theories and Researches on Corporate Risk Management and Value Creation	7
2.2	Direct researches on value creation of corporate risk management	9
2.3	Environment-specific Determinants of hedging	10
2.4	Corporate Taxes	10
2.5	Underinvestment and asset substitution.....	11
2.6	Management, compensations and risk preference	12
2.7	Financing and Investments.....	14
2.8	Cost of Financial Distress.....	14
3	Relevance.....	16
4	Quantitative Analysis	17
4.1	Sample Description and Hypothesis Development.....	17
4.2	Variables' Description	19
4.3	Empirical Analysis	25
4.4	Limitations of the models.....	38
4.5	Conclusions.....	38
5	Qualitative Analysis	41
5.1	Analytical Frameworks to Hedging	41
5.2	Interviews.....	42
6	Conclusions	56
7	References	58
8	Appendix.....	63

1 Introduction

Modigliani and Miller, in their theory, argue that risk management is irrelevant to the value the shareholders enjoy in perfect capital markets, since investors can choose to moderate or even completely eliminate firm specific risks by changing the weights of their portfolio through diversification.

Moreover, investors - possessing all the public information - could perceive specific investments as purchases of exposure to specific risks e.g. an investor will buy exposure to US dollar by purchasing a firm traded in the US stock exchange or they will buy exposure to hard commodities by purchasing shares of a mining firm.

The conditions, on which the conclusions above are drawn however, do not hold in reality, as many academics and professionals argue. It is also our opinion that the real market is significantly different than the perfect capital market described by Modigliani and Miller. The existence of costs of financial distress, costs of bankruptcy and lack of information are some of the ways the real market differs from a perfect one.

A greatly debated question among academia and business is, therefore, whether an active risk management creates or destroys value for shareholders or if it is indeed irrelevant. Until the date we began writing this thesis (September 2015) there was no definitive answer from any researcher to this question, in spite of the fact that the topic has occupied the academic community considerably and there is a great wealth of research papers on it.

Risk management is a vast topic, consequently, and in order to maximize the accuracy of the conclusions of this thesis, we have narrowed our focus. The rapid growth of multinational corporations and cross-border trade make currency hedging a relevant and interesting topic. Moreover, the rapid growth of the financial derivatives market over the last three decades, to the point that the market for over-the-counter (OTC) derivatives amounts to 553 trillion US dollars in the end of 2015 makes this market also of high interest. The focus of this thesis will hence be on currency hedging with the use of financial derivatives.

This thesis addresses the subject both on a quantitative and a qualitative level. Financial data reported by publicly-traded firms in the Stockholm Stock Exchange and in the Frankfurt Stock exchange were analyzed in an attempt to draw conclusions on the effectiveness of currency hedging. Additionally, we conducted interviews with treasury department employees of firms traded in the Stockholm Stock Exchange. These interviews served to understand how hedging, and in particular currency hedging, is perceived by the business world. Although a lot of the issues raised by the interviewees were in line with the academic theory, more factors appeared to influence their decisions to hedge or not. Conducting these interviews contributed to making this thesis more practical, having a more solid understanding of hedging –given by professionals- and taking into account factors that could have been overlooked by a strictly theoretical approach.

2 Literature Review

Risk management is a highly discussed topic within the academic and business society. Firms of any size choose to use financial or real hedging in order to minimize risks that they are unable to control or accurately forecast. Hedging these risk is far from being a modern concept. Hedging as a concept existed almost throughout recorded history. Excavations in the city of Ur in 1923 uncovered clay tablets that recorded rights on transactions and payment agreements, suggesting a use of a predecessor of modern derivatives, dating seven millennia ago.

In the Middle Ages in Europe, agreements on future transactions similar to modern day forward exchange contracts, were used to protect against fluctuations of the prices in periods of famine or oversupply.

The introduction of the modern financial system created more elaborate, customized derivative products, granting investors and corporations the ability to hedge almost any risk. Derivatives are traded having a wide variety of different elements as underlying assets: currency exchange rates, market price of commodities, stock or debt, even natural phenomena are some of the categories one can choose to hedge against or speculate on.

The role that derivatives, in particular CDS (Credit Default Swaps), played in the recent financial crisis, led to additional regulations and a shake in the trust of the market towards these elaborate financial instruments, leading to a small decline of the derivative market over the last 5 years, which is greatly dwarfed though by the growth the field experienced over the two preceding decades.

The use of financial derivatives is still highly relevant for the practice of risk management. Although a speculative use of such instruments can possibly lead to vast one-time profits or losses, a structured strategic investment approach, as part of a risk management strategy, can serve to stabilize results and protect corporations and investors from extreme events.

Until the early 1990s empirical research on the field of hedging, with the use of financial derivatives, faced substantial obstacles. Hedging strategies were confidential and were considered a competitive advantage, making quantitative analysis to hedging less relevant, since any data used were given out voluntarily and there was no legal obligation of the firms to report the details of the instruments they used. After the beginning of the 1990s though, firms were obligated to report their

positions in the footnotes of their financial statements, giving way to researchers to use these data for empirical research.

Since the initial introduction of modern financial derivatives there have been a variety of approaches on how they should be reported by companies. Approaches differ amongst international and local accounting principles and between time periods. The report of financial derivatives has over their initial conception been: voluntary or mandatory, in the form of assets or income, on different statements or as part of the three traditional financial statements i.e. Balance sheet, Income statement or Cash Flow statement. The constant changes present an additional difficulty for researchers to approach the subject as the sample used must be homogenous in its reporting standards, thus limiting the possible combinations of markets and time periods to create a sample.

In the next section we are going to summarize different theories on corporate risk management following Aretz and Bartram (2009) approach.

2.1 Theories and Researches on Corporate Risk Management and Value Creation

Basic economic theory suggests that corporate risk management cannot create value for shareholders as extensively reported from Dufey and Srinivasulu (1983). The most straightforward example is the Modigliani and Miller (1958) proposition, according to which corporate financing choices cannot be used to create value for shareholders. Since risk management can be analysed as a financing policy, the logical conclusion is that corporate risk management cannot create value in a M&M world. (Bartarm, 2002; Stulz, 2000; Smith 1995)

However, in reality assumptions underlying Modigliani and Miller proposition do not hold and thus, in presence of capital markets imperfections, corporate risk management can be a value enhancing activity as shareholders are not able to perfectly replicate risk management (Stulz, 2001). Capital market imperfections that may allow corporate risk management to enhance value at firm level may be direct and indirect cost of financial distress, cost of external financing and taxes. Other company specific factors such as country or economic environment may also affect the former proposition.

Corporate risk management theories have been usually tested empirically employing a bivariate dummy variable indicating whether a company was using financial derivatives to hedge its positions (Allayannis and Weston, 2001). In certain specific cases, such as for oil or gold companies, for which

more information about commodity price derivatives is available, researches have been able to use notional amounts or percentage of exposure hedged such as in *Lel(2006)*, *Dionne and Triki (2005)* or *Tufano (1996)*.

Furthermore, the majority of these studies links corporate risk management proxies to firm's value creation or to specific properties to verify which factors make companies more willing to hedge foreign exchange, interest rate or commodity price risk and to which extent they use them (*Bartram, Brown and Fehle, 2009; Tufano, 1996*). For a complete and exhaustive table summarizing these different methodologies, please refer to table 1 of *Aretz and Bartram (2009)*.

More specifically, in the broad range of papers analyzing corporate risk management, some of them focus more on which determinants spur the decision to hedge and the influence of hedging on firm's value (*Graham and Rogers, 2002; Allayannis and Ofek 2001*). Other researches consider different risks such as foreign exchange (*Allayannis and Weston, 2002*), interest rate (*Batram et al, 2009*) or commodity price risk (*Géczy et al, 2006*). *Petersen and Thiagarajan (2000)* have developed a research on alternative risk management practices that does not involve derivatives. However, the latter study is particularly unique, given the difficulty to collect and properly analyze hedging decisions without selecting financial derivatives as a proxy. Finally, some studies have also given attention to the relationship between governance, management compensations and agency asymmetry to corporate hedging. (*Lel, 2006*).

Further in the paper, we are going to analyze deeper theories and results regarding the main areas of research regarding corporate hedging: direct tests on value creation, country-specific determinants of hedging, taxes and agency costs following the approach of *Aretz and Bartram (2009)*.

Before proceeding with the exhaustive summary of recent researches on corporate risk management however, we want to pinpoint something we believe is particular in this specific field of research: more often than not results are contradictory, mixed or insignificant. Researchers split more or less in two schools from this point of view. The first believes that corporate risk management actually does not create value for different reasons: more or less perfect capital markets, costs, asymmetrical information and so on. The second believes that corporate risk management creates value and the main issue resides in the empirical test performed to evaluate

the hypothesis. Undoubtedly there are many empirical challenges disturbing these tests: endogeneity, identification of appropriate proxy for hedging beyond financial derivatives, extent of corporate hedging beyond a binary classification, assessment of effectiveness of different hedging techniques and time-varying exposure.

We believe that corporate risk management value creation depends on a number of factors, but ultimately an appropriate and effective hedging strategy is positive for shareholders. However, we also acknowledge the empirical limitations affecting this type of study. For this reasons, we are going to accompany our panel data analysis with interviews from professionals in the industry. We believe that having a deep discussion about corporate risk management with professionals working in treasuries of five large Swedish corporates helped us to understand the topic and to formulate our final conclusion, while offering a different angle from a more academically research.

2.2 Direct Researches on Value Creation of Corporate Risk Management

A way to analyze whether corporate risk management is able to create value for shareholders is to test directly the hedging proxy on firm value with measures as Tobin's Q, market-to-book ratio or other valuation ratios. This is the approach we have chosen for our subsequent analysis. Intuitively, if corporate hedging is value enhancing its effect should be seen also on relevant metrics as the ones mentioned. However, we agree that there may be noise and perhaps insignificance in this analysis, given the broad number of factors affecting firms' value.

Previous research shows somehow mixed results. Allayannis and Weston (2002) finds a 4% premium for a large sample in the U.S. for currency hedging. In a subsequent analysis, Allayannis et al (2004) test the result on companies belonging to different countries and it appears like the premium can be found only in countries with strong corporate governance. Carter et al (2006) provide even stronger results: a premium between 12-16% for a restricted sample of airline companies in the US.

Divergently, Guay and Kothary (2003) and Nguyen and Faff (2003) find that corporate hedging destroys value for shareholders. Jin and Jorion (2006) analyzed the effect of commodity price hedging on a sample of 119 U.S. oil and gas producers between 1998 and 2001. They find that while hedging decreases stock price sensitivity to oil and gas fluctuations, there is no evidence that it creates value for shareholders. Furthermore, Bartram et al. (2006) perform a similar research on 6896 non-financial firms from almost 50 countries. Controlling for endogeneity, financial derivatives

seem to reduce firm risk drastically and there is also some evidence that they are related with higher firms' valuations.

In conclusion, researches somehow fail to pinpoint a clear result and it appears like the found effect of hedging is strongly dependent on the sample used.

2.3 *Environment-Specific Determinants of Hedging*

The effect of different geographical and time situations on derivatives' usage, and their influence on firm's value is mixed, although this specific point has not been studied in depth yet. Even from a theoretical point of view, it is hard to assess what is the relationship between certain country-specific determinants and hedging (Bartram, Brown and Fehle 2009). For example, in countries with strong legal systems, the cost of using derivatives may be low, thus favoring their use. However, in countries with weak legal systems, there may be extra benefits to hedging if bankruptcy costs are higher and bankruptcy law is inefficient. If shareholders' rights are strong, managers can be easily replaced in case of weak performance, thus incentivizing managers to hedge using derivatives. However, if shareholders' protection is low, managers can decide to undertake hedging derivatives program to artificially influence their compensation package. Firms in countries with high political, financial and economic risk are prone to hedge more (Bodnar, 2003), but size of a country's local derivatives market shows also a positive association with derivatives' usage (Bartram et al, 2009, Bonini et al 2012). Interestingly, we did not find any relevant research on how market trends, in our case currency effects, influence the effect of hedging on shareholders' value. Later on, we are going to test whether currency movements influence corporate risk management.

2.4 *Corporate Taxes*

If taxes are convex, volatile pre-tax profits result in higher taxes paid and vice versa. Assuming that hedging stabilizes taxable income, taxation may be a determinant of derivatives' usage and hedging value creation, lowering the corporate tax burden (Stulz, 2001; Bartram, 2000; Graham and Smith, 2000; Smith et al., 1990). More specifically, firms with income in the higher taxable range or with special tax items may tend to hedge more and capture most of the benefits. Indeed, the last two factors are used as proxies or basic determinants to study the mentioned relationship such as in Howton and Perfect (1998).

There is weak empirical confirmation of the tax argument: using a tax code progressivity dummy variable such as in Haushalter (2000) or Howton and Perfect (1998) leads to positive results. However, still in Haushalter (2000) we can find that using marginal tax rate leads to the opposite result. Finally, in Bartram et al. (2009) tax credits provide incentive for corporate risk management. In conclusion, empirical results are still mixed and not particularly strong: again, the choice of proxy variables and the relatively small effect that corporate hedging has on income stabilization make analyzing the relationship difficult. Personally, we do not find the arguments very convincing from a managerial point of view. Specifically, even if there may be effects of hedging on taxes paid, we do not think that treasuries and management teams plan and develop a hedging strategy based on this factor. Consequently, we have asked the opinions of our interviewees to assess whether our intuition was credible or not.

2.5 *Underinvestment and Asset Substitution*

Information advantage of managers over shareholders, since a company can be seen as a nexus of contracts (Jensen and Meckling, 1976), can generate agency costs. For example, even if managers act consistently with shareholders' interests, they may forgo value enhancing investments if the main beneficiaries of those operations are bondholders. The latter issue, called underinvestment problem, can either be solved by deleveraging the company with a reduction of debt outstanding or through corporate risk management, which would allow the company to not lose the tax benefit from debt. In fact, corporate hedging decreases firm's volatility and thus the value will be less likely to drop below a certain threshold that would trigger the underinvestment problem. Furthermore, bondholders and shareholders may face more conflict of interest. Indeed, using Mason and Merton (1985) and Merton (1974) framework, shareholders' equity can be seen as a call option on the assets of the firm. Thus, once leverage increases, they are better off substituting safe projects with high-risk ones, as volatility increases the value of the "call option". Thus, company's creditors will anticipate this, eventually asking for higher yields or for more covenants, actions that eventually decrease firm value (Smith and Warner, 1979). However corporate risk management stabilizes firm value and this could be seen as a replacement of the former value destroying activities. Morellec and Smith (2007) have found on this topic that negotiating debt issuance and corporate hedging simultaneously is beneficial for the company, since creditors will be more inclined to grant lower yields. Specifically, we have talked about this point during the interviews, given that we believe that

the negotiation of corporate hedging policies may be particularly beneficial for companies while dealing with banks or other financial institutions.

From an empirical point of view, there is limited evidence of the relationship between asymmetrical information and corporate hedging. For example, the effect of institutional ownership and number of analysts following the company is not in the predicted direction (Graham and Rogers, 2002) in certain studies, but in the predicted one in others (Dionne and Triki, 2005). The existence of large blockholders is negatively associated with corporate risk management (Haushalter 2000, Tufano 1996).

Underinvestment should be a more significant problem for firms with significant growth opportunities: from this point of view, proxies such as R&D, PP&E expenditures, asset growth rate, attempted acquisition activities and, for certain commodities' industries, exploration expenditures should be positively associated with corporate hedging.

From an empirical point of view, R&D is strongly associated with corporate hedging, but at the same time PP&E expenditures, asset growth rate, attempted acquisition and exploration expenditures never have the correct sign (Lin and Smith, 2007; Knopf et al. 2002; Allayannis and Ofek, 2001; Howton and Perfect, 1998).

Furthermore, shareholders active in regulated industries should face less informational asymmetry (Mian, 1996) and less growth opportunities (Smith and Watts, 1992) thus one could assume that companies operating in strongly regulated industries have less demand for financial derivatives for hedging purposes. In Rogers (2002) we find that the former proposition is true.

2.6 Management, Compensations and Risk Preference

More recently, researchers have started to analyze the links between management compensations, managerial behaviours and corporate risk management. Managers have often an undiversified wealth position in the company due to stock options compensations, current and future income and also career opportunities. Given this strong correlation between firm and management wealth, executives may be inclined to reduce firm's risk level to compensate for under-diversification (Mayers and Smith, 1990). Corporate hedging may reduce firm's idiosyncratic risk thus aligning management and shareholders' interests (DeMarzo and Duffie, 1995) and also it may disincentive

management to undertake costlier diversification strategies such as acquisitions or business expansions (Bodnar et al, 1997).

A common way to align managerial interests with the ones of shareholders, is to link compensation to shareholders' value, tying bonuses to the stock price. Share programs however increase even more the undiversified wealth position of top management, thus lowering even further risk appetite. On the other hand, non-linear compensations, such as stock options, increase risk appetite (Aretz and Bartram, 2009). However, given that stock price is often not linked directly to management's direct actions, this may lead to managers engaging suboptimal conduct such as trading off firm value in order to reduce their exposure. Furthermore, it is hard to distinguish between effective and ineffective managers when market forces influence too much the stock price (Stulz, 2001; Bartram, 2000). Thus, corporate risk management may help shareholders to reduce the exposure of stock prices to market fluctuations. Adding on this, Morellec and Smith (2007) also theorize that, due to the reduction of agency conflicts between management, shareholders and bondholders, corporate hedging can also alleviate cash-flow problems. In our quantitative analysis we are going to test whether corporate hedging reduces cash-flow volatility.

Given the previous theories, it could be argued that companies with large and undiversified blockholders should use derivatives to greater extent: unfortunately, contrarily to theoretical assumptions, the latter variable is often in the opposite direction (Haushalter, 2000; Tufano, 1996).

Other studies try to trace a relationship between stock compensation packages and corporate derivatives usage as explained before: specifically, companies whose management is paid with share programs should be more risk adverse and thus more prone to hedging, whereas if the management is paid in stock options, the opposite relationship holds. These theories however are considered to be quite weak, as Aretz and Bartram (2009) argue, given that they fail to take into account that those programs have different sensitivity toward change in share price and volatility. To overcome this critics, some studies deploy sensitivity analysis of the value of CEO portfolio with respect to changes in stock price and volatility (Lel, 2006; Graham and Rogers, 2002). Specifically, the result in Lel (2006) is that only firms with weak corporate governance use financial derivatives to hedge the volatility in management share packages compensations. Again, the link between value creation, risk management and agency conflicts seems to be null or weak at best when analyzing

compensations and management risk attitude. In our paper, we have focused more on the operational nature of firms rather than on agency conflicts and management reward, thus in our qualitative interviews section there is not a deep analysis on the topic.

2.7 *Financing and Investments*

With an appropriate synchronization of financing and investment, corporate risk management can become a value enhancing activity. A firm may be forced to cut back positive NPV projects or to rely on costly external financing if internal cash-flows are volatile and they are necessary for specific investments at certain points in time. As we discussed before, external debt is costly (Bartram, 2000; Myers, 1993), due to yields and covenants. Furthermore, issuance of new shares has a negative effect on shareholders' value (Asquith and Mullins, 1986). Thus, firms more often cut back their investments rather than raise money in the financial markets, and the higher the cash flow volatility, the more positive NPV projects are foregone (Minton and Schrand, 1996). Corporate hedging could be a relatively cheaper solution for a firm, allow it to use internal funds available to finance investments, and it could also decrease the level of external control posed by the markets. Empirically, there is strong evidence that companies using derivatives show a lower sensitivity of investments to pre-hedging cash flows (Allayannis and Mozumdar, 2004), but, at the same time, the effect of hedging on cash flows is small (Guay and Kothari, 2003).

2.8 *Cost of Financial Distress*

The more levered a company is, the higher the probability it will enter in bankruptcy, thus triggering costs of financial distress even before the company is in actual bankruptcy. Corporate risk management decreases the risk of these extreme realizations, reducing firm volatility and also allowing the firm to carry more debt, thus increasing its value (Graham and Rogers, 2002). Given that corporate hedging decreases costs of financial distress, firms with more leverage or higher bankruptcy probability should be more willing to hedge. Several proxies can be used to test the former relationship: interest coverage ratio, long-term debt or implied default probability. Despite endogeneity problems in their analysis, Bartram et al. (2009), Graham and Rogers (2002) and Haushalter (2000) find strong positive relation between long-term debt ratio and corporate hedging, even though it is significant only for firms with strong corporate governance (Lel, 2006).

Furthermore, users of derivatives carry less short-term liquidity than non-hedgers (Allayannis et al., 2003; Tufano, 1996).

Regarding the size of costs of financial distress, hedgers have a lower tangible to total assets ratio according to Howton and Perfect (1998). Size is also an important determinant: large corporates hedge more than small on average, but small firms setting up a risk management program do it in a more extensive way than large ones (Graham and Rogers, 2002; Allayannis and Ofek 2001). In conclusion, there is relationship between leverage, bankruptcy costs and financial hedging, however the results are not always clear (Aretz and Bartram, 2009).

3 Relevance

This thesis aims to build on previous academic research on the topic of hedging and expand it. It is our strong belief that even though hedging has been the subject of extensive research, no researcher has arrived to strong conclusions that could be applied to the market as a whole. What is more, we are of the opinion that research on a sample of companies over a period after the financial crisis of 2008 would contribute to the academic background of the subject. Additionally, the majority of the previous researches has been mainly focused on specific sectors, e.g. Tufano (1996) examined the gold-mining industry, Haushalter (2000) examined the oil and gas industry, or firms traded in one of the main U.S. indices. However, as Bartram et al (2009) indicate in their research, a sample limited to one economy or industry limits the understanding of the true effects of hedging overall. Although a specified sample will give more industry/country specific results, it will fail to capture the economic magnitude of some factors in the global environment. For the purposes of this thesis we decided to take a middle approach, widening the sample to achieve diversification and yield more generalizable results, while still keeping focus within economies that have a certain level of dependence. Therefore for this thesis a data sample from a diverse set of industries, from two different European markets, was chosen to try to enhance the understanding of the subject of currency hedging through the use of financial derivatives.

Additionally, we limited the sample to only companies that have at least a minimum level of foreign exposure. Building on previous research's conclusions about the advantages and disadvantages of currency hedging, this paper will continue to add to the academic research of the subject by trying to estimate the effects of different levels of hedging.

The post-2008 period presents an exceptionally interesting period to examine the behavior of firms and their attitude towards currency hedging, as well as the way the market perceives said behavior. The scarcity of capital, the shake in trust towards financial institutions, as well as the extreme volatility observed in the markets provide an unusual environment and a rare opportunity to observe and study the behavior of firms towards hedging and its effects.

In contrast to the majority of research already conducted, we decided to create a sample of firms from two different economies: one that uses a major currency (Euro) and one that uses a local currency (Swedish kronor). This will create the possibility to draw conclusions based on the combined sample, but also observe how fluctuations in the currencies and general condition of the markets influence hedging effects and hedging decisions in different environments.

4 Quantitative Analysis

4.1 Sample Description and Hypothesis Development

Our analysis is focused on Swedish and German companies, thus we direct our research toward large companies in those two countries. The scope of this analysis requires to select only companies with an underlying exposure to foreign exchange rates' fluctuations, either as transaction risk or translation risk.

The former is known as the aleatory effect of changes in exchange rates during the period between a business commitment and the settlement date. However, from a broader perspective, transaction risk is currency risk reflected on the income statement in terms of revenues and costs, arising from operations in different currencies. Examples of transaction risks may be production costs incurred in Swedish Krona and corresponding sales in Euro or commitment to a business contract in another currency on a certain date with a lagged effective delivery.

Translation risk is the one associated with companies that list foreign currency assets or liabilities on their balance sheet. Eventually, fluctuations in the currency market will affect the Group's balance sheet and earnings whenever the fiscal period ends and the rules of consolidation accounting requires the Group to translate in the operating currency assets and liabilities of subsidiaries. An example of translation risk could be having assets in US Dollar with financing exclusively carried out in Euro.

After randomly selecting a large number of companies, we had to screen down the sample to 42 Swedish and 25 German non-financial and non-energy firms for a four years' time period: from 2011 to 2014. This leads to a total of 268 firm-year observations.

Our primary focus is to target mid-large to large companies as we think it is reasonable to assume that large international firms have exposure to currencies' movements as Bonini et al (2012) assumed in their work on translation risk. In Appendix 1 we list our sample with indication of the hedging dummy assigned.

The focus on non-financial and non-energy companies is a standard among researches in this field, such as Allayannis and Weston (2001) and we agree with the motivations behind this decision.

First of all, firms operating in the financial industry approach derivatives in a very different way: indeed, given that they sell or deal with these instruments for complex strategies, it is almost impossible to gauge whether they are holding them for hedging purposes or for other reasons.

On the other hand, energy companies, being extremely regulated and related to national and political interests, may hinder the unbiasedness of our sample and given the nature of their operations make difficult to assess the *modus operandi* of their currency hedging.

The reasons behind exclusions of certain companies in the other sectors are multiple:

- We did not find a relevant foreign exchange exposure, thus undermining our assumption of currency exposure.
- The firms analyzed were subsidiaries or strongly dependent on other foreign entities.
- The information provided in their annual reports where not clear enough to infer about their actual hedging activities and exposure to foreign currencies.

Criticizers may suggest that this screening biases the sample and makes the choice of companies not random anymore. We agree that the reduction of observations reduces the statistical power of any test we intend to perform: this is an unfortunate consequence of the data selection required for this study. Indeed, the information had to be retrieved and analyzed in the annual report of every single company in every single year, given that we preferred to be sure to correctly identify hedging firms, rather than just looking for certain keywords as in Magee (2009).

On the other hand, we do not think that the randomness of the sample is compromised due to the necessity of dropping certain firms. Indeed, the exclusions have been made solely on lack of information and not on *a priori* criteria, apart from the exclusion of certain industries as justified before.

We focus at first on firms with foreign exposure as we are not interested on the effect of speculation through currency derivatives on shareholders' value, but on the effect of hedging through currency derivatives on shareholders' value. This implies that firms without currency exposure are not relevant, even if they hold derivatives. Allayannis and Weston (2001) in their study collected information regarding companies with and without exposures, finding that hedging effect, measured as derivatives' usage, for firms without foreign exposure is statistically insignificant. Relying on their findings, we prefer to focus our resources on a deeper analysis of firms with clear foreign exposure, rather than collecting a larger number and split them by an arbitrary "Foreign Sales" variable.

4.2 Variables' Description

In order to assess whether hedging is beneficial to the firm or not, we use two different dependent variables: Tobin's Q and Cash-Flow Volatility.

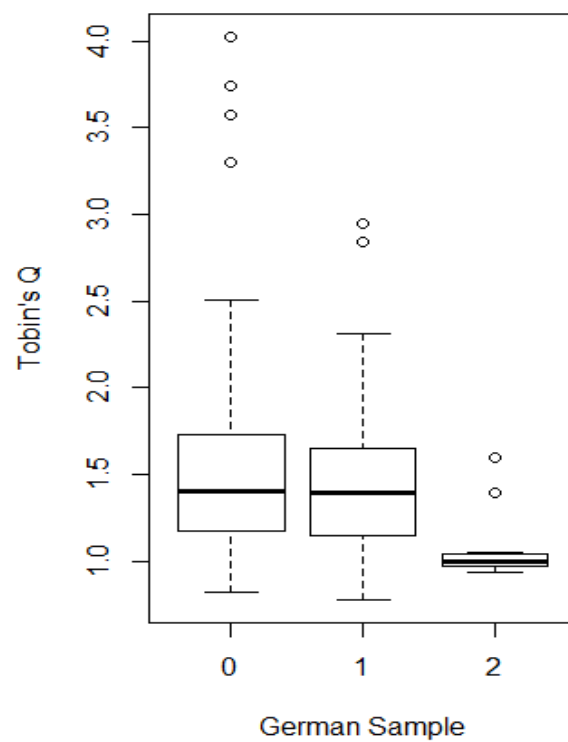
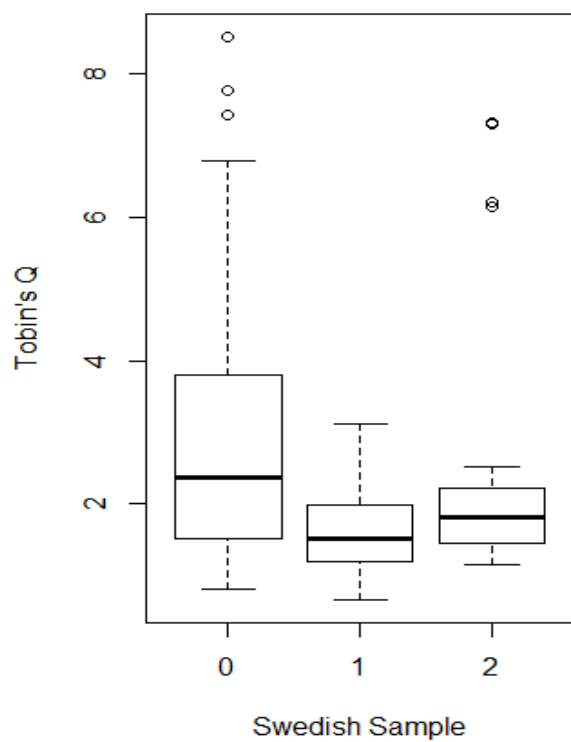
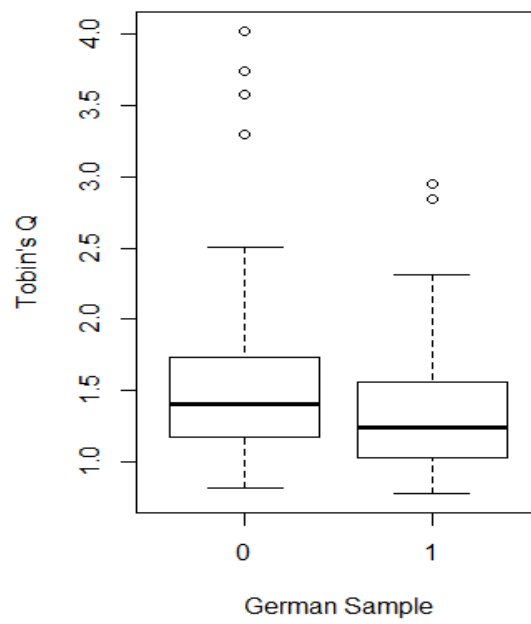
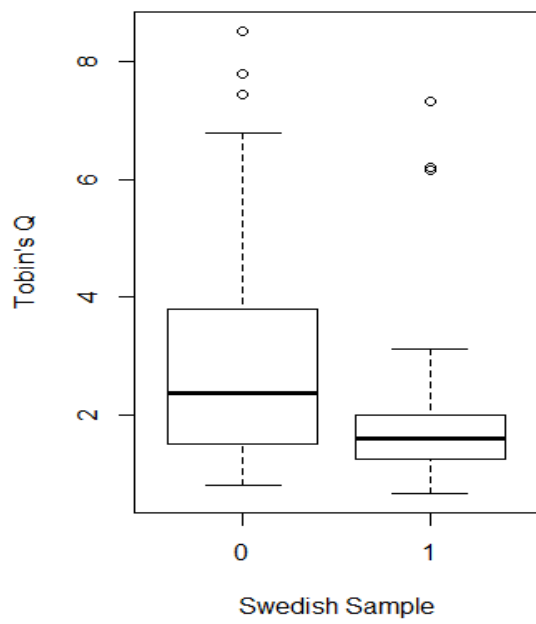
4.2.1 Tobin's Q

Tobin's Q ratio, from James Tobin, represents the ratio of market value to the cost of asset replacement calculated at the end of each fiscal year. We have used this figure to indicate shareholders' value as it is a standard approach in previous literature as in Allayannis and Weston (2001) for example.

The main benefit of using Tobin's Q is that it makes comparisons across firms easier: however, as we will show later on, we control for different features that may affect the values, such as idiosyncratic differences, industries or years.

$$\begin{aligned} & \text{Tobin's Q} \\ &= \frac{(\text{Market Cap} + \text{Total Liabilities} + \text{Preferred Equity} + \text{Minority Interest})}{\text{Total Assets}} \quad (1) \end{aligned}$$

Tobin's Q for our sample was retrieved using Bloomberg.



On the x-axis the values 0,1 and 0,1,2 indicate whether a company is non-hedger/hedgers or non-hedger/hedger/strong hedger. Particularly in the Swedish sample, non-hedgers have a higher Tobin's Q. However, strong hedgers have a greater Tobin's Q compared to normal hedger. In the German one non-hedgers have a higher Tobin's Q, followed by hedgers and by strong hedgers. This observation stimulates the issue of endogeneity as discussed by Magee (2009). The basic assumption behind our regression is that Tobin's Q values do not affect the decision to switch hedging policies and we believe that this is true. Especially during our qualitative interviews with treasures working in companies, which are part of our sample, we understood that hedging is a long-term strategic decision that does not follow yearly fluctuations in shareholders' value. It may be that companies distressed, extremely healthy or with chronic differences in Tobin's Q compared to their peers takes it into account while considering to hedge. For example, during our interviews, we assessed how one of the firms, with a remarkably high EBIT margin, does not feel the necessity to undertake the administrative costs necessary to set up a perfect hedge strategy as required by IFRS 39. However, we believe that companies do not adjust hedging policies on a standard basis due to fluctuations in their shareholders' value.

4.2.2 Cash-Flow Volatility

Cash-Flow volatility is detrimental to companies and it is proven on an empirical basis that it diminishes shareholders' value and increases the cost of financial distress. Firms with extremely volatile cash flows are less likely to be targets for LBOs, may face liquidity problems and are generally traded at a discount as shown in Allayannis, Rountree, Weston (2005) and Minton and Schrand (1999).

We want to check whether hedging has an effect on cash-flow volatility on top of shareholders' value. We built the variable using Minton and Schrand's (1999) approach.

First of all, we downloaded from Bloomberg quarterly Cash-Flows for the ten years before the firm-year observation took place. If more than 20% of the data were missing, then we removed the company from the sample. Indeed, our sample size shrunk to 190 time-year observations.

Cash flow volatility is built as the standard deviation of the ten previous quarterly cash-flows. Indeed, firms, due to size or sectors or other variables, have different average for cash-flows and in this way we can quickly de-mean them and check the volatility. As reported in the paper Minton

and Schrand (1999), there is a main drawback using this method: we do not take into account seasonality or other autoregressive patterns. For example, if a firm has a predictable sales pattern, which involves higher revenues in winter and lower in summer, this method will inflate artificially its cash-flow's volatility. However, we believe that to capture the bigger picture of the effect of hedging on cash-flow volatility, the approximation is good enough and it does not twist the results.

4.2.3 Hedging

The degree to which firms hedge is hard to assess using only public available information such as annual reports or Bloomberg. Certain companies report their hedging positions clearly and with precision, allowing the reader to understand how much and in which way risk management is taking action to hedge against foreign exchange, interest rate and commodity risks. Other times, annual reports are extremely cryptic with only fair values of derivative instruments or very broad strategies indicated, thus not allowing the reader to understand properly their positions and targets. In our opinion, the lack of transparency and the difficulties in collecting and elaborating this information has been the main issue for researchers performing this kind of analysis and investigating quantitatively the effects of corporate hedging.

We have found that in the literature there are two main ways to take into account corporate hedging.

First of all, the researcher could collect notional values of foreign exchange derivatives and use them as a continuous control variable, an approach used by Grahm and Rogers (2002). The main advantage of this method is taking into account different levels, being able to discern between light and heavy hedgers. Moreover, according to Grahm and Rogers, a continuous variable allows to handle better the endogeneity problem. On the other hand, there are some drawbacks. The first one is the sample reduction incurred in retrieving the necessary data. Compared to US filings, European companies are not forced to report their notional amounts or every specific hedging strategy. This means that the sample could shrink substantially and we could lose relevant and important companies that simply do not report notional values. Moreover, it is controversial whether the researcher should count also cross-currency fixed income swaps, swaptions and others. Grahm and Rogers in their analysis take into account vanilla forward and currency options only.

The second way, the one we adopt, is creating a dummy variable for each firm-year observation for whether it is a hedger or not. This approach has been previously implemented by Nance, Smith and Smithson (1993), Mian (1996), Geczy, Minton and Schrand (1997), Haushalter (2000), Allayannis and Ofek (2001) and many others. The main advantage of this approach is that the research is able to investigate whether a firm is truly hedging or not, going beyond simple notional values that could hide speculative purposes or extremely short-term hedging strategies. The main drawbacks are resources constraints, as information must be retrieved and analyzed on each year's annual report for each firm, and the impossibility to distinguish between light and heavy hedgers. Indeed, using this approach, two firms, hedging respectively 30% or 85% of their exposure, will be considered the same.

Acknowledging the latter issue, we create another dummy variable, which takes three possible values: non-hedger, hedger or strong hedger. We classify non-hedgers firms as those that do not hedge or hedge less than 30% of their exposure. Hedgers are firms that cover up to 75% of their exposure, whereas strong hedgers from 75% to 100%. The purpose of this second dummy variable is to check whether there are remarkable differences between a bivariate or trivariate dummy variable.

Table 1. Number of firms hedging over time

	2011	2012	2013	2014
Swedish Sample	34	32	31	31
German Sample	15	13	12	16
Total Sample	49	45	43	47

Table.2 Percentage of firms hedging over time

	2011	2012	2013	2014
Swedish Sample	81%	76%	74%	74%
German Sample	60%	52%	48%	64%
Total Sample	73%	67%	64%	70%

According to our samples, Swedish firms seem to be more prone to hedging. This is aligned with previous research (Bonini et al, 2012), showing that for a number of factors Nordic companies have a higher demand for derivatives compared to their continental counterparts. However, a number between 74% and 81% is still unusually high according to professionals operating in the field. We think that the relatively small sample, on top of our rigorous data screening, may have skewed the input in this direction. However, trying to alter the data to incorporate less hedging firms we found no difference in the results. Moreover, we prefer to maintain a random and unbiased sample rather than trying to adjust it.

4.2.4 Control Variables

Inference regarding hedging benefits requires to clear the analysis from other effects that could cause an omitted variables bias and thus nullify the results of our research. Following previous literature such as Allayannis and Weston (2001), we have decided to include in the model the following control variables. Unless specified in the following description, all the values have been taken from Bloomberg.

- (a) Size: there is an unclear connection between size and shareholders' value and cash-flow volatility. However, given that in our sample we have both very large companies that are world leaders in their field, but also small companies competing at a regional level, we thought that opting to control for this variables would have helped to improve our model. We have opted for log of total assets as control variable.
- (b) Leverage: capital structure and the amount of debt influence firms' profitability. Differences in debt amount are controlled through an ad-hoc variable, long term debt on assets.
- (c) Profitability: firm profitability has an effect on whether stocks are traded at premium or at discount. To control for profitability, we use return on asset.
- (d) Exposure: different degrees of exposure may affect the relationship between being a hedger and our dependent variables. To account for this, we use foreign sales on sales. The latter figure is retrieved from Bloomberg, but the former had to be found in the annual reports. Wherever Sweden or Germany are not specifically mentioned (e.g. certain companies indicate only Nordic Sales) we have approximated at best of our capacity. Given the

extremely low relative value of these approximations, we are confident the analysis is not going to be affected in a negative way. As specified before, whenever we met a substantial lack of data in the annual reports we have dropped the company from the sample.

- (e) Sector: if hedgers or non-hedgers are concentrated in high Tobin's Q industries, this could affect the validity of the analysis. We control for it through dummy variables, where each one employed identifies a sector. To control for such an effect, we use the two-digits Global Industry Classification Standard (GICS), developed in 1999 by MSCI and Standard & Poor's. In our sample not all of the possible sectors are present: we have observations for Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Informational Technology, Telecommunication Services and Utilities. Their GICS codes are respectively 15, 20, 25, 30, 35, 45, 50 and 55. We are missing Energy and Financials, which is in line with our aforementioned reasoning regarding their *ex-ante* exclusion.
- (f) Time: we use a time-fixed effect to control for the four different years of our sample.
- (g) Country: a dummy variable that indicates whether a company is Swedish or German.

4.3 Empirical Analysis

In order to better calculate the existence and magnitude of a currency hedging premium, we present four different analysis.

4.3.1 Univariate Tests

Following the approach of Allayannis and Weston (2001) we start our analysis with a univariate regression in which we test our hypothesis that investors reward the use of currency derivatives regressing the log Tobin's Q first against the bivariate hedging variable and subsequently using as regressor the trivariate one.

We perform the aforementioned analysis for the full, the Swedish and the German sample.

	Full Sample		Swedish Sample		German Sample	
	(Intercept)	Hedge	(Intercept)	Hedge	(Intercept)	Hedge
Observations	268		168		100	
Estimate	0.63332	-0.21607	0.88757	-0.41279	0.402	-0.11643
Std. Error	0.04959	0.05985	0.07505	0.08598	0.05102	0.06818
T Value	12.77	-3.61	11.827	-4.801	7.882	-1.708
Pr(> t)	<0.000002	0.0000036	<0.0000002	0.0000035	<0.000000004	0.0909
p-value	0.0003656		0.000003501		0.09086	
R-squared	4.67%		12.19%		2.89%	

	Full Sample			Swedish Sample			German Sample		
	(Intercept)	Hedge =1	Hedge =2	(Intercept)	Hedge =1	Hedge =2	(Intercept)	Hedge =1	Hedge =2
Observations	268			168			100		
Estimate	0.633	-0.24341	-0.10746	0.88757	-0.47575	-0.16578	0.40218	-0.06192	-0.33944
Std. Error	0.04944	0.06197	0.08940	0.07324	0.08642	0.11670	0.04971	0.06990	0.11114
T Value	12.81	-3.928	-1.202	12.118	-5.505	-1.421	8.091	-0.0886	-3.054
Pr(> t)	<0.000002	0.000109	0.230427	<0.000001	<0.000001	0.157	<0.000001	0.37792	0.00291
p-value	0.0004704			0.0000002406			0.0116		
R-squared	5.61%			16.74%			8.779%		

Contrarily to our first hypothesis hedging does not create value and it is actually associated with a decrease in Tobin's Q. Looking at the individual countries, the loss in value is higher in Sweden than in Germany. In the regression with the trivariate hedging variables, we can notice that in Sweden strong hedging causes a smaller loss in value whereas in Germany the opposite applies.

The univariate regression does not really bring much value, as the reader could have seen the results right away in the previous boxplots. However, it is interesting to compare these results with the ones of the full model, as we can see whether the values change significantly or remain constant.

4.3.2 Multivariate Test

We propose a multivariate regression that takes into account time, sector, size, leverage, profitability, exposure and firm idiosyncratic effect.

Following the standard literature we control for standard financial ratios such as size, leverage and profitability. We take into account size taking the log of total assets, leverage with the log of the ratio of long term debt to assets and profitability with the ROA. Other financial metrics would have been available for these regressors e.g. log of total sales, log of long term debt on equity and EBITDA margin. We did not find any significant difference using those financial indicators, thus we show the regressions' results using the first metrics.

In the end, to control for firms' idiosyncratic effect we decide to implement a random effect on each firm. We think that including firms' effect was of most importance: certain companies have constantly a higher Tobin's Q and thus importing this effect in our regressions would have distorted our results. For example, as we could see before, in our Swedish sample, non-hedgers have a remarkable higher Tobin's Q.

However, we have chosen to implement a random effect instead of a fixed effect for two main reasons. First of all, the numbers of firms that switch from hedgers to non-hedgers in our sample is extremely low, thus applying a fixed effect to each company would have removed the information they carry regarding hedging and shareholders' value. Indeed, if we apply a fixed effect to Adidas and Adidas never changes its hedging policies over our sample, the hedging dummy variable is excluded in the fixed effect and thus ignored.

Another reason is the loss in degrees of freedom and consequently in statistical power that applying a fixed effect would have caused. Indeed, with only four years in our sample, removing 67 degrees of freedom out of a total number of observations of 268 would have been a significant statistical cost.

As reported in Chris Brooks (2012), a random effect model is a special variant of the fixed effects model. It helps to handle unobserved heterogeneity when this heterogeneity is constant over time and correlated with independent variables. The underlying assumption is that the individual-

specific effect is a random variable uncorrelated with the explanatory variables (Schmidheiny, 2015). The random effect model can be expressed as

$$y_{i,t} = \alpha + \beta x_{i,t} + \omega_{i,t}, \quad \omega = \epsilon_i + u_{i,t}.$$

x_{it} is a $1 \times k$ vector of explanatory variables. The main difference with a fixed effect is that the variation in the cross-sectional dimension is captured via ϵ_i and not with dummy variables in x_{it} . In this model, the error term ϵ_i is required to have zero mean, must be independent of the individual observation error term, is heteroskedastic and is independent of the explanatory variable. The parameters are usually estimated using a GLS (generalized least square) procedure, as the estimation would have been doable, but biased and inefficient using the more traditional OLS. To perform a random effect analysis on one of the variables in R, we have used the package “lme4” which includes the function “lmer”, developed by Bates, Maechler, Bolker and Walker.

Finally, the equation used to perform this analysis is

$$\log(\text{Tobin's } Q) = \alpha + \text{NAME}_i + \beta \text{Hedge}_i + \beta \text{Year}_i + \beta x_i + \beta \text{GICS}_i + \beta \text{Country}_i + \epsilon_i$$

NAME is a variable containing the names of all the companies in our sample and that is where we applied the random effect.

Hedge is our hand-made variable, taking values of 0 and 1 if we use it as a bivariate dummy variable or 0,1 and 2 if we are working with the trivariate variables.

The matrix $x_{i,t}$ represents the explanatory variables used each year for each firm: as described before they are logarithm of assets, logarithms of long-term debt to assets, ROA and foreign sales on sales.

Year, GICS and Country are control variables as described in the previous section.

As the reader may notice looking at the table below, it may look like that some control dummy variables are missing: specifically, the year variable 2011, the sector variable Materials (15) and the country variable Germany: they are not explicitly described, but their effect is included. Indeed, due to the structure of *lmer*, the first categorical variable in a regression is automatically included and its effect incorporated. The coefficients of variables belonging to the same vector must be interpreted as the difference between the implicit and the explicit variable. For example, in our case

the coefficient of *Sweden* represents the difference between Germany and Sweden *ceteris paribus*. The coefficients related to Consumer Discretionary and Consumer Staples are, respectively, the differences between Consumer Discretionary and Materials and Consumer Staples and Materials. The choice of which value is the explicit is completely random and does not influence the results: indeed, R automatically absorbs the first categorical variables in alphabetic or size order. Germany comes before Sweden, Materials (15) is the first GICS and 2011 is the first year in our sample.

As with univariate regressions, we report six different sets of results: full, Swedish and German sample for both the bivariate and trivariate hedging. Obviously, while analyzing just the Swedish or German sample, we drop the *Country* control variable.

As we can see in Table 3 and Table 4, the results are still negative and it looks like that hedging does not create value for shareholders. However, controlling for other variables, the results is smoothed and substantially less negative. The Swedish sample shows the same feature as before: the estimate of the bivariate hedging variables is -0.28. The same pattern that we have seen in the univariate regression with the trivariate hedging variable applies in this case as well: strong hedging is related to a smaller decrease in Tobin's Q than weak hedging.

The German sample shows a different result: hedging does create value for shareholders. Looking at Table 3, we can see that hedging is related to a 6% increase in Tobin's Q, even if this is not the case for strong hedging, as we can see in Table 4.

The results are puzzling and hard to interpret. As with previous literature, we have found that there is no a clear answer. The effect of hedging on shareholders' value seems to be hard to capture using this type of analysis.

Table 3**Table: Mixed Linear effect with bivariate Hedging variable**

	Full			Sweden			Germany		
	Estimate	Std. Dev	t value	Estimate	Std. Dev	t value	Estimate	Std. Dev	t value
Intercept	0.289644	0.297391	0.974	0.172098	0.405051	0.425	0.163311	0.318277	0.513
Hedge	-0.077705	0.048456	-1.604	-0.285980	0.089996	-3.178	0.063421	0.040644	1.560
2012	0.061733	0.025539	2.417	0.017358	0.035817	0.485	0.126280	0.028864	4.375
2013	0.185802	0.026033	7.137	0.139240	0.036402	3.825	0.254766	0.029571	8.615
2014	0.145569	0.026494	5.494	0.096910	0.037937	2.554	0.192378	0.029192	6.590
Log(Assets)	-0.025285	0.029368	-0.861	-0.011562	0.041757	-0.277	-0.037948	0.030868	-1.229
Log(Lt_Debt/Assets)	-0.008256	0.004767	-1.732	-0.005209	0.005543	-0.940	-0.039235	0.010952	-3.583
ROA	0.005021	0.001901	2.642	0.003440	0.002195	1.567	0.020526	0.004701	4.366
Foreign Sales on Sales	0.022599	0.020018	1.129	0.387242	0.251239	1.541	0.026138	0.014027	1.863
Industrials	0.154558	0.148233	1.043	0.312757	0.215925	1.448	0.127430	0.120432	1.058
Consumer Discretionary	0.236780	0.167880	1.410	0.561452	0.253628	2.214	0.078602	0.126833	0.620
Consumer Staples	0.297783	0.193487	1.539	0.405260	0.296442	1.367	0.353876	0.138638	2.553
Health Care	0.356202	0.192715	1.848	0.484665	0.287299	1.687	0.301273	0.142587	2.113
Information Technology	0.186106	0.216905	0.858	0.240305	0.289079	0.831	0.095078	0.208646	0.456
Telecommunication Services	0.014759	0.313468	0.047	0.138400	0.376046	0.368		n.a	
Utilities	-0.504924	0.563767	-0.896		n.a		-0.545026	0.341304	-1.597
Sweden	0.232058	0.103063	2.252		n.a			n.a	
Random effect	Variance		Std. Dev.	Variance		Std. Dev	Variance		Std. Dev
Intercept	0.14588		0.3819	0.17259		0.4154	0.032310		0.17975
Residual	0.02127		0.1458	0.02601		0.1613	0.009967		0.09984

Table 2

Table Mixed Linear effect with Trivariate Hedging Variable

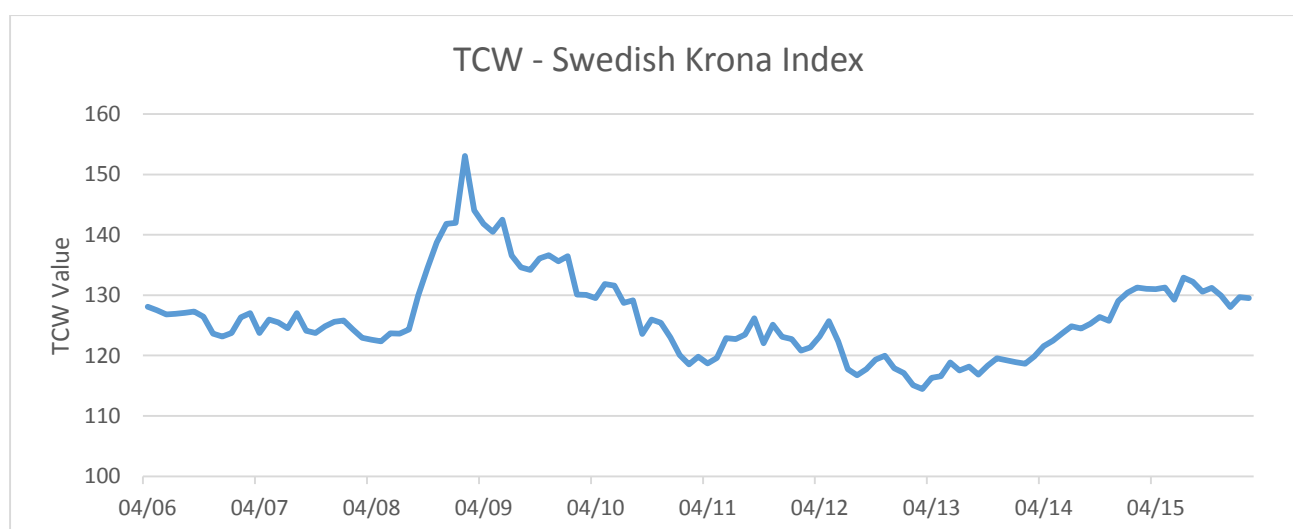
	Full			Sweden			Germany		
	Estimate	Std. Dev	t value	Estimate	Std. Dev	t value	Estimate	Std. Dev	t value
Intercept	0.286553	0.298932	0.959	0.278154	0.40814	0.682	0.163311	0.318277	0.513
Hedge	-0.076078	0.049544	-1.536	-0.361501	0.103249	-3.501	0.063421	0.040644	1.56
Hedge 2	-0.088572	0.085021	-1.042	-0.147963	0.13052	-1.134	-0.088572	0.085021	-1.042
2012	0.061466	0.025637	2.398	0.013556	0.035834	0.378	0.12628	0.028864	4.375
2013	0.185395	0.026209	7.074	0.139121	0.036322	3.83	0.254766	0.029571	8.615
2014	0.145219	0.026642	5.451	0.097985	0.037849	2.589	0.192378	0.029192	6.59
Log(Assets)	-0.025038	0.029496	-0.849	-0.016221	0.041565	-0.39	-0.037948	0.030868	-1.229
Log(Lt_Debt/Assets)	-0.008255	0.004778	-1.728	-0.00477	0.005537	-0.862	-0.039235	0.010952	-3.583
ROA	0.005021	0.001904	2.637	0.003253	0.002195	1.482	0.020526	0.004701	4.366
Foreign Sales on Sales	0.022766	0.020081	1.134	0.392234	0.250183	1.568	0.026138	0.014027	1.863
Industrials	0.155048	0.148703	1.043	0.287934	0.21459	1.342	0.12743	0.120432	1.058
Consumer Discretionary	0.237997	0.168535	1.412	0.53529	0.251946	2.125	0.078602	0.126833	0.62
Consumer Staples	0.299281	0.194289	1.54	0.334601	0.297758	1.124	0.353876	0.138638	2.553
Health Care	0.359285	0.194315	1.849	0.368316	0.295613	1.246	0.301273	0.142587	2.113
Information Technology	0.187279	0.217649	0.86	0.178826	0.289434	0.618	0.095078	0.208646	0.456
Telecommunication Services	0.013657	0.314467	0.043	0.124179	0.372829	0.333		n.a	
Utilities	-0.49692	0.567364	-0.876		n.a		-0.545026	0.341304	-1.597
Sweden	0.232058	0.103063	2.252		n.a			n.a	
Random effect	Variance	Std. Dev.		Variance	Std. Dev		Variance	Std. Dev	
Intercept	0.14675	0.3831			(Intercept)		0.16931	0.4115	
Residual	0.02134	0.1461			Residual		0.02591	0.161	

4.3.3 Multivariate Test in Times of Currency Strengthening

So far, we did not consider foreign exchange movements in our model. For this kind of analysis currencies movements have an undeniable effect as we are going to show. Indeed, in periods of Swedish Krona appreciation, Swedish exporters are negatively affected and vice versa. Thus, especially in those periods, hedging should be valued by investors and should have a positive effect on Tobin's Q.

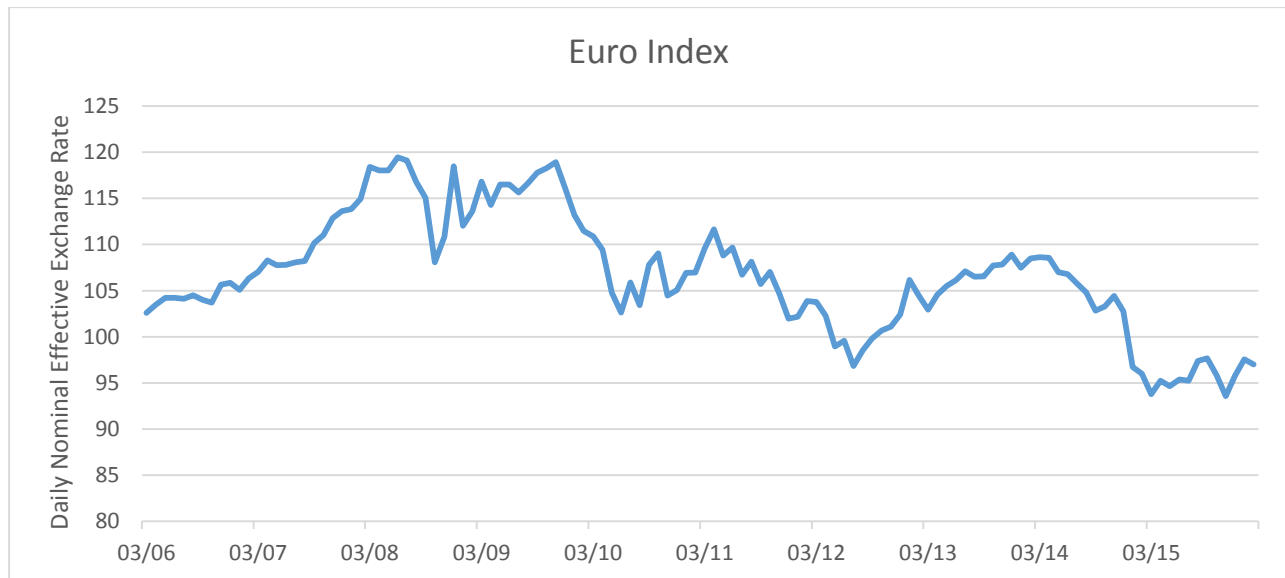
In order to perform this analysis, we have created a new dummy variable for each firm-year observation that can take the value of "Appreciation" or "Depreciation", depending on that year's currency movement. We have selected two indices: one from Riksbank for the Swedish sample and another one from the European Central Bank for the German sample.

The TCW Index ("total competitiveness weights") published by Riksbank is one of the two different exchange rate indices for the Krona. As the institution states on its webpage, as of January 2016, "The TCW Index is a geometric index and its weights are based on the average aggregate flows of processed goods for 21 countries. The weights take into account exports and imports, as well as third-country effects. The weights, which are produced by the IMF, are based on data from 1989-1991 and have not been updated since then".



An increase in the TCW implies depreciation of the Swedish Krona and vice versa.

The Daily Nominal Effective Exchange Rates of the Euro are calculated by the European Central Bank (ECB) and “they are weighted on averages of bilateral euro exchange rates against 19 trading partners of the euro area”.



In this case, a decrease in the index implies a depreciation whereas an increase denotes an appreciation, thus being the contrary of the Swedish Krona index.

What we notice looking at the graphs and analyzing their numbers is that Swedish Krona depreciated in 2011, 2013 and 2014, while appreciated in 2012. On the other hand, the Euro depreciated in 2011 and 2014 and appreciated in 2012 and 2013.

In order to assess how it changes the effect of hedging during years of currency strengthening, rather than simply checking the effect of strengthening on Tobin's Q , we shrink our sample performing the same analysis on firm-years observation distinguished by the dummy variable “Appreciation” only.

Given the small difference in the previous analysis between the bivariate and the trivariate hedging variables, we only report results for the bivariate dummy.

Table 5

	Sample - Appreciation		
	Estimate	Std. Dev	t value
Intercept	0.537028	0.285362	1.882
Hedge	0.020892	0.059793	0.349
Industrials	0.181931	0.124317	1.463
Consumer Discretionary	0.190561	0.136215	1.399
Consumer Staples	0.412742	0.165391	2.496
Health Care	0.485691	0.156534	3.103
Information Technology	0.020633	0.185506	0.111
Telecommunication Services	0.276050	0.249184	1.108
Utilities	-1.569673	0.888771	-1.766
Log(Assets)	-0.059582	0.028148	-2.117
Log(Lt_Debt / Assets)	-0.031142	0.011518	-2.704
ROA	0.023647	0.005787	4.086
Foreign Sales on Sales	0.082233	0.047592	1.728
Random effect	Variance	Std. Dev.	
Intercept	0.08706	0.29507	
Residual	0.008534	0.09238	

The new sample is composed by 87 firm-year observations, specifically Swedish firms in 2013 and Germans in 2012 and 2013. As we can see, in this specific case hedging creates value for shareholders as there is a 2% premium. The result shows how in times of currency strengthening hedging creates value as it protects exporters from the negative effect of the currency on their business. This result is aligned with Allanyanis and Weston (2001) and it fits our hypothesis that foreign exchange movements impact the effect of hedging on Tobin's Q.

4.3.4 Hedging and Cash Flow Volatility

Finally, as last analysis, we check whether hedging decreases or increases cash flow volatility. Previous literature has demonstrated that lower cash flow volatility is beneficial to the company for different reasons. In general, lower cash flow volatility has a positive effect on stock's returns as shown by Allayannis, Rountree, Weston (2005).

In this analysis, we are going to take into account only transaction risk, as translation risk has a different effect on the balance sheet. However, the reader should not underestimate the effect that translation risk can have on companies' earnings: for example, PepsiCo in the fourth quarter of 2015 lost \$105 million from its Venezuelan subsidiaries related to translation risk only.

We have decided to focus on cash flows rather than earnings because it is extremely cumbersome and time consuming to assess fully the effect of hedging derivatives on earnings. Indeed, due to IFRS 39, whether a firm applies hedge accounting or not has an effect on how earnings are affected by currency derivatives. However, as we are going to discuss later, IFRS 39 is considered to be extremely clumsy by finance departments that are not very sophisticated. Thus, many hedgers buy currency derivatives in order to hedge against contracted and forecasted cash flows, but do not register them as hedge accounting due to the prohibitive administrative cost.

We expect hedging to have a negative effect on cash flow volatility, thus being positive for investors and management.

There are two main intuitions behind this analysis: directly, hedging decreases the fluctuations of inflows and outflows caused by swings in the foreign exchange market, especially when sales and cost of goods sold are denominated in different currencies.

Indirectly one could argue that hedgers have a more prudent risk management profile, thus they manage to smooth cash flows through different techniques, currency derivatives being one of them.

As we have written before, to perform this analysis we had to reduce the sample size to 196 firm-year observations. Indeed, whenever more than 20% of the 10 previous quarterly cash-flows were not available, we had to remove the company from the sample. In Appendix 2 we listed all the companies used for this analysis.

The model employed is similar to the previous one as we have used the mixed linear model with the same control variables. However, instead of the log of Tobin's Q we have Cash-Flow Volatility as the independent variable. To control for firm idiosyncratic effect that are not accounted by the other control variables, we have applied a Random effect on each company for the aforementioned reasons.

As we can see from the table, hedging decreases cash flow volatility by 2.5% with a t-value of -0.506. The result seems to be aligned with our previous expectations, even if it is of small magnitude. Unfortunately, a t-value of -0.0506 indicates that the result is not fully statistically significant and that there could be noise influencing the result. Checking the other regressors, we can see how size and leverage decreases cash-flow volatility, whereas profitability and foreign exposure increases it.

Checking the Swedish sample only, composed by 104 firm-year observations, hedging has a way stronger negative effect on cash flow volatility, decreasing it by 34%. The t-value of -2.871 seems to confirm the strength of this result. The other regressors i.e. size, leverage, profitability and foreign exposure, behave in the same way as with the full sample.

The German sample, composed by 92 firm-year observations, produces counterintuitive results. In this case it looks like hedging increases cash flow volatility by 6.8% with a t-value of 1.69. The other regressors follow the same pattern we have seen for the full and for the Swedish sample.

Table 6

	Full			Sweden			Germany		
	Estimate	Std. Dev	t value	Estimate	Std. Dev	t value	Estimate	Std. Dev	t value
Intercept	0.355107	0.30782	1.154	0.80111	0.462222	1.733	0.1025	0.348788	0.294
Hedge	-0.0247	0.048854	-0.506	-0.347881	0.121185	-2.871	0.068847	0.040741	1.69
2012	0.076388	0.026974	2.832	0.021841	0.043341	0.504	0.141064	0.029178	4.835
2013	0.20145	0.027484	7.33	0.150449	0.04399	3.42	0.269744	0.029962	9.003
2014	0.14964	0.027446	5.452	0.096947	0.044536	2.177	0.202579	0.029376	6.896
Log(Assets)	-0.05679	0.029918	-1.898	-0.063138	0.047451	-1.331	-0.03514	0.03417	-1.028
Log(Lt_Debt/Assets)	-0.04449	0.008555	-5.201	-0.039505	0.011485	-3.44	-0.04092	0.011436	-3.578
ROA	0.008668	0.002196	3.947	0.007774	0.002765	2.812	0.022682	0.004688	4.838
Foreign Sales on Sales	0.024236	0.018208	1.331	0.11335	0.250217	0.453	0.026796	0.013567	1.975
Industrials	0.305298	0.133601	2.285	0.506692	0.193126	2.624	0.134891	0.132315	1.019
Consumer Discretionary	0.19174	0.140177	1.368	0.388936	0.229459	1.695	0.081039	0.132825	0.61
Consumer Staples	0.379452	0.153893	2.466	0.39914	0.23641	1.688	0.357916	0.145141	2.466
Health Care	0.535464	0.169621	3.157	0.72475	0.28532	2.54	0.311559	0.149096	2.09
Information Technology	0.288239	0.203146	1.419	0.393628	0.286206	1.375	0.091997	0.218234	0.422
Telecommunication	0.147437	0.242495	0.608	0.209455	0.287366	0.729		n.a	
Utilities	-0.36197	0.467296	-0.775		n.a		-0.54914	0.3409	-1.611
Sweden	0.272403	0.092141	2.956		n.a			n.a	
Random effect	Variance	Std. Dev.		Variance	Std. Dev		Variance	Std. Dev	
Intercept	0.08016	0.2831		0.07561	0.275		0.035859	0.18936	
Residual	0.01738	0.1318		0.0238	0.1543		0.009268	0.09627	

4.4 Limitations of the Models

We are aware that this model has a few limitations. First of all, the sample is not big enough to be completely exhaustive and this leads to increased standard deviations and perhaps to wrong or skewed results. As we admitted before, collecting this information manually from annual reports while maintaining a rigorous data screening process is costly, a point also raised by Monica Marin (2006).

Another possible limitation is the endogeneity problem i.e. whether is not hedging that influences Tobin's Q and cash-flow volatility, but the other way around. We reject this limitation, as currency hedging is usually a strategic choice set up by the Board of Directors or top management and it does not change very often depending on the market or previous performances, unless extreme events happen. Not only our data show that changes are extremely unlikely, but this intuition has been confirmed during the qualitative interviews.

An important limitation is how to capture the hedging activity. Before, we described the two most common solutions in academia: notional values of currency derivatives or an ad-hoc dummy variable. In both cases, there will be measurement errors, arbitrary decisions and an overall incomplete variable. We believe this is the hardest and most important obstacle in this field of analysis. However, if a researcher were to use only public data, unfortunately she could not get deeper information than that.

4.5 Conclusions

The results obtained from our analysis are somehow puzzling and inconclusive, a point also shown by Magee (2006). The magnitude of hedging is low on cash-flow volatility and even lower for Tobin's Q. However, we do not find this surprising as the hedging of currencies' effects is one of the very numerous activities of companies and perhaps not even one of the most crucial from a short to medium term investors point of view. What we find puzzling and interesting are the differences in sign we find in different samples. This applies both when we divided observations on a geographical basis or only selecting periods with appreciation in the underlying currency. Indeed, we do not find clear results such as in Allayannis and Weston (2001) or Graham (2002) on

whether hedging is profitable or not. Anyhow, we believe that our results shed a light on currency hedging: it does not have a clear impact on shareholders' value and it is not necessarily good or bad. Different companies in different periods may have diverse necessities that make hedging either a good or a bad choice. This intuitive point, confirmed during our interviews, is especially true when considering EBIT margins and cash-flows allowances. Firms with tight margins and a lack of safe cash-flows are extremely exposed to tail risks given by currency's fluctuations. In this case, the expected value of purchasing hedging protections is probably positive as it may avoid the firm to enter in a distressed situation due to market swings. On the other hand, companies with large margins and safe cash-flows do not run this risk and for them is more important the financial and administrative cost of hedging. Moreover, commodity, currency and fixed income hedging depends substantially on the underlying market, thus it would not be appropriate to apply a "one size fits all" reasoning. For example, when currencies or commodities are historically strong and managers feel there is a strong downward pressure which eventually will affect the prices, there may be a reason to not hedge in order to not be at competitive disadvantage with the market.

Second of all, we believe that researches have so far focused too much on the short-term impact of hedging i.e. whether it reduces volatility or increase shareholders' value. Running our qualitative interviews and studying the topic, we came to the conclusion that one of the most important benefits of hedging comes from avoidance of extreme events and black swans, more than from normal operations and yearly benefits.

As Monica Marin (2006) has shown, foreign exchange risk management decreases the probability of bankruptcy which is particularly significant from this point of view. Perhaps, a follow up on this research, would be to analyze longer time series trying to avoid sample bias and check whether hedgers manage to avoid entering in financial distress and to trigger covenants and restructuring processes. Moreover, this is what we believe hedging is for. Often we have read a comparison between hedging and insurance policies, and the value of the insurance is not fully understood until a black swan happens. A recent and good example is the decision of the Swiss Central Bank

to unpeg the Swiss Franc from the Euro. Companies whose business makes them have a natural short exposure to the Swiss Franc have suffered the sudden decision of the central bank, which was not expected and created a currency fluctuation of substantial magnitude.

5 Qualitative Analysis

We feel that a purely theoretical and quantitative approach would fail to capture the real extent of the subject. Therefore, for the purpose of grasping the subject and the way it is approached by firms, interviews were conducted with employees of the treasury departments of five Swedish firms, namely Hexagon, Boliden, Meda, Billerundkorsnas and Atlas Copco, in an attempt to have an overview of how the treasury departments of companies, that do business in different industries, approach risk management and the use of currency derivatives in particular.

On the process of the interviews, we inquired not only for the individual firm's strategy on hedging and the rationale behind it, but also for the personal opinions of the professionals working within the firms, since the two are typically aligned but not always on a perfect match.

5.1 Analytical Frameworks to Hedging

Using the material gathered from the interviews together with the existing academic background on hedging, especially the strategy overview from Aslund and Meens, four main approaches were identified.

Constant Hedging (Passive)

The companies that use this approach typically hedge a predefined level of their exposure every predefined time period. E.g. Company X's treasury has the mandate to hedge 40% of the group's exposure to foreign currencies in the beginning of each month.

One-time Hedging

Companies that use this approach, only hedge in line with big anticipated Cash Flows. E.g. Company Y (with SEK as a functional currency) will acquire Company Z (with Euro as a functional currency) in six months from now. Company Y will hedge against possible fluctuations in the exchange rate and lock in the price today by entering in a forward contract.

This approach may be also used by companies that use the other three approaches in anticipation of future Cash Flows, especially when the Cash Flows have been invoiced or are in any way guaranteed.

Active Hedging

Companies that use this approach will hedge against fluctuations in the exchange rate only when the current rate is favorable to the company. E.g. Company T's treasury has the freedom to hedge up to 60% of the foreign currency exposure. The treasurer will follow the variance on the exchange rate that is of interest to the company and only lock in exchange rates for future cash flows when they judge that the current rate is above a certain predefined level that would be advantageous to the firm.

No Hedging

Companies that are of the belief that hedging does not add substantial value to their business. These companies usually have high liquidity and their balance sheets can withstand large one-day exchange rate changes, or simply believe that hedging is not a core part of their business and therefore is irrelevant to their business model.

5.2 Interviews

In this section we will discuss the structure, results and limitations of the interviews together with the conclusions that we made based on them.

5.2.1 Structure of the interviews

In conducting the interviews, we attempted to get both the opinion of the company and the opinions of the individual professionals that worked for the company, whether those two were aligned or not. For this reason, we prepared a set of questions that covered a variety of points that we felt that should be addressed (Appendix 4). The responses to the questions were documented as part of the research and were used to draw conclusions in the later stages.

Apart from the structured part of the interviews, we engaged in an open discussion with the professionals on the topic of hedging and specifically currency hedging, in order to get a better understanding of the market views on the topic. The discussion

shed further light on the topics the questions touched upon and aided us in drawing more concrete conclusions.

5.2.2 Limitations and disclaimer

Despite a good diversity of industries, we acknowledge that five companies is a limited number to derive a conclusion on market sentiment toward derivatives hedging. However, we defend our decision to run a few, but deep, interviews as we are interested in understanding reasons and thoughts behind corporate currency hedging, rather than collecting a larger number of qualitative data.

For privacy reasons, these answers are not going to be linked to any specific individual or company, thus all our statements just derive from our understanding of the topic and they are not a summary of any other point of view.

5.2.3 Overview of the interviews

In the process of conducting the interviews we came across a number of different points of agreement and disagreement amongst the different firms and also between the factors taken into account by academics and professionals. For the purposes of this thesis and in the course of respecting private information of the companies and the individual interviewed, there will be no company specific case

The magnitude of the different views on hedging amongst firms is first of all evident when examining the companies at a surface level. Companies with similar levels of foreign exposure can have substantially different levels of that exposure hedged, ranging from as high as more than 70% to no exposure hedging at all. Of most importance, we believe that personnel capabilities and working hours dedicated to hedging is key in this sense. It is easy to infer that different size companies have different size treasury departments and thus different amounts of employees handling their exposure and hedging strategy, thus taking the absolute number of employees that work on hedging within each company and comparing them would be biased and would not yield substantial conclusions. Therefore, we compared the relative percentage of the total working hours of each treasury department to the working hours dedicated to hedging. Unsurprisingly the range there is also great, with

companies dedicating anywhere between less than 3% to over 50% of the working hours of the treasury department to hedging. Obviously the companies that are closer to the left side of the distribution are the ones that engage in passive hedging strategies or do not hedge and the companies that are closer to the right side of the distribution are the ones that engage in more active hedging strategies, which is either locking in whenever they feel it is the best opportunity or monitor directly exposure through their global treasury. However, there is not a linear relationship between how active a company is in hedging and the time dedicated to hedging. Both active and passive hedging strategies require a great amount of working hours, especially when there are quotas in place for the maximum level of the unhedged position.

The observation above about the relation of working hours dedicated to hedging and the levels of hedging was supported by all professionals. The work needed in order to comply with the IFRS (appendix 5) to have a hedging position apply to hedge accounting standards is considered problematic. Compliance with the IFRS and the amount of effort needed to achieve compliance was moreover a factor that all professionals take into account when deciding on hedging strategies. Cumbersome regulations make hedging less attractive as professionals perceive that the extra cost associated with compliance to the IFRS outweighs the rewards gained by those hedging positions. A common sentiment amongst professionals was that, if the regulations were not so complicated, they would engage in more active hedging strategies than the current.

Hedging strategies also have high levels of stickiness, with the majority of companies interviewed revising their hedging strategies only in cases of extreme events or after long periods (more than 5 years). This was also observed when going through the annual reports of the full sample used for the thesis, as the vast majority of the firms did not switch their hedging strategies over the sample period and those who did usually had special reasons to do so. Hedging strategies in most companies are reviewed not only by the employees conducting the hedging, but also by higher management officials. This creates a bottleneck that hinders hedging strategies from changing regularly. Companies where the treasury was observed to have higher

flexibility regarding hedging levels and strategies were also generally observed to have a better performing hedging portfolio.

Another topic where major variances were observed amongst the interviewees was the value of hedging. We observed a wide variety of opinions on this question. There are professionals that agree with the original academic view of Modigliani and Miller, hedging offers no additional value to the shareholders, since the informed shareholders will invest in a company to add specific exposure to their portfolio. More conservative professionals argued that one of the main benefits of hedging is the time buffer it provides the company between an event and the time it affects the company. On the other hand, advocates of an active hedging strategy are of the opinion that a thorough, well-planned hedging strategy can provide an advantage to the company and place it in a better position in the market.

In line with academia, professionals agree about the benefits of hedging in terms of reducing the costs associated with financial distress. Professionals argue that a hedged position is viewed favorable by the market, since it involves less uncertainty. This in turn has an effect on the company's rating and on how investors perceive the risk-reward profile of the company.

However, academia usually overlooks yet one more factor that periodically plays a role in hedging decisions. Firms will hedge positions as an auxiliary business for their associated banks. This can happen in two ways. First the bank might directly ask the firm to hedge specific levels of its exposure to reduce its risk, before entering in a loan agreement. Alternatively, firms might proactively engage in this form of "auxiliary" hedging, in order to strengthen their relationships with a bank –along with regulating their risk profile- and achieve better terms for future deals with said bank.

Market and competition conditions is one more factor, whose weight varies depending on the professional. More active hedgers constantly observe and try to predict the market before taking decision. Passive hedgers consider the market conditions irrelevant and will hedge predefined levels of their exposure without regard to the market in order to create a time buffer for extreme events. Competition is also seen as a factor that can potentially influence hedging decisions. Although some

professionals consider competitor behavior irrelevant to their decisions on financial subjects like hedging, others take competitors behavior into account, keeping track of their actions and trying to stay in par or ahead of the market.

Moreover, major differences were observed on the structure of hedging and hedging decisions. First, some firms favor a project/cash flow specific model to hedging, without accounting for any correlations between assets that are already in their portfolio. In contrast, other professionals stated their preference to using more elaborate models, incorporating correlations between the hedged assets and engaging in hedging transactions against the exposure calculated after accounting for these correlations. Also differences were observed in the level of centralization involved in hedging strategies. Even though the majority of companies had specific guidelines on the levels of hedging, different companies managed their hedging portfolio in dissimilar ways. Companies were observed to manage all their exposure centrally, disregarding local exposure or exposure of specific functions in favor of the centralized exposure. On the other side, some firms manage their exposure hedging in a decentralized way, allowing local subsidiaries, branches and even functions of the company to manage their own exposure.

The aforementioned summary, supports the conclusion made before about the ambiguity that surrounds the subject of hedging and the fact that there are points of agreement but also of disagreement between academia and the market, but also inside each of the two fields.

In the following part, the factors professionals consider in order to decide to engage or not engage in hedging will be discussed. Moreover, a brief discussion about how each of the factors and how the stance professionals takes towards it will be made. This section will end with discussion and considerations about the connection between the differences and the similarities between the way hedging is perceived by academia and by the market.

5.2.4 Hedging as perceived by professionals

The views of the professionals on hedging offered important insights on how hedging is approached by the market. Although most of the points raised were in line with the

academic literature on the subject, we observe that some of the factors that affect hedging decisions are often overlooked by the existing literature. This section will be divided in two parts. In the first part the factors and understandings in favor of hedging will be analyzed, and in the second the factors and understandings against hedging.

5.2.4.1 Views in favor of hedging

The main considerations and factors that lead professionals to positive decisions in relation to hedging are presented below.

Postponing Effects of Market Events

Hedging the exposure of the company, especially in the case of rolling hedges (predefined levels of exposure hedging that is refreshed periodically), serves to create a time buffer between the moment a market event occurs and the time it will affect the company. This time buffer offers the company time to adjust to the new market reality e.g. update price lists, alter cost structures etc.

This approach requires little resources in terms of human capital since market research and forecasting is not relevant for its application. Indeed, positions are covered only once items are added to the balance sheet. The time buffer is valued by companies that favor the passive approach to hedging. Companies that consider this as a strong reason to hedge, typically are not concerned by presenting profits or losses in their hedging portfolio and consider it an auxiliary activity that serves to provide flexibility to the company in case of extreme events.

Smoothering Profits and Losses

Hedging allows the firm to keep its results independent of factors it does not control, at least to a certain degree and for a limited amount of time. Stability in the results conveys a signal of safety to the shareholders, making the company more appealing to investors.

Furthermore, hedging makes the results more representing of the management's efficiency, since the results no longer carry noise from external factors and are a better indicator of the performance of the company. A solid, non-fluctuating result pattern is also a good indicator for stability when considering raising debt.

Some of the professionals argued that by having a lower variance in its results, a firm can present a lower risk level and therefore enjoys better ratings and can leverage this position to receive favorable terms for raising debt from banks and from the market. Typically, companies that use either a passive approach or an active one, perceive this effect as a reason to engage into hedging activities.

Cost of Financial Distress

Companies that hedge their exposure have a lower correlation with the market and a lower variance and expected variance of their results. This in turn has an effect in the risk profile of the company, rendering it less likely to enter into a situation of financial distress. The reduced risk level is rewarded by creditors by better conditions and increased accessibility to funds.

Moreover, the lower probability of financial distress, as depicted by better ratings, is integrated in the pricing of the company in the market and is rewarded by investors. The majority of the interviewees agreed on this as being one of the most important positive effects of hedging and one of the most relevant reasons to engage in hedging activities.

Liquidity and Investment Opportunities

A company that enjoys a low exposure to fluctuations of the market can more accurately forecast its future performance. This implies a better management of the projected cash flows of the company and therefore makes maintaining desired levels of liquidity more feasible in the long term. Maintaining a certain level of liquidity and the knowledge that this liquidity is less likely to be affected by market events, allows investment flexibility to a firm.

Firms that are able to more accurately forecast their financial position in the future are more likely to take advantage of investment opportunities as they appear, even if that implies a drop from their normal liquidity levels.

Moreover, maintaining these liquidity levels even in periods of financial instability, allows the firm to make investments and seize opportunities that it would be unable to should its cash flows had been affected by unfavorable market events.

Costs-Revenues Lock-In

A hedged cash-flow involves substantially lower levels of uncertainty than an unhedged one. Companies choose to reduce the uncertainty involved in future cash flows by using financial derivatives. For example, a firm would decide to lock in a specific exchange ratio for a cash flow expected in the future in order to remain unaffected by currency fluctuations.

Cash-flows lock-in is valued by all professionals. It is the main effect taken into account by firms that engage in “One Time Hedging”. As mentioned before, “One Time Hedging” strategy is also often implemented by firms that follow one of the other strategies.

It is most commonly used for transactions of great volume or value that is because, for example a small fluctuation in the currency exchange rate could potentially have strong effects on big cash flows e.g. an acquisition or the construction of new facilities in a different country whose market functions with a different currency.

Relations with Financial Institutions

Treasurers and firm’s management will sometimes engage into hedging through the use of financial derivatives as a means of strengthening their relationship with a financial institution. Often a financial institution will request that a firm lowers its risk profile as a prerequisite for entering into a loan agreement. In that case the firm might decide to purchase the, required by the financial institution, instruments in order to achieve the desired risk profile to qualify for the loan.

It is however also the case that firms act proactively in this manner. Some firms decide to purchase financial instruments for hedging as a way to achieve risk profiles that appeal to financial institutions beforehand. Furthermore, some firms use them as a way to establish and strengthen their partnership with specific financial institutions. The financial instruments used for hedging are a source of revenue for financial institutions, thus companies that make extensive use of them are considered valuable clients. Therefore, the rationale of some professionals is to become an important

enough source of revenue for said financial institution that it will try to protect the firm in order to safeguard that revenue stream.

This approach, which is in line with the practice of relationship banking is considered to add value to the firm, in the form of lasting partnerships, by many professionals and is used by some firms regardless of their main policy towards hedging.

Favorable market situation

The situation of the market is a factor that some professionals take into account before engaging into hedging transactions. By establishing a view on the current level of the exchange rates, these professionals attempt to create value for the firm by locking-in only favorable rates by making profits on the hedging portfolio. The professionals that consider favorable rates as a reason to hedge argue, that when rates reach extreme levels and they judge that it is unlikely for the rates to move any more in a favorable direction, the treasury should ensure that the firm can enjoy the favorable rates for an extended period of time.

This reasoning is only observed by professionals that engage in active hedging strategy. Taking a view on the market in order to make hedging decisions should not be confused with speculative hedging, which we do not touch upon for the purposes of this thesis. The professionals that engage in active hedging strategies and take into consideration their view on the market situation, only engage in transaction and translation hedging and do not create hedging portfolios with the aim of making a profit on fluctuations of exchange rates, but rather aim on locking in advantageous conditions for the future transactions of the firm.

5.2.4.2 Views against hedging

Cost of Hedging

An important factor that companies take into account when deciding on how they will implement their hedging strategy is the costs associated with hedging. Many

professionals question whether these costs are justified by the value that hedging actually adds to the company, and are therefore skeptical about the use of financial hedging. These costs come in a variety of forms.

Cost of financial derivatives

Financial instruments, even the ones that do not require an immediate cash flow, imply certain financial costs. These costs might be in the form of a direct coupon payment, as is the case for call options, in the form of bond funds in the case of forward agreements. These costs, either direct or opportunity costs, can be substantial and therefore have an impact on the liquidity of the firm and on its ability to make investments.

Cost of human resources

The formulation and implementation of a solid hedging strategy requires specialized workforce that focuses on the subject. The more elaborate and active the strategy that a firm favors, the more work hours must be employed for its implementation.

It is apparent that specialized personnel carry a high cost and is therefore a negative fixed cash flow for the firm even in periods when hedging does not offer substantial value to the firm.

Thus, some professionals deem this cost unjustifiable by the occurrences when having a permanent specialized workforce actually has a positive effect on the results of the company.

Cumbersome accounting

Perhaps the most important factor that was mentioned by all the professionals interviewed and that we have found no mention of in the academic literature, is the complexity of the accounting standards for reporting the financial derivatives used for hedging.

Professionals find the current International Accounting Standards, related to hedge accounting, particularly cumbersome. In Appendix 5 we describe past and future legal requirements to recognize hedging instruments. The introduction of the latest standard made applying hedge accounting significantly more complicated for

companies. The firms that decide to comply with hedge accounting invest a great amount of working hours in order to ensure that the fluctuations of the marked-to-market price of derivatives will not appear on their profits and losses in the financial report, and their results will therefore not present big variance derived from these financial instruments. It is also important to note that some firms that are in favor of hedging, do so without applying hedge accounting that is because the professionals find the costs associated with the compliance to outweigh the benefits of excluding the variance of the financial derivatives from their results.

It was a common notion amongst the interviewees that simpler requirements for the recognition of the financial instruments used for hedging purposes would probably make them reconsider their views on hedging and would probably lead them to introducing higher levels of hedging in their strategies.

Postponing effects of market events

As discussed before, hedging creates a time buffer between the moment an event takes place in the market and the moment it has an effect on the firm.

Contrary to the belief of other professionals that this time buffer adds substantial value, some professionals question the value that this time buffer actually creates.

These professionals have different understanding of market events. From the moment an event hits the market, it is inevitable that it will have an effect on the firm. The creation of a time buffer only then postpones a possible hit and is rarely long enough for the firm to manage to formulate a strategy to completely negate the effects of said event. Thus the costs associated with entering into a hedging strategy fail to create substantial value to be justified.

This argument was used frequently by professionals that favored any other strategy than the constant (passive) strategy but was more relevant for those professionals that were fundamentally against hedging.

Liquidity Buffer

It was observed over the course of the interviews that the liquidity and the availability of funds in the firms play a major role in the perceived importance of hedging.

While companies that have a low level of current assets appreciate the safeguarding of their liquidity levels through hedging, this is not the case for firms that enjoy a high level of current assets and cash surplus.

In firms that have the benefit of possessing big amounts of cash or easily liquefied assets, there is no perceived need to undertake costs to safeguard said liquidity levels. The firms' employees deem that the firm possesses a liquidity buffer that allows it to take a hit in case of extreme events, without disrupting its operations. Thus undertaking constant costs for a hedging program loses its value.

This argumentation was only observed by professionals that both favored the no hedging approach, and also where employed by firms that enjoys such liquidity. However, professionals that favored other strategies also agreed that high liquidity levels might reduce the need for elaborate hedging strategies or hedging strategies in general.

Strong Market Position

Firms that have a strong position in the market or enjoy strong bargaining power towards their suppliers and clients often have a different approach to hedging. High profit margins, that are usually an outcome of strong market positioning, also lead professionals to approach hedging in a different way.

Similar to the view developed by some professionals when a liquidity buffer exists, hedging is considered less relevant by the employees of firms that have a strong position in the market. Having high margins means that the firm can easily take a hit from fluctuations in the exchange rates without it resulting in substantial losses. Moreover, possessing high negotiation power means that the firm can transfer part of the losses caused by market events to its suppliers or its clients.

Given this understanding, much like in the case of the liquidity buffer, the professionals argue that the constant costs associated with maintaining a hedging portfolio are by no means justified, since the benefits they would offer are irrelevant

due to the nature of the company. This view was observed only by firms that favor the no hedging strategy.

5.2.4.3 Comparison of Academic and Market Hedging

After cross examining the findings of the interviews with professionals in comparison with the academic literature, we observe a certain degree of divergence between the determinants of hedging pinpointed by the two different categories.

As it is expected, even if some professionals accept some of the points of the classic theory of Modigliani and Miller, there is no reference to perfect capital markets theory among professionals. A perfect market with no costs of financial distress, no transaction costs and full access to information is no longer the basis of any assumption when entering a discussion about the implementation of a hedging strategy of a firm that operates in the real market. Costs of financial distress are severe and can lead a firm to bankruptcy and other costs due to lack of information or market imperfection are normal. Therefore, the professionals operating under these circumstances take actions accordingly.

In accordance to what was expected by the academic research that we conducted prior to the interviews, the professionals raised points about some important factors on the subject of hedging.

The negative correlation of hedging with the costs of financial distress is considered by all professionals and is therefore a highly relevant factor that affects hedging decisions in the markets. Also the consideration, that hedging can assist with maintaining steady levels of liquidity and ensure that a firm avoids underinvestment issues, appears strongly in the market as it is also discussed in the academic literature.

Importantly, both recent theories and professionals agree that hedging is an activity carried out also for managerial reasons. Indeed, managers are usually considered to be more risk averse than investors thus they prefer hedging to preserve their wealth in the company, in the form of future remuneration, stock options and career

opportunities. Furthermore, hedging is supposed to give the management a better view on the true effectiveness of operations, disregarding market's effects on results.

Although some of the factors, elements and effects of hedging that are discussed in the academic literature were not directly discussed by the professionals interviewed, we attribute this fact to the limited amount of interviews conducted and we are of the opinion that a larger sample would have occurrences of more of the subjects of the academic literature being mentioned as relevant by market professionals.

Academia, however, does not take into account real world issues that play a major role in the process of defining the actions a firm will take regulate its exposure. The most striking example of this is the relevance of the International Accounting Standards that regulate the use of financial derivatives for the purpose of hedging exposure. When a treasury department decides on its attitude towards hedging, the ease or complexity of implementing said strategy is a significant factor that is taken into consideration. The current IFRS for instance, poses an important obstacle to many firms for the implementation of hedging strategies, because of its complexity and the extra costs imposed on the firm to assure compliance with it. The increasing difficulties in the implementation of hedge accounting and the changes in the way financial instruments are recognized in the financial statements lead companies to be more skeptical towards hedging.

Additionally, academic literature discusses the concept of liquidity in relation to investment opportunities and financial distress, which are both considerations of professionals in the market. However, liquidity of the company, market position and flexibility of the profit margins receive less attention. These factors are perceived by some professionals to constitute an operational hedging buffer, allowing firms to absorb market hits in their results and reducing the necessity of financial hedging.

Another topic we found was discussed in academic papers but has never been mentioned in our interviews was the relation between taxation and hedging. Even if hedging can create tax benefits, interviewees stated that they do not take that into account while hedging.

In the end, the issue of endogeneity is often cited in academic papers. Attitude toward hedging may vary with different level of profitability, leverage or one of the other variables. Thus, if hedging depends on the other variables, the regression suffers from endogeneity. However, we do not believe that this is the case in reality. Of course, in case of major corporate events this may happen: filing for bankruptcy, change of executives, M&A and so on and so forth. However, commitment to hedging seems to be a long-term strategy which is not affected by gradual changing in company's health.

The aforementioned points are highly relevant for the market. Professionals perceive value creation and destruction indirectly through factors that elude the quantitative and theoretical academic research. Especially after gaining those first-hand insights, we do believe that hedging is a value enhancing activity, however due to data collection and proxies issues, it is still cumbersome to capture this effect using a panel data analysis.

6 Conclusions

To sum up, this study has investigated the market's perception of how firm's corporate currency hedging, through financial derivatives, influences the same year's Tobin's Q and cash-flow volatility.

Unfortunately, but consistently with previous research, the results are mixed and the only conclusion we can infer from them is that there is not a one-size fits all corporate currency hedging takeaway. Indeed, while performing this type of analysis, we have checked how analyzing different countries (Sweden or Germany) or different

currency's movements (Appreciation vs Depreciation) could alter the sign of our result.

To address an issue related to the simplicity of a bivariate dummy variable to capture hedging effect, we have increased the variable's scope, transforming it in a trivariate one, capturing no hedging, hedging and strong hedging. As we did not find significant differences among the two, we came to the conclusion that for this kind of analysis a normal hedging variable works well.

Furthermore, we believe that future research should not focus anymore on analysis of corporate currency hedging while measuring it against same-year Tobin's Q. First of all, the results are mixed as different currency movements, countries, corporate structures and other variables may lead to different results. Moreover, after our research, we believe that this is not where hedging value creation can be found. Further research should focus on extreme left-tail realizations, thus checking the cost of hedging versus the cost arising from bankruptcy or serious financial distress due to lack of hedging.

In our qualitative interviews, we have found confirmation that companies hedge as they recognize it is value enhancing, especially from an indirect point of view: easier relationship with banks and debtholders, avoidance of extreme events, managerial accountability and strategic lock-in of rates. However, when they do not hedge it is often due to long-term strategic board decisions, lack of enough personnel to handle the bureaucratic nature of the operation or particularly strong margins.

In conclusion, we believe that corporate currency hedging is a crucial operation for firms, but should be approached case by case, without a common rule for every single company. Even if we did not find any direct clear result on its effect on Tobin's Q or cash-flow volatility, during our interviews we came across many indirect ways it creates value for companies.

7 References

- Adam, Tim R, and Chitru S Fernando. "Hedging, Speculation, and Shareholder Value." *Journal of Financial Economics* 81, no. 2 (2006): 283–309.
- Allayannis, George, Ugur LeI, and Darius P Miller. "CORPORATE GOVERNANCE AND THE HEDGING PREMIUM AROUND THE WORLD*," 2003.
- Allayannis, George, and Eli Ofek. "Exchange Rate Exposure, Hedging, and the Use of Foreign Currency Derivatives." *Journal of International Money and Finance* 20, no. 2 (2001): 273–96.
- Allayannis, George, B Rountree, and J Weston. "Earnings Volatility, Cashflow Volatility, and Rm Value." *University of Virginia and Rice University Working Paper*, 2006.
- Allayannis, George, and James P Weston. "The Use of Foreign Currency Derivatives and Firm Market Value." *Review of Financial Studies* 14, no. 1 (2001): 243–76.
- Aretz, Kevin, and Söhnke M Bartram. "Corporate Hedging and Shareholder Value." *Journal of Financial Research* 33, no. 4 (2009): 317–71.
- Aslund Anders and Meens Mireille, "An Analytical Hedging Framework – Developing a Value-Added Approach to Risk Management", Commerzbank
- Asquith, P., and D.W. Mullins, Jr. 1986. "Equity Issues and Offering Dilution". *Journal of Financial Economics* 15:1/2:61-89.
- Bartram, S.M. 2000. "Corporate Risk Management as a Lever for Shareholder Value Creation". *Financial Markets, Institutions, and Instruments* 9:5:279-324
- Bartram, S.M, 2002 "Enhancing Shareholder Value with Corporate Risk Management" *Corporate Finance Review*, Vol. 7 (3), November/December, 7-12.
- Bartram, S.M, G.W. Brown and J. Conrad 2006 "The Effects of Derivatives on Firm Risk and Value" Lancaster University and University of North Carolina at Chapel Hill Working Paper
- Bartram, Söhnke M, Gregory W Brown, and Frank R Fehle. "International Evidence on Financial Derivatives Usage." *Financial Management* 38, no. 1 (2009): 185–206.
- Bodnar, G.M., C. Tang and J. Weintrop 1997. "Both Sides of Corporate Diversification: The Value Impacts of Geographic and Industrial Diversification" NBER Working Paper Series

- Bonini, Stefano, Maurizio Dallocchio, Philippe Raimbourg, and Antonio Salvi. "Do Firms Hedge Translation Risk?" *Available at SSRN 1063781*, 2012.
- Carter, D.A, D. Rogers, and B.J. Simkins 2006. "Does Hedging Affect Firm Value? Evidence from the US Airline Industry". *Financial Management* 35:1: 53.87.
- Catlett, Lowell B. "Commodity Options as an Alternative to Hedging Live Cattle," 1980.
- DaDalt, Peter, Gerald D Gay, and Jouahn Nam. "Asymmetric Information and Corporate Derivatives Use." *Journal of Futures Markets* 22, no. 3 (2002): 241–67.
- DeMarzo, Peter M, and Darrell Duffie. "Corporate Incentives for Hedging and Hedge Accounting." *Review of Financial Studies* 8, no. 3 (1995): 743–71.
- Dionne, G., and T. Triki 2005. "Risk Management and Corporate Governance: The importance of Independence and Financial Knowledge for the Board and the Audit Committee" HEC Montréal Working Paper
- Froot, Kenneth A, David S Scharfstein, and Jeremy C Stein. "Risk Management: Coordinating Corporate Investment and Financing Policies." *The Journal of Finance* 48, no. 5 (1993): 1629–58.
- Géczy, Christopher, Bernadette A Minton, and Catherine Schrand. "Why Firms Use Currency Derivatives." *The Journal of Finance* 52, no. 4 (1997): 1323–54.
- Géczy, C., B.A. Minton and C. Schrand "The Use of Multiple Risk Management Strategies: Evidence from the Natural Gas Industry" *Journal of Finance* 54:6: 2241-2263
- Graham, J.R., and C.W. Smith, Jr. 2000 "Tax Progressivity and Corporate Incentives to Hedge". *Journal of Applied Corporate Finance* 12:4: 102-111
- Graham, John R, and Daniel A Rogers. "Do Firms Hedge in Response to Tax Incentives?" *The Journal of Finance* 57, no. 2 (2002): 815–39.
- Guay, Wayne, and Sri Prakash Kothari. "How Much Do Firms Hedge with Derivatives?" *Journal of Financial Economics* 70, no. 3 (2003): 423–61.
- Haushalter, G.D. 2000 "Financing Policy, Basis Risk and Corporate Hedging: Evience from Oil and Gas Producers" *Journal of Applied Corporate Finance* 13:4: 87-92
- Haavaldsen, Eirik. "Determinants and Effects of Corporate Currency Hedging," 2010.
- Haigh, Michael S, and Matthew T Holt. "Hedging Foreign Currency, Freight, and Commodity Futures portfolios—A Note." *Journal of Futures Markets* 22, no. 12 (2002): 1205–21.
- Haushalter, G David. "Financing Policy, Basis Risk, and Corporate Hedging: Evidence from Oil and Gas Producers." *The Journal of Finance* 55, no. 1 (2000): 107–52.

- Howton, S.D., and S.B. Perfect 1998 "Currency and Interest-Rate Derivatives Use in U.S. Firms". *Financial Management* 27:4: 111-121
- Hutson, Elaine, and Simon Stevenson. "Openness, Hedging Incentives and Foreign Exchange Exposure: A Firm-Level Multi-Country Study." *Journal of International Business Studies* 41, no. 1 (2010): 105–22.
- Jensen, M.C. and W.H. Meckling 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure" *Journal of Financial Economics* 3: 305-360
- Jin, Yanbo, and Philippe Jorion. "Firm Value and Hedging: Evidence from US Oil and Gas Producers." *The Journal of Finance* 61, no. 2 (2006): 893–919.
- Knopf, John D, Jouahn Nam, and John H Thornton Jr. "The Volatility and Price Sensitivities of Managerial Stock Option Portfolios and Corporate Hedging." *The Journal of Finance* 57, no. 2 (2002): 801–13.
- Lel, U. 2006 "Currency Hedging and Corporate Governance: A Cross-Country Analysis" University of Indiana Working Paper
- Leland, Hayne E. "Agency Costs, Risk Management, and Capital Structure." *The Journal of Finance* 53, no. 4 (1998): 1213–43.
- Lin, C-M., and S. Smith 2007 "Hedging, Financing and Investment Decisions: A Simultaneous Equation Framework". *The Financial Review* 42: 2: 191-204
- Marin, Monica. "Can Financial Risk Management Help Prevent Bankruptcy?" *Journal of Finance and Accountancy* 12 (2013): 1.
- Martinsen, Gustav, and Christoffer Branæs Skaarer. "Currency Hedging in Norwegian Listed Companies: Strategies and Effects on Exposure," 2012.
- Mason, S.P., and R.C. Merton 1985 "The Role of Contingent Claims Analysis in Corporate Finance" In: Altman, E.I., and M.G. Subrahmanyam (eds.). *Recent Advances in Corporate Finance*. Irwin, Homewood, IL, 7-54
- Mayers, D., and C.W. Smith, Jr. 1990. "On the Corporate Demand for Insurance: Evidence from the Reinsurance Market." *Journal of Business* 63:1: 19-40
- Merton, R.C. 1974 "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates." *Journal of Finance* 29:2: 449-470
- Mian, S.L. 1996. "Evidence on Corporate Hedging Policy". *Journal of Financial and Quantitative Analysis* 31:3 419-439

- Minton, Bernadette A, and Catherine Schrand. "The Impact of Cash Flow Volatility on Discretionary Investment and the Costs of Debt and Equity Financing." *Journal of Financial Economics* 54, no. 3 (1999): 423–60.
- Modigliani, F., and M.H. Miller 1958 "The Cost of Capital, Corporation Finance, and the Theory of Investment" *American Economic Review* 48:3: 261-279
- Morellec, E. and C.W. Smith, Jr. 2007 "Agency Conflicts and Risk Management" *Review of Finance* 11, 1-23
- Myers, S.C. 1993 "Still Searching for Optimal Capital Structure" *The Revolution in Corporate Finance*. Basill Blackwell Ltd, New York, NY, 91-99
- Nance, Deana R, Clifford W Smith, and Charles W Smithson. "On the Determinants of Corporate Hedging." *The Journal of Finance* 48, no. 1 (1993): 267–84.
- Nguyen, H., and R.Faff 2003 "Are Financial Derivatives Really Value-Enhancing? Australian Evidence" University of South Australia Working Paper.
- Nguyen, Hong V. "Why Do Non-Financial Firms Select One Type of Derivatives Over Others?" *Available at SSRN 1707739*, 2010.
- Petersen, M.A., and S.R. Thiagarajan 2000 "Risk Management and Hedging: With and Without Derivatives" *Financial Management* 29:4: 5-30
- Rogers, D. 2002. "Does Executive Portfolio Structure Affect Risk Management? CEO Risk Taking Incentives and Corporate Derivatives Usage" *Journal of Banking and Finance* 26:2: 271-295
- Ross, Michael P. *Corporate Hedging: What, Why and How?* Citeseer, 1998.
- Scordis, Nicos A, James Barrese, and Ping Wang. "The Impact of Cash Flow Volatility on Systematic Risk." *Journal of Insurance Issues*, 2008, 43–71.
- Shihab, Mohamed, and Fredrik Bubere. "Hedging Strategies of Swedish Mining Companies: A Qualitative Study," 2013.
- Smith, Clifford W, and Rene M Stulz. "The Determinants of Firms' Hedging Policies." *Journal of Financial and Quantitative Analysis* 20, no. 4 (1985): 391–405.
- Smith, C.W., Jr. 1995 "Corporate Risk Management: Theory and Practice." *Journal of Derivatives* 2:4: 21-30
- Smith, C.W., Jr., and R.L. Watts 1992 "The Investment Opportunity Set and Corporate Financing, Dividend, and Compensation Policies". *Journal of Financial Economics* 32:3: 263-292

- Söderlund, Astrid, Nils Wickelgren, and Christian Andersson. "Currency Hedging Management in Global Firms. The Case of Heidelberg Cement," 2004.
- Stulz, René M. "Optimal Hedging Policies." *Journal of Financial and Quantitative Analysis* 19, no. 2 (1984): 127–40.
- Stulz, R.M. 2000 "Diminishing the Threats to Shareholder Wealth." *Financial Times, Series Mastering Risk*, April 25, 2000: 8-10
- Stulz, R.M 2001 "Creating Value with Risk Management" *Derivatives, Risk Management and Financial Engineering*. Southwestern College Publishing Co., Cincinnati, Chapter 3.
- Tufano, Peter. "Who Manages Risk? An Empirical Examination of Risk Management Practices in the Gold Mining Industry." *The Journal of Finance* 51, no. 4 (1996): 1097–1137.
- Van der Sanden, Vincent Herman Tony. *An Empirical Study of Hedge-Ratios for Corporate Bonds*. Erasmus University, 2010.
- Yan, Shanhong, and Vika Brucaite. "Financial Risk Management-Case Studies with SKF and Elof Hansson." *Rapport Nr.: Masters Thesis*, no. 2000 (2001).

8 Appendix

Appendix 1

In this table the reader can find our sample used for the multivariate regression with Tobin's Q as dependent variable.

Below each year, on the left column there is the Bivariate Hedging Dummy Variable whereas on the column on the right there is the Trivariate Hedging Dummy Variable

<i>Name</i>	<i>2011</i>		<i>2012</i>		<i>2013</i>		<i>2014</i>		<i>Country</i>	<i>GICS</i>
AAK AB	1	2	1	2	1	2	1	2	<i>Sweden</i>	30
ABB LTD-REG	1	1	1	1	1	1	1	1	<i>Sweden</i>	20
ADDTECH AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	20
ALFA LAVAL AB	1	2	1	2	1	2	1	2	<i>Sweden</i>	20
ASSA ABLOY AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	20
ATLAS COPCO AB	0	0	0	0	0	0	0	0	<i>Sweden</i>	20
BEIJER REF AB	0	0	0	0	0	0	0	0	<i>Sweden</i>	20
BILLERUDKORSNAS AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	15
BOLIDEN AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	15
CLAS OHLSON AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	25
ELECTROLUX AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	25
ELEKTA AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	35
ERICSSON LM AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	45
FAGERHULT AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	20
GETINGE AB	1	2	1	2	1	2	1	2	<i>Sweden</i>	35
HENNES & MAURITZ AB	1	2	1	2	1	2	1	2	<i>Sweden</i>	25
HEXAGON AB	1	2	1	2	0	0	0	0	<i>Sweden</i>	45
HEXPOL AB	1	1	0	0	0	0	0	0	<i>Sweden</i>	15
INDUTRADE AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	20
KAPPAHL AB	1	1	1	1	1	1	1	1	<i>Sweden</i>	25

MEDA AB	1	2	1	2	1	2	1	2	Sweden	35
MODERN TIMES GROUP AB	1	1	1	1	1	1	1	1	Sweden	25
NIBE INDUSTRIER AB	1	2	1	2	1	2	1	2	Sweden	20
NOBIA AB	1	1	1	1	1	1	1	1	Sweden	25
NOLATO AB	1	1	1	1	1	1	1	1	Sweden	20
OREXO AB	0	0	0	0	0	0	0	0	Sweden	35
PARTNERTECH AB	0	0	0	0	0	0	0	0	Sweden	45
QLIRO GROUP AB	0	0	0	0	0	0	0	0	Sweden	25
SKF AB	1	1	1	1	1	1	1	1	Sweden	20
SSAB AB	1	1	1	1	1	1	1	1	Sweden	15
SVENSKA CELLULOSA AB	1	1	0	0	0	0	0	0	Sweden	30
SWEDISH MATCH AB	0	0	0	0	0	0	0	0	Sweden	30
SYSTEMAIR AB	1	1	1	1	1	1	1	1	Sweden	20
TELE2 AB	0	0	0	0	0	0	0	0	Sweden	50
TELIASONERA AB	1	1	1	1	1	1	1	1	Sweden	50
TRELLEBORG AB	1	1	1	1	1	1	1	1	Sweden	20
VOLVO AB	1	1	1	1	1	1	1	1	Sweden	20
ADIDS AG	1	1	0	0	1	1	1	1	Germany	25
BAYER AG	1	1	1	1	1	1	1	1	Germany	35
BEIERSDORF AG	1	1	1	1	0	0	1	1	Germany	30
CONTINENTAL AG	0	0	0	0	0	0	0	0	Germany	25
DAIMLER AG	1	1	1	1	1	1	1	1	Germany	25
E.ON SE	1	2	1	2	1	2	1	2	Germany	55
FRESENIUS SE & CO	1	1	0	0	0	0	0	0	Germany	35
HEIDELBERGCEMENT AG	1	1	1	1	1	1	1	1	Germany	15
HENKEL AG	0	0	0	0	0	0	1	1	Germany	30
INFINEON TECHNOLOGIES AG	0	0	0	0	0	0	1	1	Germany	45
LANXESS AG	1	1	1	1	1	1	1	1	Germany	15
METRO AG	0	0	0	0	0	0	0	0	Germany	30
K+S AG	1	2	1	1	1	1	1	2	Germany	15
THYSSENKRUPP AG	1	1	1	1	0	0	0	0	Germany	15

VOLKSWAGEN AG	1	2	1	2	1	2	1	2	<i>Germany</i>	25
DEUTSCHE POST AG	0	0	0	0	0	0	0	0	<i>Germany</i>	20
DUERR AG	0	0	0	0	0	0	1	1	<i>Germany</i>	20
FUCHS PETROLUB SE	0	0	0	0	0	0	0	0	<i>Germany</i>	15
GEA GROUP AG	0	0	0	0	0	0	0	0	<i>Germany</i>	20
GERRESHEIMER AG	0	0	0	0	0	0	0	0	<i>Germany</i>	35
KION GROUP AG	1	1	1	1	1	1	1	1	<i>Germany</i>	20
KLOECKNER & CO SE	0	0	0	0	0	0	0	0	<i>Germany</i>	20
LEONI AG	1	1	1	1	1	1	1	1	<i>Germany</i>	25
MINERALS TECHNOLOGIES	1	1	1	1	1	1	1	1	<i>Germany</i>	20
NORMA GROUP SE	1	2	1	1	1	1	1	1	<i>Germany</i>	20

Appendix 2

In this table the reader can find our sample used for the multivariate regression with Cash-Flow Volatility as dependent variable.

<i>Name</i>	<i>2011</i>	<i>2012</i>	<i>2013</i>	<i>2014</i>	<i>Country</i>	<i>GICS</i>
AAK AB	1	1	1	1	<i>Sweden</i>	30
ABB LTD-REG	1	1	1	1	<i>Sweden</i>	20
ADDTECH AB	1	1	1	1	<i>Sweden</i>	20
ALFA LAVAL AB	1	1	1	1	<i>Sweden</i>	20
ATLAS COPCO AB	0	0	0	0	<i>Sweden</i>	20
AXIS COMMUNICATIONS AB	0	0	0	0	<i>Sweden</i>	45
BILLERUDKORSNAS AB	1	1	1	1	<i>Sweden</i>	15
BOLIDEN AB	1	1	1	1	<i>Sweden</i>	15
CLAS OHLSON AB	1	1	1	1	<i>Sweden</i>	25
CLOETTA AB	1	1	1	1	<i>Sweden</i>	30
ELECTROLUX AB	1	1	1	1	<i>Sweden</i>	25
ERICSSON LM-B	1	1	1	1	<i>Sweden</i>	45
GETINGE AB-B SHS	1	1	1	1	<i>Sweden</i>	35
HENNES & MAURITZ AB	1	1	1	1	<i>Sweden</i>	25
INDUTRADE AB	1	1	1	1	<i>Sweden</i>	20
MODERN TIMES GROUP AB	1	1	1	1	<i>Sweden</i>	25
NOBIA AB	1	1	1	1	<i>Sweden</i>	25
OREXO AB	0	0	0	0	<i>Sweden</i>	35
SKF AB	1	1	1	1	<i>Sweden</i>	20
SSAB AB	1	1	1	1	<i>Sweden</i>	15
SVENSKA CELLULOSA AB	1	0	0	0	<i>Sweden</i>	30
SWEDISH MATCH AB	0	0	0	0	<i>Sweden</i>	30
TELE2 AB	0	0	0	0	<i>Sweden</i>	50
TELIASONERA AB	1	1	1	1	<i>Sweden</i>	50
TRELLEBORG AB	1	1	1	1	<i>Sweden</i>	20

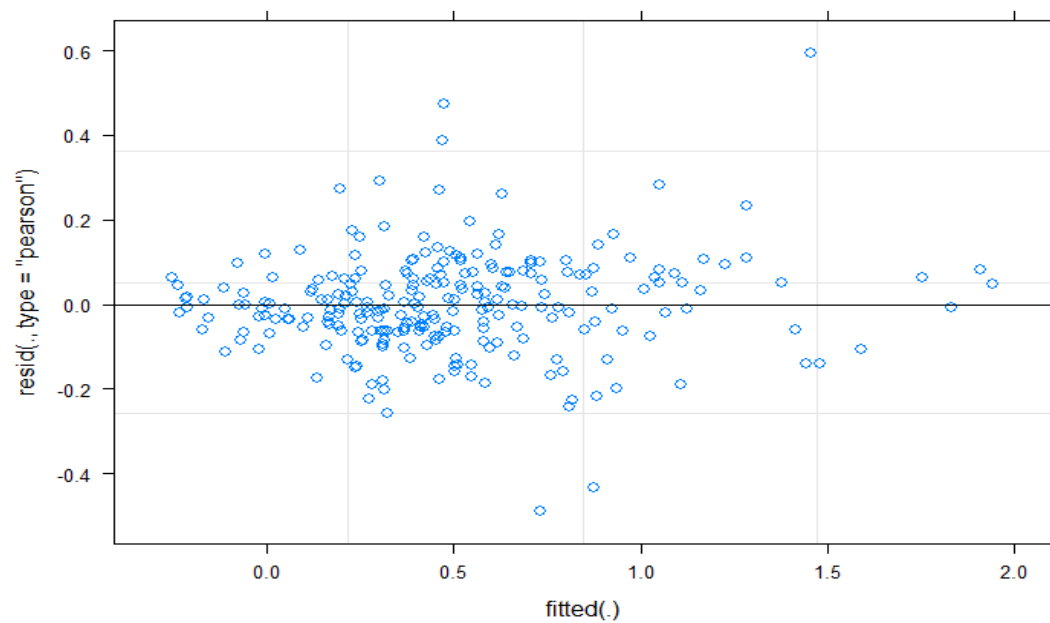
VOLVO AB	1	1	1	1	Sweden	20
ADIDAS AG	1	0	1	1	Germany	25
BAYER AG	1	1	1	1	Germany	35
BEIERSDORF AG	1	1	0	1	Germany	30
CONTINENTAL AG	0	0	0	0	Germany	25
DAIMLER AG	1	1	1	1	Germany	25
E.ON SE	1	1	1	1	Germany	55
FRESENIUS SE & CO KGAA	1	0	0	0	Germany	35
HEIDELBERGCEMENT AG	1	1	1	1	Germany	15
HENKEL AG & CO KGAA					Germany	
VORZUG	0	0	0	1		30
INFINEON TECHNOLOGIES					Germany	
AG	0	0	0	1		45
LANXESS AG	1	1	1	1	Germany	15
METRO AG	0	0	0	0	Germany	30
K+S AG-REG	1	1	1	1	Germany	15
THYSSENKRUPP AG	1	1	0	0	Germany	15
VOLKSWAGEN AG	1	1	1	1	Germany	25
DEUTSCHE POST AG	0	0	0	0	Germany	20
DUERR AG	0	0	0	1	Germany	20
FUCHS PETROLUB SE	0	0	0	0	Germany	15
GEA GROUP AG	0	0	0	0	Germany	20
GERRESHEIMER AG	0	0	0	0	Germany	35
KLOECKNER & CO SE	0	0	0	0	Germany	20
LEONI AG	1	1	1	1	Germany	25
MTU AERO ENGINES	1	1	1	1	Germany	20

Appendix 3

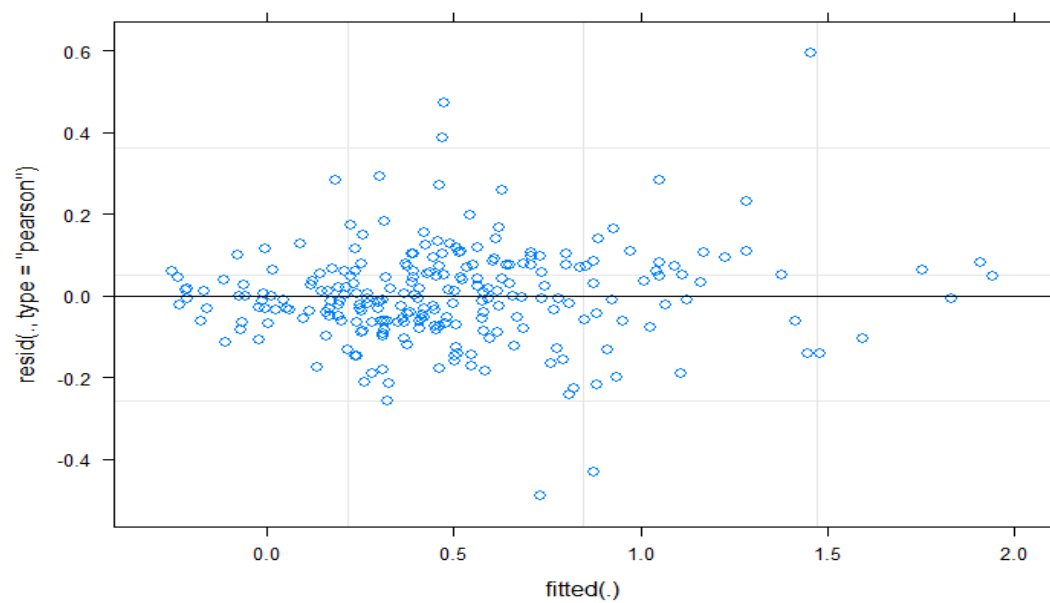
In this appendix we are going to show plots related to shape of residuals of our previous mixed linear models.

We have checked shape of residuals to assess whether our mixed linear models are solid and do not show non-random patterns among residuals.

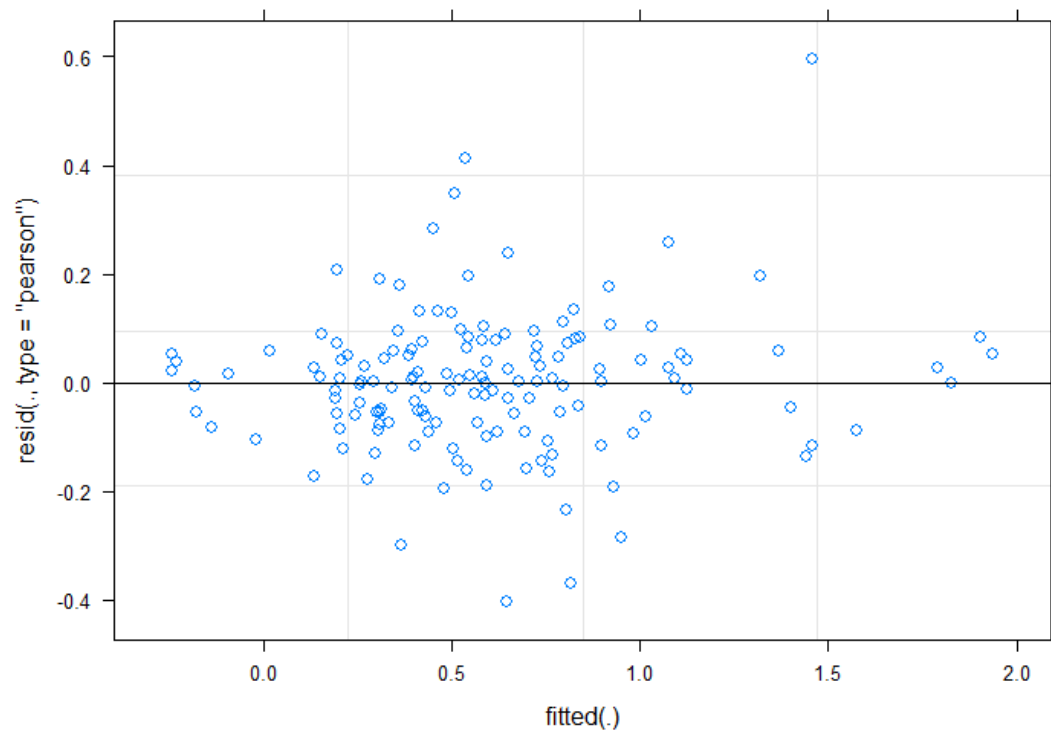
Random Effect Regression – Full samples, Bivariate Hedging – Tobin's Q



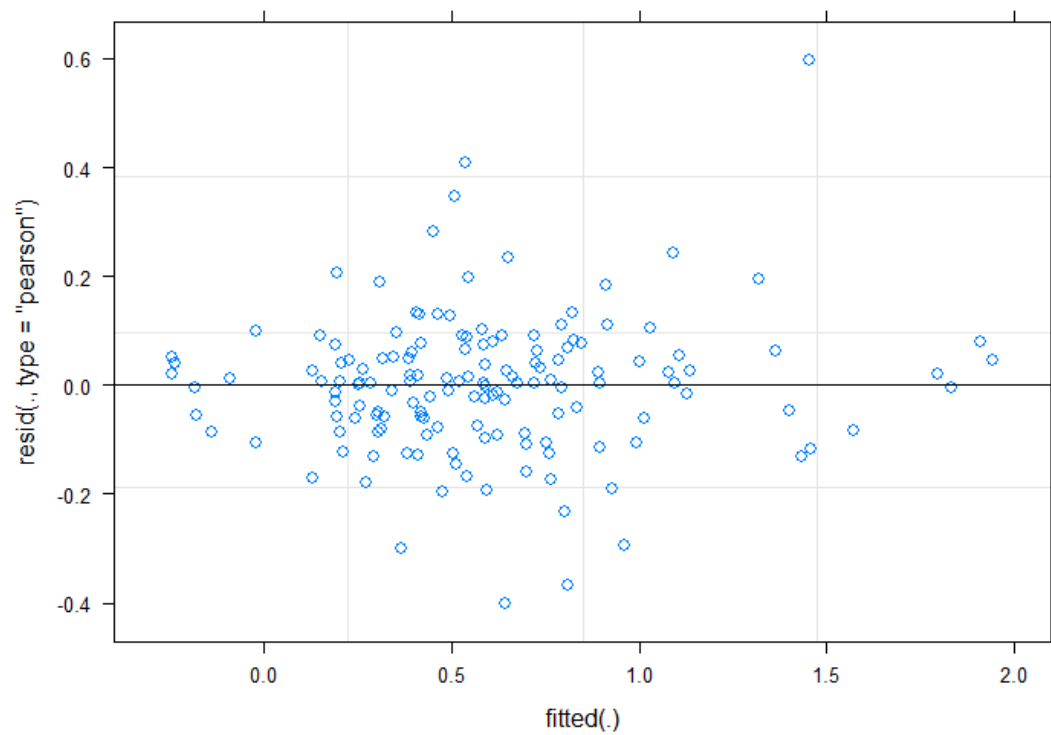
Random Effect Regression – Full samples, Trivariate Hedging – Tobin's Q



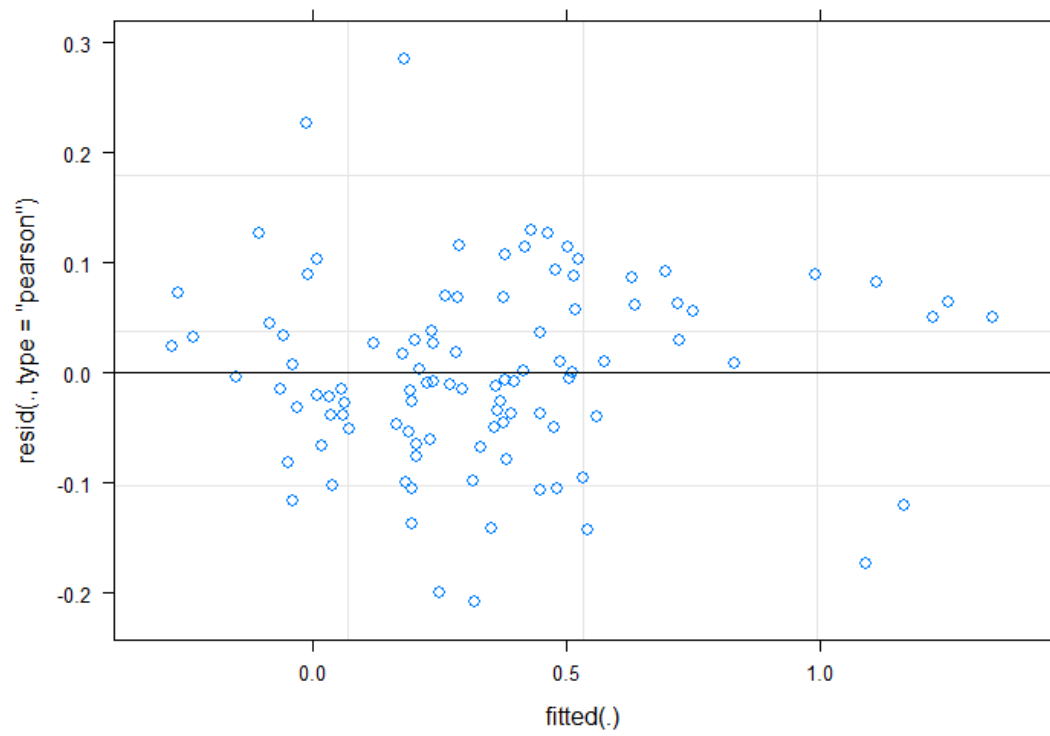
Random Effect Regression – Swedish sample, Bivariate Hedging – Tobin's Q



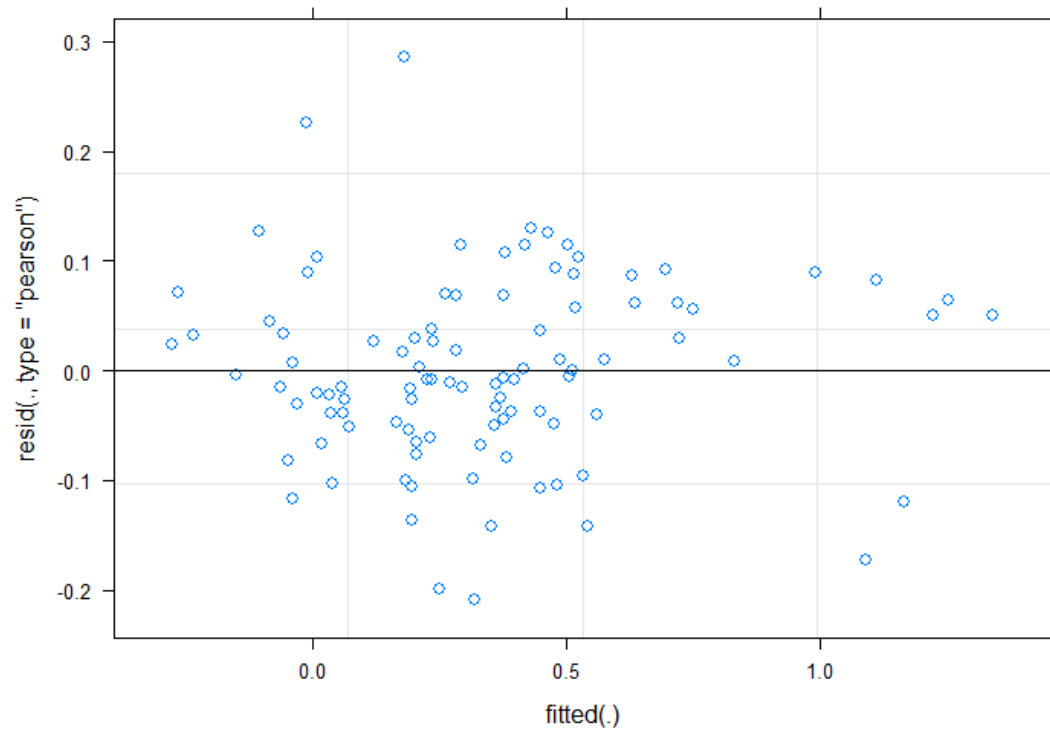
Random Effect Regression – Swedish Sample, Trivariate Hedging – Tobin's Q



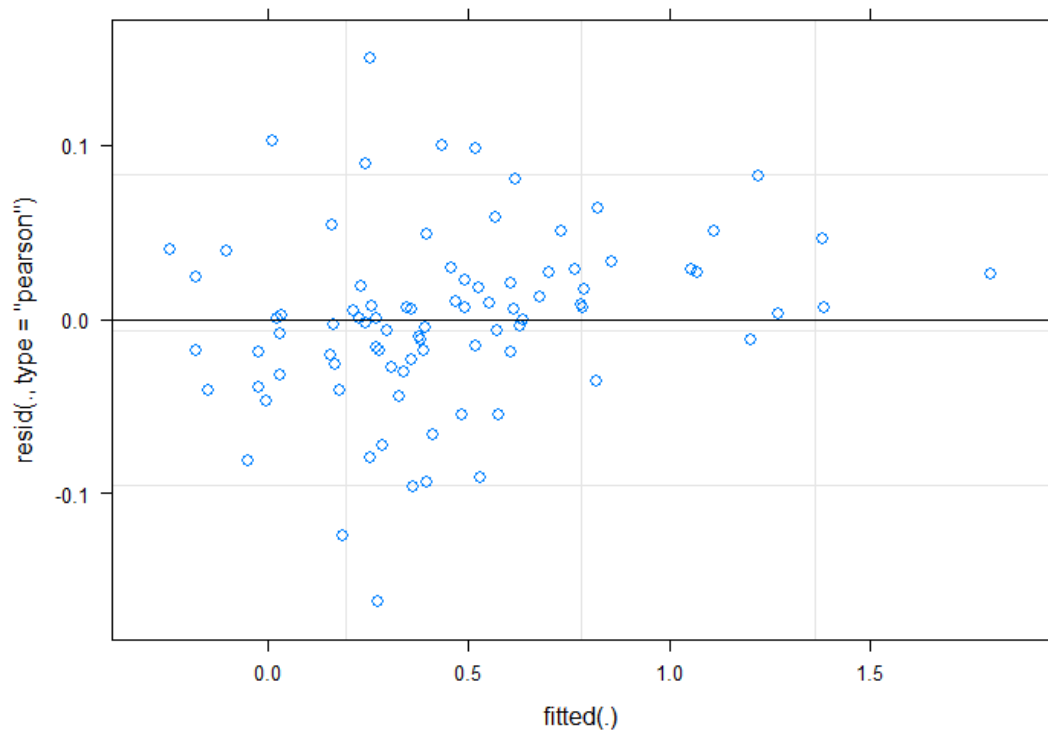
Random Effect Regression – German Sample, Bivariate Hedging – Tobin's Q



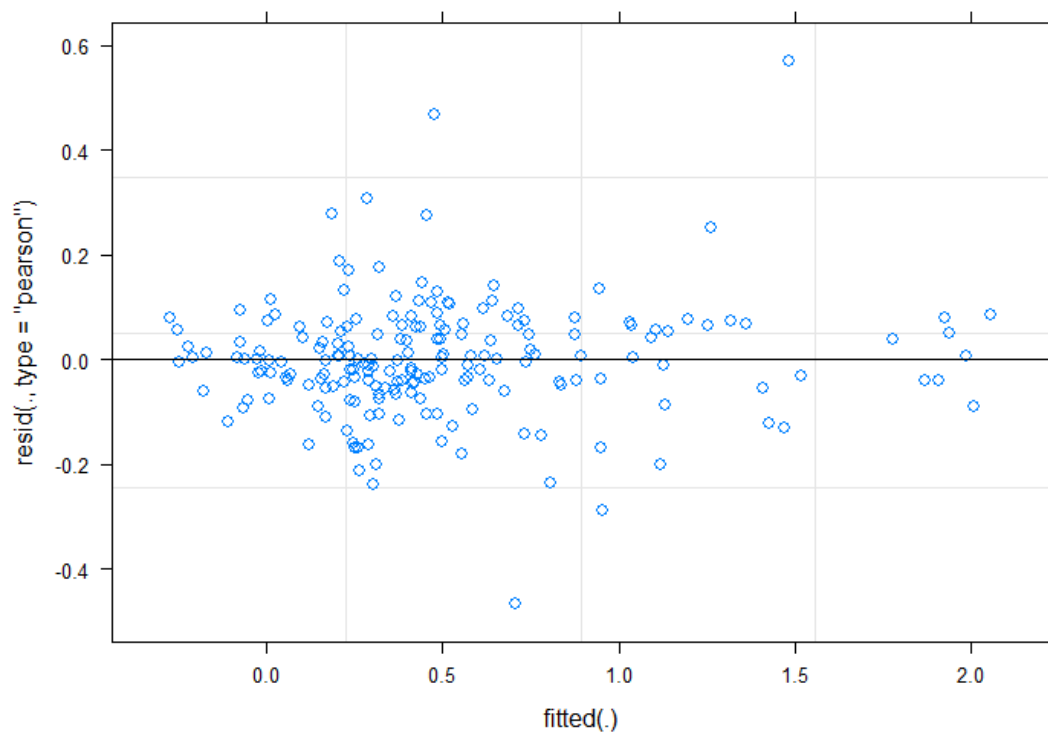
Random Effect Regression – German Sample, Trivariate Hedging – Tobin's Q



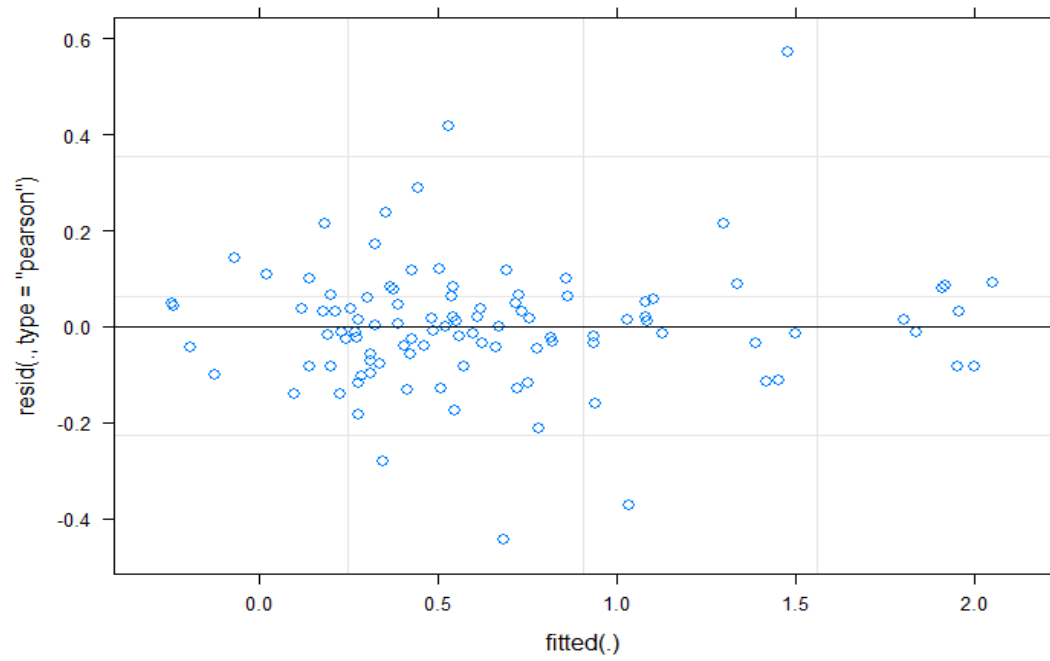
Random Effect Regression – Appreciation – Tobin's Q



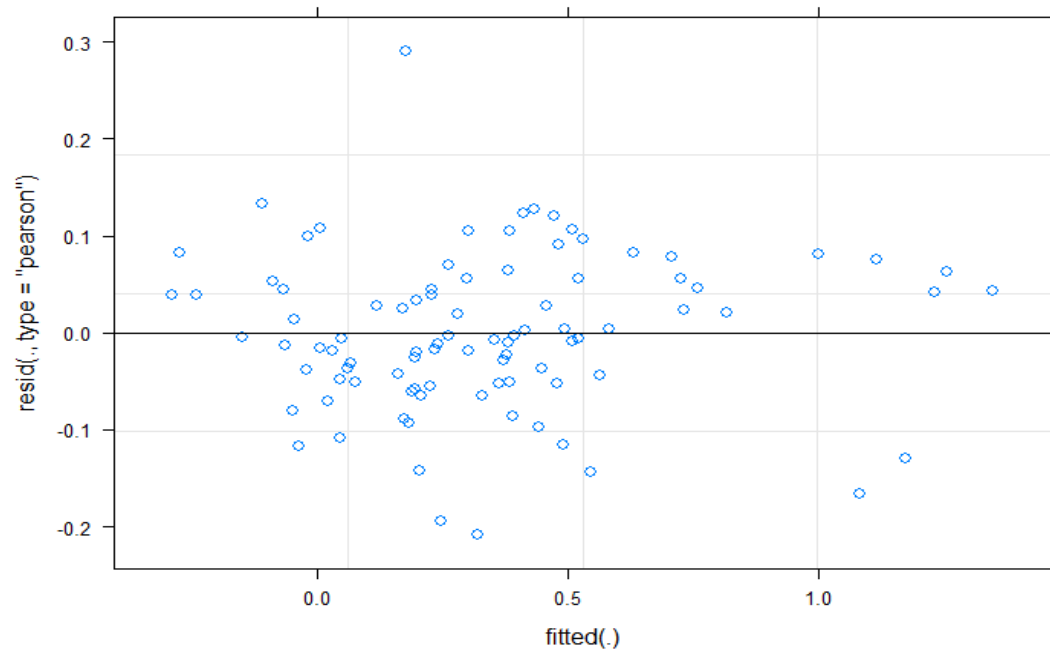
Random Effect Regression – Full Sample – Cash Flow Volatility



Random Effect Regression – Swedish Sample – Cash Flow Volatility



Random Effect Regression – German Sample – Cash Flow Volatility



Appendix 4

Interviews questions

What is your overall view on hedging?

- What are the main reasons that incentive you to hedge?
- Derivatives vs non-derivatives hedging

Do you think that hedging creates value for shareholders?

- Is this the reason why you are hedging or just a side-line benefit?

Do you think that hedging is beneficial to the management more than the shareholders?

- Managers may feel really judged on their skills rather than on markets' movements

What are the factors you look at when considering hedging?

How important are accounting/corporate finance values when considering hedging?

- Debt and cost of financial distress
- Cheaper borrowing (lower risk AND banks' pleasing)
- Investment opportunities
- Cash flow allowance
- Cash-flow volatilities
- Tax code

How important is your view on the market? Does it even matter?

- Should markets' movements be incorporated in hedging strategies?
- Are options are way to benefit from upsides?

Do you react to competitors' hedging behavior? (Why and how?)

- Shouldn't hedging depend on your risk alone?
- However, hedging strategies may impact analysts' judgement and prices

How much your counterparty (the bank) affects your hedging behavior?

- Is cost of hedging an important variable?
- Do you think that corporates in general had a mistrust in the banking industry, removing their hedging attitude?

In your department, how much do you deem important hedging?

- Value for time?
- Hard to explain to other departments?

Appendix 5

Given the importance of hedging accounting and the legal framework of financial instruments, we are going to describe the European legislation of the issue. The following appendix is going to describe on

IAS 39, Financial Instruments: Recognition and Measurement

- **Date:** effective from periods beginning or after 1 January 2015
- **Initial Recognition:** instruments are recognized on balance sheet when the entity becomes one of the party related to the financial instrument
- **Initial measurements:** All financial instruments are measured initially at fair value, with transaction costs added to or deducted from the carrying value
- **Subsequent measures:** subsequent measurement depends on the classification of the financial instruments:

Financial assets held for trading, derivatives – unless accounted for as hedges-, and other assets designated to this category under the fair value option should be measured at fair value with all gains and losses being recognized as profit or losses.

Financial assets which the entity has the intention and realistic capability to hold until maturity, such as non-derivative financial assets with fixed or determinable payments and fixed maturity, are amortized at cost using the effective interest method less impairment costs.

Financial assets available for sales, including all financial assets not classified in another category and any financial instruments designated to this category on initial recognition, are valued at fair value with gains or losses recognized on other comprehensive income and impairment losses and foreign exchange differences recognized on profit and losses.

Financial liabilities are classified at fair value through profit or loss follow the same methodology of the first category of financial assets.

The remaining financial liabilities that are not classified at fair value are amortized at cost using the effective interest rate method.

IAS 39 has a broad variety of other rules, the aforementioned being just the surface. However, for the purpose of our thesis, we have found useful to understand and go through “Hedge Accounting”.

Hedge Accounting may be applied if the entity respects all the following criteria:

- At inception, the financial instruments have been recognized for hedging accounting purposes, with the necessary documentation, risk management goals and strategy for undertaking the hedge
- The instruments are required to be highly effective (80-125%) in covering changes in fair value or in cash flows attributable to the underlying
- For cash flow hedges, a forecast transaction, underlying exposure to be hedged, is expected to be very likely to happen and to generate cash-flows that can eventually hit the cash-flow statements
- The effectiveness of hedging must be measurable with reliability
- The hedge is assessed on an ongoing basis and it must fulfil the mentioned requirements during the whole period designated for hedging

There are further classifications that fall into the legislation of Hedge Accounting.

Cash Flow hedging is the hedge of the exposure to variability in cash flows that is generated from a particular risk recognized or highly probable lying in assets or liabilities and that could affect profit or loss. The portion of profit and loss generated from the hedging instrument deemed as effective is recognized in Other Comprehensive Income, whereas profit and losses generate from the hedging instrument deemed as ineffective are recognized as such. Cash Flow hedge accounting is discontinued if the instrument is sold, expires, terminates or is exercised, if the hedge no longer meets the aforementioned requirements, if the forecasted transactions no longer take place or if the entity revokes the designation of hedge accounting.

Fair Value hedge is the hedge of an exposure to a firm recognized or unrecognized asset or liability that may influence profit and loss and is attributable to a specific risk. Profit or losses on the hedged item attributable to the hedged risk adjusts the carrying value of the hedging item and are recognized in profit or loss. Gain or losses on the

hedged item due to foreign exchange fluctuations or remeasurements are recognized in profit and loss. Fair value hedge accounting is discontinued if the hedging instruments expires, is sold, terminates or is exercised, if the hedge no longer meets the criteria set or if the entity revokes the designation.

Hedge of a net investment in foreign operations follow similar rules to cash-flow hedging.

For foreign currency risks and others, also non-financial items can be accounted as hedging items, if it covers the whole risk, not such part of it, and the risk itself is extremely hard to measure and subcategorize in different risks.

The EU is working, but did not endorse yet, on IFRS 9 to replace IAS 39

IFRS 9

- **Date:** expected to be effective from 1 January 2018.
- **Replacement of IAS 39:** IFRS 9 is going to replace IAS 39 and introduces a single classification and measurement model for financial assets, depending on the entity's business model objective for managing financial assets and the contractual cash flows characteristic of financial assets. Specifically, for hedging, IFRS 9 will removes the requirement to distinguish between embedded derivatives from financial asset host contracts, requiring instead to classify the whole contract at cost or at fair value.
- **Initial Recognition and measurement:** Recognition takes place when the entity becomes party to the transaction and the initial measurement is at fair value, with directly attributable transaction costs adding to or removing from carrying value.
- **Subsequent measurement for Financial Assets:**
Financial assets can be subsequently classified as Amortized Cost, Fair Value through profit or loss and Fair value through other comprehensive income
Amortized cost financial assets must respect two criteria: first of all, they have a business model objective being assets held in order to collect contractual cash flows which are solely payments of principal and interest on the principal

amount outstanding. Subsequent measurements are through amortized cost using the effective interest method.

Fair value through profit or loss assets are the ones that do not meet the amortized cost recognition criteria and that are designed as such at inception, which is irrevocable. Subsequent measurements in this case are at fair value, with all gains and losses recognized in profit or loss.

In the end, Fair value through other comprehensive instrument is available for investment in equity instruments that are not held from trading and for debt instruments that categorize under the Amortized cost category, are held to collect contractual cash flows, but are not going to be held until maturity. In those cases, subsequent measurements are going to be recorded in other comprehensive income.

- **Subsequent measurement for Financial Liabilities:**

Financial liabilities are going to be classified as either Amortized cost or fair value through profit or loss, with specific guidance for specific liabilities such as financial guarantee contracts, commitment to provide loans at below market interest rate, financial liabilities arising when the transfer of a financial asset either does not qualify for a derecognition or where there is continuing involvement.

Financial liabilities categorized at amortized costs are all financial liabilities except the ones classified under fair value. Subsequent measurements is amortized cost using the effective interest rate method.

Liabilities at fair value through profit or loss are derivatives, liabilities held for trading, liabilities recognized as such as recognition (with the option to redesignate the liability if it eliminates a substantial accounting inconsistency). Gains or losses from fair value measurements are being recognized in profit or loss.

- **Subsequent measurement for Embedded Derivatives:**

Embedded derivatives are part of a hybrid contract that causes some or all of its cash-flows to be altered by certain triggering events.

Embedded derivatives whose host is a financial asset are not separated from it: instead the whole contract is accounted as a sole instrument.

Embedded derivatives part of financial liabilities are separated from the host contract and treated as a derivative if the economic characteristics of the embedded and of the contract are not closely related, an identical instrument would meet the definition of derivative and the entire hybrid instrument is not measured at fair value through profit or loss.

Further specifications apply to Hedge Accounting

- **Hedging relationship** must consist of eligible hedging instrument and hedged item
- **Designation and documentation** must be formalized at inception, clarifying the hedging relationship, risk management's strategy and objectives, the nature of hedging and hedged items and assessment of hedging efficacy. Specifically, to hedging effectiveness, it is crucial that the following requirements are met: an economic relationship exists, credit risk does not dominate change in values and the hedge ratio is the same for both the hedging relationship and the quantity of instruments used to hedge the underlying.

More specific rules apply to eligible hedging instruments – for example, options must be value separating their intrinsic and time value, whereas forward must distinguish between forward and spot element.

- **Eligible items** can be, among other more specific clauses, cash flow hedges, fair value hedges or hedges of net investments in a foreign operation.

Cash Flow hedge is hedge to an exposure to cash flow variability due to financial assets, liabilities or highly probable forecasted transactions. Hedge effectiveness is accounted in other comprehensive items and the lower of the cumulative profit or loss on the hedging instrument or fair value change in the hedged item is recognized separately within equity in cash flow hedge reserve.

- 1.1.1. Fair value hedges are hedge of exposure deriving from assets, liabilities or commitments that could affect the entity's profit or loss statement. Gain or losses on hedged and hedging instruments are accounted on profit or loss, unless they are measured at fair value through other

comprehensive income: in the latter case, gains or losses affect other comprehensive income.

Hedge of an entity's net investment in the net assets of a foreign operations are measure, if effectiveness is proven, through other comprehensive income.