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SCHOOL OF ECONOMICS  
AND MANAGEMENT  
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# Hedging

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# More than just numbers

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Tutor: Mr. Sven-Olof Collin  
Authors: Johan Björkholtz

Patric Cederholm  
Jonas Lundin

## SUMMARY

- Title:** Hedging – More than just numbers
- Authors:** Johan Björkholtz, Patric Cederholm and Jonas Lundin
- Tutor:** Sven-Olof Collin
- Problem statement:** Exchange rates have fluctuated since the beginning of trade, and there is nothing indicating that future exchange rates will become more stable. Firms have had to construct and implement a risk management program in order to offset any imbalance caused by fluctuating exchange rate.
- These programs are build by the evaluation of different factors. What this dissertation has done is together with the tradional factors add factors that have developed through the research of behavioural finance, such as loss aversion and overconfidence.
- Purpose:** The purpose of this dissertation is to examine the different factors that influence a firms hedging decision. Furthermore the purpose is not only to test one factor at a time but rather several factors simultaneous.
- Methodology:** We have used an eclectic approach to fulfil our purpose. With the several theories as base we have created hypotheses, which we then have tested in reality. The analysis has been made by regression and qualitatively studies on 29 companies.
- Conclusions:** We have conducted two kinds of analysis, one regression and one qualitatively. We started out with 15 factors. In our final model we had nine plus two left. With these 11 factors we could explain approximately 60% of a firms hedging behaviour.
- Keywords:** Hedging, multifactor, behavioural finance

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**Tutor:** Mr. Sven-Olof Collin  
**Authors:** Johan Björkholtz

**Patric Cederholm**  
**Jonas Lundin**

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**Appendices**

# Chapter 1

## Introduction

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*This chapter starts with an explanation of what risk management is and why it is of importance. Furthermore, the reader will get an understanding of what others have written in this area as well as the authors' ideas of what have to be done in order to get a more complete picture of factors explaining a firm's hedging strategy. The chapter ends with the authors' view of people who may have an interest in this thesis.*

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### 1.1 Background

The last two decades have confronted firms with major changes in the macroeconomic environment and the conditions of doing business. Markets have transformed into being more open to international trade. This economic integration together with the increased financial integration have resulted in that there no longer exist firms that are unaffected of what is happening on the global arena. Even if firms, as well as customers, benefits from a higher degree of international trade, increased economic and financial integration also have another impact on both the domestic and the international firm.

The history shows that the exchange rates have a tendency to fluctuate, and since there is nothing indicating that future exchange rates will become more stable, it has been necessary for firms to construct and implement a risk management program in order to have a clear strategy on how to handle exchange rate exposure and other macroeconomic exposures.

In order to handle exposures the firm can implement internal as well as external techniques. External techniques are financial instruments bought by the firm with the only purpose to reduce the exposure to an acceptable level. As an example of external techniques, forwards, options and swaps can be mentioned. Internal techniques are operations such as overseas production and pricing. Sometimes they are used with the direct objective to reduce the exposure but sometimes the reduced exposure is received indirectly as a consequence of the firm's actions.

Regarding the techniques there is no general guideline stating that one techniques is superior another. What is preferable for one firm may be the opposite for another. It is reasonable to believe that whether a firm uses a specific technique or not, there is an underlying reason

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**Tutor: Mr. Sven-Olof Collin**

**Authors: Johan Björkholtz**

**Patric Cederholm  
Jonas Lundin**

explaining its actions. The question is what kind of underlying factors that affects a firm and its hedging strategies?

## 1.2 Research problem

A significant number of surveys have been carried out with the objective to explain which factors that influence a firm and its hedging strategies. For example, Jalilvand et al (2000) show that firms with lower credit rating use derivatives to a larger extent than firms with higher credit rating and therefore draw the conclusion that a firm with a weak balance sheet implement strategies in order to stabilize the cash-flow.<sup>1</sup> However, former researchers have in general only tested one or two factors at the time and as far as we know no one has included all factors in one single model.

A survey published in “Dagens Industri” (2002-02-27) shows that it may be appropriate to include more than one factor when one is trying to explain a firm’s hedging strategy. The result of this survey shows that large Swedish firms have not changed their hedging strategies despite a stronger home currency. This result is surprising since Swedish firms’ annual turnover, in general, to a large extent consists of sales derived from export. But there may be a logical explanation to the result.

One explanation is that a survey of this kind not can be carried out with only one factor included. By only examine one factor; in this case fluctuations in the exchange rates, one disregard from the fact that other factors may influence the firms simultaneously. If these factors show that the firms instead of change their strategies should hold on to the existing ones, the firms may do so.

Another weakness in former research is that factors of behavioral characters have not been included. A fairly new research area that received great recognition at the Noble price award 2002, where D. Kahneman was rewarded the price for his pioneer research in this field. Researchers in behavioral finance have in several independent surveys examined if factors, such as traditions, trends, overconfidence and loss-aversion have an impact on people in their decision-making process and found out that they do. Since the choice of hedging strategy is a form of decision factors from behavioral finance, self-control, confirmation-bias, trends, traditions, loss-aversion, regret-aversion and overconfidence must be included if one wants to get the whole picture of what influence a firm and its hedging strategy.

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<sup>1</sup>The variables that former research has examined can be found in chapter 3.

As regards traditions they have a tendency to decrease the number of changes while trends may work in the opposite direction. Overconfidence deals with the phenomena that people sometimes “forget” to consider underlying factors. Finally, loss-aversion considers how people act when they are to handle decision concerning losses. A more detailed explanation of the above factors can be found in chapter three.

To sum up former research have not considered the multifactor expectation together with factors derived from behavioral finance in one model.

### 1.3 Aim

The aim of this thesis is to explain what kind of economic and behavioral factors that influence a firm’s hedging strategy when it concerns the level of the hedged. The aim is also to utilize a multifactor model that includes factors from behavioral finance.

### 1.4 Limitations

A risk management program is implemented in order to give the manager an idea of what kind of risks the firm is exposed to and how these risks can be controlled through internal and external hedging techniques. Examples of risks are interest rates, exchange rates, inflation rates and country risks.

However, since all exposures influence firms’ cash flow in one way or another it is plausible to assume that firms act in the same manner whether it is foreign exchange exposure or interest rate exposure. Therefore, this thesis is limited to include foreign exchange rate exposure only.

### 1.5 Target group

This thesis is mainly written for students studying business and economics at a bachelor and master level but we strongly believe that managers for both domestic and international firms will find the study of interest as well.



# Chapter 2

## Methodology

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*Chapter two will explain why the aim of this thesis needed an eclectic approach and why a quantitative as well as a qualitative method have been used. Since this thesis to some extent relies on data used in a candidate dissertation this chapter begins with a discussion around the method used in that paper.*

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### 2.1 Former research method

In “Hedging – A rational decision?” (2002), the authors conducted a sample study. In the dissertation the aim was to investigate if firms acted irrationally when they faced risks derived from transaction exposure. No empirical study had been made in this area of research before and therefore the authors did not know which method that was the best. A quantitative method was selected and it worked well.

Behavioral finance was then and still is a relatively new area of research and when a research topic is new there are often few theories explaining the area. When the theory is weak an inductive study should be used, where one starts with experiments and from that one can form a theory (Saunders, Lewis and Thornhill, 2000)

However, since there were strong and deeply rooted theories in traditional finance, which are in contrast to behavioral finance and behavioral finance has spun-off theoretically from traditional psychology and its theories it was possible to use a deductive study. However, most studies until now have still been approached through experiments.

### 2.2 The research method used in this thesis

An article in the business magazine ”Dagens Industri” (2002-02-27) showed that even though the Swedish krona had strengthened in value Swedish firms had not changed their hedging strategies. Which are the underlying factors when firms construct their hedging strategies?

In order to realize the aim the authors decided to conduct an eclectic approach using both a quantitative and a qualitative method.

## 2.2.1 The eclectic approach

The aim of this paper is to explain what kind of economic and behavioral factors that influence a firm's hedging strategy when it is time to decide what amount to hedge. In order to achieve this objective it is not possible to use either an inductive or deductive approach. By investigating factors identified by former researchers the authors are working in a deductive way. On the other hand, by investigating the factors simultaneously and include factors derived from behavioral finance, that has not been done before, the authors at the same time are working in an inductive way.

In order to realize the aim, the authors instead have appointed an eclectic approach. Collins Cobuild English Dictionary defines eclecticism as:

*“Eclecticism is the principle or practice of choosing or involving objects, ideas and beliefs from many different sources.”*

Researchers in finance do not often use an eclectic approach. Instead the researchers have concentrated on one theory at the time. However, it has been done. For example, Pillariseti (1996) used an eclectic approach when he tried to define the natural rate of inflation in Australia.

While an eclectic approach is a rare method in finance it is a more commonly used method in psychology. Psychological researchers work with individual's minds and since the mind is not like a mathematic formula, always reacting the same to a given stimuli, researchers combine different theories to explain the differences in behavior.

Since the authors include behavioral as well as financial factors and individuals manage each firm this thesis will gain from an eclectic approach. By using more than one theory and putting all factors into a single model the authors will receive a higher prediction value and therefore a more realistic result.

## 2.2.2 The quantitative method

To use a quantitative study reasons for and against such an approach can be identified. In a quantitative study there is only right and wrong and there are no half-truths (Hussey & Hussey, 1997). Anyway, one can always claim that there is a probability that something is true or false.

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**Jonas Lundin**

The valid reason to why this method is selected has to do with the fact that most of the data needed to realize the aim is of a quantitative art, that is, the data can be quantified and investigated without questions of deeper character.

### **2.2.3 The qualitative method**

The alternative to quantitative study is a qualitative study. This can give more and deeper information why something occurs and that you will have a greater level of control (Saunders et al, 2000), whereas the quantitative survey shows how it happens (Andersen, 1998). Furthermore the qualitative study works better and more often in an inductive way (Svenning, 1996).

Since this investigation also includes behavioral factors, such as, overconfidence and traditions that not always can be quantified and used in a model a qualitative method has to be used as well.

# Chapter 3

## Theoretical framework

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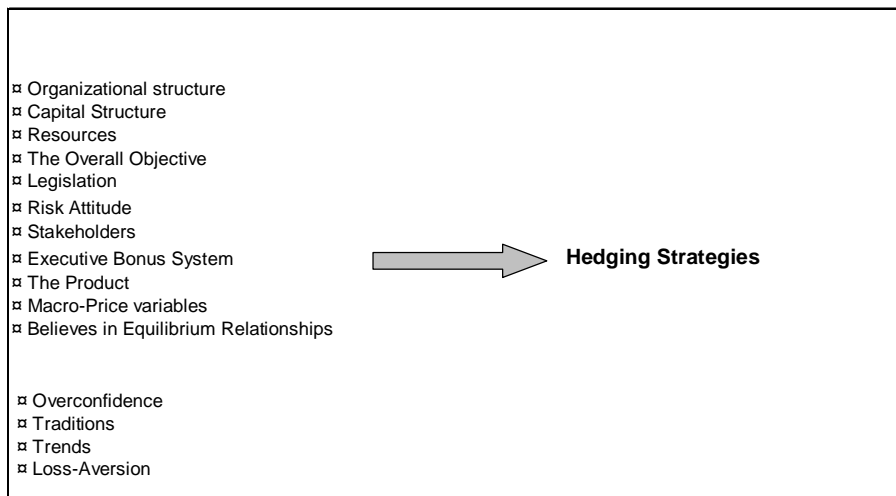
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***This chapter will begin with an introduction to our model. Furthermore it will summarize the most important theories in finance that may influence a firm's hedging strategy. The reader will also get a summary of what former researcher in the area have found out. Finally, it will give the reader arguments to why other factors, such as traditions, trends, overconfidence and loss-aversion have to be taken into account and included in one single model.***

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### 3.1 Our Extended Model

In our extended model we rely on factors identified by former researchers. However, in our extended model we also add factors derived from behavioral finance that we believe affect firms' hedging strategies as well.



The model above starts with the more traditional factors that explain hedging strategies. The final four are the ones that belong to behavioural finance. The eleven traditional factors and the four new factors are then “put” together to explain hedging behaviour.

## 3.2 Former research

Many researchers have tried to explain what factors that influence a firm's hedging strategy. In this section we will summarize what this research have resulted in. However, in order to give the reader an idea of the concept hedging strategies this section will start with an explanation of how the authors have defined hedging strategies followed by explanations and discussions around traditional financial theories that have an impact on firms' hedging strategies.

### 3.2.1 Hedging Strategies

Hedging strategies are a part of a larger concept called risk management and the following is a broad definition of what risk management is:

*“the ability to identify, measure, and assess limits to acceptable financial risk which an organization may, at a reasonable cost, defray or reduce, using financial instruments available in the marketplace”*  
(Darke 1990).

There are four primary risk management strategies that can be adopted. The first is the “do nothing” strategy. This is based on the belief that everything evens out over a longer period of time and that financial forecasting is just guesswork anyhow. Secondly, is to create natural hedges. This is when companies set up overseas production facilities to supply the local market. However, this is just manageable for large firms since it takes a lot of resources. Thirdly, a partial hedge strategy based on a fixed per cent hedge is maintained. Finally, there is the out right active approach where one changes the hedging procedure whenever the risk changes. (Darke, 1990)

Natural hedges are a form of internal technique, whereas a fixed percent hedge is an external technique. When one uses external hedging one will eliminate uncertainty in cash flow in a fairly simple and cheap way, but it is under a limited time only. As well as it has to be re-evaluated each and every time one decides to renew the hedge.

By using internal techniques (by setting up a factory in the above example) one will eliminate foreign exchange exposure in that specific country and currency. However, at the same time as you eliminate the exposure other risks will occur. These are the country specific risk that comes from starting up a factory abroad. Another popular internal method is to play different currencies against each other. However there is always a chance of all currencies moving in the same direction and therefore one cannot offset the exposures.

As already been stated, hedging strategies can be examined from two different angles. One way is to consider the composition of instruments used and another is to investigate to what extent the exposed amount is hedged. When we further on discuss hedging strategies we mean to what extent the exposed amount is hedged.

Regarding to what extent an exposed amount should be hedged there are no basic rules to follow. If the firm hedges ten, fifty or maybe one hundred percent depends on several firm-specific factors, such as cost and risk attitude. However, to get an overall understanding over to what extent a firm may hedge an exposed amount one has to consider traditional financial theories and in the following section the most important theories will be explained and discussed.

### 3.2.1.1 Expected utility theory

Daily firms have to make decisions relying on imperfect information. In other words they do not know the true outcome. During such circumstances, any rational firm will choose the decision that provides the largest expected monetary value (Schotter, 1994).

*John has to choose between two options:*

*The first option (A) gives John the opportunity to gain \$500 with a probability of 30% or lose \$100 with a probability of 70%.*

*The second option (B) gives John the opportunity to gain \$100 with a probability of 100% and not risk losing anything.*

*Which of the two options should John choose?*

According to the theory of the largest expected monetary value a rational person would choose option B since the expected monetary value is higher in option B than in option A (Schotter, 1994).

Expected monetary value Option A:  $(500 \cdot 0,3) + (-100 \cdot 0,7) = \$80$

Expected monetary value Option B:  $(100 \cdot 1,0) = \$100$

Even if it is logical to use expected monetary value as a criterion when a firm makes its decisions it may not be the most proper one. If John has a bill of \$ 400, that has to be paid tomorrow, he is not helped much by the \$ 100. It is then more likely that John will gamble and choose Option A even if that option has a lower expected monetary value. This theory was proposed by Daniel Bernoulli and is called the expected utility theory (Eaton & Eaton, 1995). The theory states that when firms make decisions involving uncertainty they do not only try

to maximize the monetary expected value. They also consider the utility of each decision (Schotter, 1994).

From the above discussion one can conclude that when firms are discussing hedging related questions they consider both the expected utility and the expected monetary value. However, to get a deeper understanding one has to combine the above theories with firms' attitude toward risks. A risk-averse firm may be willing to pay an additional cost in order to know the future outcome while a risk-neutral firm may not. This will be discussed further on when the factor risk attitude is presented.

### 3.2.1.2 Capital structure and the irrelevance theorem

Two Nobel price winners in economics, Miller and Modigliani, stated in 1958 the irrelevance theorem. This theorem says that a firm's market value has nothing to do with the debt to equity ratio within the firm. Instead, Miller and Modigliani claim that it is only the firm's investment decisions, which settle the market value and thus, investment decisions can be isolated from its financing decisions totally.

One must be aware though that this theorem is based on strong assumptions about taxation and the way capital markets function. Furthermore it leaves out the commercial side of the company.

When one looks at the real world other factors must be taken into account and thus modifications of Miller and Modigliani's strong assumptions are needed. First of all one has to consider taxes and transaction costs. Secondly one has to look more into the connection between a firm's capital structure and the composition of its labor and product markets. (Oxelheim, 1996)

The authors' view of; if the theorem holds or not is not of importance. What is important is that if a firm believes in the theorem the underlying reason to hedge may be different from a firm that does not believe in the theorem, which will be discussed further on when the factors overall objective and investment plans are explained.

### 3.2.1.3 Agency Costs

Jensen and Meckling (1976) initiated research about agency costs. Agency costs are costs due to conflicts of interest and this arise from the principal – agent problem. Conflicts of interest arise due to the fact that the inside and outside world of a company have opposing interests.

Two types of interest conflict can be identified in the agency – principal problem. One is between shareholders and debt holders and the other one is between shareholders and managers.

The first conflict arises due to the fact that a debt contract will give shareholders an incentive to invest under the optimally level. What does this then mean? This means that shareholders expect the value of equity to decrease due to an indigent investment and furthermore they also expect that this decrease will compensate the increase in equity value captured at the expense of debt holders. As long as debt holders can predict in a correct way the shareholders' future behavior shareholders will bear this cost to the debt holders.

Due to this conflict between shareholders and debt holders we can expect firms to have high levels of debt due to the fact that they have a low or no possibility at all for asset substitution.

The conflict between shareholders and managers is the second conflict. This conflict is brought into light due to the fact that managers do not get fully compensated when they seek profit. Because of this, managers do not receive full return from their profit seeking actions, but still they have to carry the whole cost. We illustrate this by a small example.

*Managers in a firm believe they need to build a recreation facility to important guests and investors. This facility costs \$ 10 000 000 to build. The facility does not generate any profit it only has costs.*

In this example the recreation facility only capture a fragment of the gain and the managers have to bear the whole cost. Consequently, it is then possible to say that managers exaggerate in their pursuit to seek profit and maximize the value of the firm.

One way of managing this conflict would be to increase the managers' share of the net wealth created by their own activities. This can be done by increasing the part of the firm that is financed by debt, for example to increase the debt ratio.

As has been discussed there are different conflicts that arise due to the fact that a firm has stakeholders with their own objectives. This will be discussed further on in section 3.2.2.7.



### **3.2.1.4 Systematic Risk and Portfolio Theory**

Before the factors identified by former researchers are presented there are two more traditional theories that have to be mentioned, namely systematic risk and portfolio theory.

Systematic risk can be defined to be the risk that cannot be diversified away. “Systematic risk is the risk of holding the market portfolio. As the market moves, each individual asset is more or less affected. To the extent that any asset is affected by such general market moves, that asset entails systematic risk” (www.contingencyanalysis.com). E.g. political decisions in a country and new laws that changes the playground. This is the opposite of specific risk, which is unique to an individual asset.

Portfolio theory is another theory that is worth mentioning. Harry Markowitz was the explorer and founder of it, in 1952. It focuses on how individual investors optimize market risk against expected return. For any expected return or any level of market risk there is a optimal portfolio mix and that portfolio will be leveraged or deleveraged with risk-free assets depending on what you risk preference is (www.contingencyanalysis.com).

Both of these theories will have an impact on how firms hedge. Systematic risk might influence firms to hedge through plants in other countries or stay out from specific countries. Portfolio theory on the other hand impacts the firms’ decision on how much and with what the exposures should be hedged.

## **3.2.2 Identified factors by former researchers**

In connection to every factor we have constructed hypotheses in order to give the reader an understanding how every variable may affect the hedging strategy (Ceteris Paribus).

### **3.2.2.1 Organizational Structure**

A firm’s organizational structure has an impact on its hedging strategies depending on if it can be classified as an international or global corporation. An international firm is a firm that only exports to other countries while a global firm is a firm that has subsidiaries abroad (Baldoni, 1996). The international firm has not the same opportunities to use internal techniques as the global firm and it can therefore be assumed that the international firm uses external instruments to a larger extent.

*H (1): Increased overseas production is negatively correlated with the percentage hedged.*

### **3.2.2.2 Capital Structure**

Regarding the capital structure there are different aspects that has an impact on firms' hedging strategies.

A firm that has most of its debts in foreign currencies is more vulnerable to exchange rate fluctuations than a firm that has debts denominated only in the domestic currency (Bris & Koskinen). These have to be reflected in the hedging strategy. A firm with a lot of foreign debt can use hedging techniques to protect itself from the indirect interest cost that arise due to exchange rate fluctuations, while the firm with only domestic debt should concentrate on the interest rate exposure.

*H (2): The degree of foreign debt is positively correlated with the percentage hedged.*

In their study, Bris & Koskinen, also found out, that highly leveraged firms are more vulnerable to exchange rate fluctuations than less leveraged firms. A highly leveraged firm is dependent on a stable stream of cash flow in order to make interest payments and keep the bankruptcy cost on a reasonable level. One can therefore assume that firms that are of financial distress uses internal or external hedging techniques to a higher degree than firms with a strong balance-sheet. A survey carried out in Canada supports Bris & Koskinen's theories. The result shows that firms with lower credit rating use derivatives to a larger extent than firms with higher credit rating (Jalilvand et al, 2000).

*H (3): The cash-liquidity ratio is negatively correlated with the percentage hedged.*

Also Adam (2002) discusses the importance of stable cash flow but for another reason. Mr. Adam states that since firms prefer to rely on internal rather than external capital to finance their future investments, firms should use derivatives to protect the cash flow. If Mr. Adam is correct in his view, firms that are planning to invest in the near future will use different hedging techniques to a larger extent than firms with no expansion plans will.

*H (4): Expansion plans are positively correlated with the percentage hedged.*

In section 3.1.1.2 the authors explained the irrelevance theorem and stated that a firm believing in the theorem may hedge differently from a firm not believing in the theorem. From the above discussion concerning capital structure one can draw the conclusion that a firm believing in the theorem would not hedge to a larger extent if its degree of foreign debt increased, while it would if its expansion plans increased. However, this is only correct as long as the firm's overall objective is to maximize the value, which will be discussed in section 3.2.2.4.

### 3.2.2.3 Resources

Previous surveys show that larger firms use derivatives to a larger extent than smaller firms (Jalilvand et al, 2000). The question is why? It may be so that larger firms have a larger exposure or that the financial sector has failed to meet the demand from smaller firms. Another explanation has to do with how much time and money a firm spends on questions concerning macroeconomic exposure. Small firms do not have their own treasury departments like larger firms (Carter & Sucher, 1996). Darke (1990) also brings up the influence that technical expertise of the firm have on the strategies. Smaller firms could therefore be expected to use internal and external hedging techniques more temperate than larger firms do.

*H (5): The presence of specialized finance competence in a firm is positively correlated with the percentage hedged.*

### 3.2.2.4 The Overall Objective

The choice of goal for the whole risk management program does influence the whole process, including the identification of exposures and the choice of strategy (Espinoza, 2001). A firm, whose goal is to maximize shareholders value may use other strategies than a firm whose goal is to reduce the cost of capital. The firm with the objective to reduce the cost of capital can do so by minimize the variance in the cash-flow, while the firm with the objective to maximize shareholders value can do so by increase the cash-flow.

Oxelheim & Wihlborg, (1997) go one step further and divide the overall objective into short and long-term goals and claim that the strategies should be influenced by a firm's time horizon. A firm which overall objective is to maximize the short-term profit may use the same instrument as a firm which overall objective is to maximize shareholders value, but depending on what it believes about the future it will hedge to a larger or smaller extent.

*H (6): Presence of objectives to reduce the variance in any variable is positively correlated with the percentage hedged.*

### **3.2.2.5 Legislation**

Underlying rules regarding accounting principles may affect the hedging strategies as well since changes in accounting rules have an impact on a firm's income statement (Rossi, 1999). In the article, "Accounting proposal may influence hedging strategies", Sworobuk (1996) discusses The Financial Accounting Standards Board (FASB) new accounting standards and in what way it will affect the firms hedging strategies. It is reasonable to believe that the firm changes its hedging policies when the rules change. However, we have so far not found any empirical investigations that either support or reject Mr. Sworobuk's theories.

*H (7): More rigorous accounting principles are positively correlated with the percentage hedged.*

### **3.2.2.6 Risk Attitude**

A firm's willingness to take risks could affect its hedging strategies as well. Regarding individuals, they can be put in three different categories, namely risk-averse, risk-neutral and risk-lover (Roos, 1996). The question is in which category firms should be put. Much research carried out in the 1980s indicated that many firms could be seen as risk-averse in their approach to manage foreign exchange risk (Carter & Sucher, 1996). However, in general a distinction is made between risk-averse and risk neutral firms, where the risk-averse firm's objective is to reduce the variance in the target variable while the risk-neutral firm's objective is to maximize the value of the target variable (Oxelheim & Wihlborg, 1997). As when we discussed the overall objective, both a risk-neutral and a risk-averse firm can use the same derivatives. The difference lies in that the risk-averse firm should offset the exposed amount, while the risk-neutral firm can hedge both to a larger and smaller extent than the exposed amount.

*H (8): The degree of a firm's risk-aversion is positively correlated to the percentage hedged.*

### **3.2.2.7 Stakeholders**

It has already been stated that conflicts arise due to stakeholders different interests in a firm. Depending on which stakeholders that have the largest influence on the firm, the firm will construct their

strategies after this specific group's wishes (Oxelheim & Wihlborg, 1997). For example, if the costs of hiring and firing employees are extremely high it may be of importance to use internal hedging techniques, such as diversify the production facilities, in order to spread the risk to more than one country. On the other hand, if a firm is strongly influenced by a bank that is worried about the firm's future interest payments the firm may be forced to use derivatives in order to stabilize the cash-flow and reduce the bankruptcy risk.

*H (9): The degree of shareholders' influence is negatively correlated with percentage hedged.*

Since shareholders want to see their stocks increase in value, it is more likely that shareholders are willingly to take higher risk in exchange for higher returns and therefore they do not want the company to hedge to a larger extent.

*H (10): The degree of creditors' influence is positively correlated with percentage hedged.*

Creditors want a safe return on their investments and do not want to invest in something risky. That is why we believe creditors want companies to lower their risks as much as possible by hedging as much as possible.

*H (11): The degree of employees' influence is positively correlated with percentage hedged.*

Employees do not want to lose their jobs and therefore they want to see the firm minimize the risks by hedging more.

*H (12): The degree of suppliers' influence is positively correlated with percentage hedged.*

Since suppliers supply companies with products and services they want to be sure that they will be paid in the future. This is why we believe the suppliers want firms to minimize their risks through higher percentage hedge.

*H (13): The degree of customers' influence is positively correlated with percentage hedged.*

Customers want a steady supply of products and services. Furthermore customers and firms may have had a good relationship for many years and it can be expensive for the customer to change to another firm. Due to this customers want firms to hedge to a larger extent and minimize risk.

### 3.2.2.8 Macro-price Variables

Since fluctuations in macro-price variables influence both the wealth and the competitiveness of the firm (Andrén, 2001), it is reasonable to assume that the underlying macro-price variables affect the hedging strategies to a large extent. When one considers macro-price variables it is important to identify not only the exposure from the sale side but also the exposure from the cost side (Shoup, 1998). Furthermore, one has to consider if one has to deal with stable currencies or currencies that fluctuate heavily, since fluctuations have a direct impact on a firm's cash flow.

*H (14): The volatility of a currency is positively correlated with the percentage hedged.*

### 3.2.2.9 Executive Bonus Systems

One factor that will affect the amount that will be hedged is the management's benefits. With that we mean options and shares distributed to management as a bonus. Several studies show that the amount of options and share will influence the risk management programs.

The common view is that option-programs provide a disincentive to hedge (Smith&Stulz 1985, stated by Daniel A. Roger 2002). At the same time CEO:s of riskier firm expects higher risk premium and lower pay-performance sensitivity resulting in interdependency between risk management and executive compensation. According to Smith&Stulz (1985), shareholders can influence the management decisions by either using linear, concave or convex function of firm value, there the latter giving higher incentive to increase risk. However, Tufano (1996) provides the primary evidence that there is a linkage between management motives and hedging decisions. In his findings one can see that managers with deep in-the-money options provide weak risk-taking incentives where as out-of-the-money options gives a much higher incentive for risk-taking. One has to be aware that this study was conducted on only one industry sector. Daniel A. Roger (2002) has by using a vega-to-delta ratio stated that there is a connection between risk-taking incentive and hedging decisions.

Vega is the measure of a CEOs incentive to increase risk. It is based on a partial derivative of the dividend-adjusted Black-Scholes equation. The figure is then multiplied by the number of stock options, the answer is the incentive to increase risk in dollar terms. The delta (the incentive to increase stock price) uses the same procedure but

uses the stock return as a base, where vega use standard deviation of stock return. This study was not limited to one sector and therefore complements and supports previous findings.

*H (15): The degree of options in executives' bonus systems is negatively correlated with the percentage hedged.*

### **3.2.2.10 The Product**

Another factor that may influence the extent of hedging is the product itself. A product that follows a price inelastic demand curve might not have to be hedged. What is meant here is that if the sale of a product is not influenced by the price to a large extent one can decide to hedge less and compensate any loss by raising the price. In Björkholtz et al (2001) it is argued that this is something that would go under irrational behavior when one assumes the firm to be risk-averse. But when the firm is risk-neutral it can be a logical reason for maximizing shareholder value. This option is not available when the product is price-elastic, since this would render a decrease in sales.

Some people would argue that price-elasticity and a firm's possibility to change prices are not connected. However, we argue that; a firm that sells products with high price elasticity will use price increases to offset unfavorable exchange rate changes to a lesser extent than firms with a product with a low elasticity rate. Therefore, one could use price-elasticity as a proxy for the willingness to use price changes as a hedging method.

*H (16): The price elasticity of a product is positively correlated with the percentage hedged.*

### **3.2.2.11 Believes in Equilibrium Relationships**

According to Oxelheim & Wihlborg (1997) a firm's hedging strategy depends on how the firm looks at different equilibrium relationships. If one look at two firms, one that believes that the International Fisher Parity (IFP) holds and one that do not believe in the same, their hedging strategies should be different. The firm that believes that it can beat the market should use derivatives that make it possible to gain from deviations of IFP, while the not believing firm should not.

*H (17): The degree of beliefs in equilibrium relationships is positively correlated with the percentage hedged.*

### **3.2.3 Summary**

In this section the authors have explained the concept of hedging strategy and summarized the most important financial theories that may explain a firm's hedging strategy. The authors have also explained more specific factors that influence a firm's hedging strategy and through hypotheses explained in what direction these factors should affect a firm's hedging strategy (*Ceteris Paribus*).

## **3.3 The additional factors**

Even if many researchers have investigated what kind of variables that influence a firm's hedging strategy and in what direction, complements have to be done in order to get a more complete picture over the underlying reasons behind a hedging strategy. The major reason to why we believe that a more extended model is needed is a survey published in "Dagens Industri" (2002-02-27) showing that Swedish firms hold on to their existing strategies despite changes in variables that, according to former researchers, should result in a changed hedging strategy.

In this section we will present other factors that may have an impact on a firm's hedging strategy. We will also present in what direction the factor may influence the hedging strategy by deduce hypotheses.

### **3.3.1 Behavioral variables**

A research area that has received increased attention in recent years is Behavioral Finance. The reason to why researchers have started to pay attention to this area is its ability to explain behavior that not could be explained by traditional financial models. We hypothesize that some of these factors influence the hedging behavior of firms.

Traditions, overconfidence, loss-aversion and trends are factors that in several independent studies have shown to have an impact on investors' decision-making process. Since the manager of a firm in many ways is in the same position as the investor these factors may have an impact on a firm's hedging strategy as well. When we state that an investor and a manager are in the same position we rely on the fact that an investor has to motivate its actions to its clients while the manager has to motivate its actions to the stakeholders of the firm. We will now continue to explain the ideas behind the theories and look at different studies.



### 3.3.1.1 Traditions

The effect, of traditions, on people can be answered by examining how familiarity bias, regret-aversion, and self-control have an impact on people in their decision process.

#### 3.3.1.1.1 Familiarity bias

People prefer to stick to things that are familiar to them, i.e. familiarity bias, rather than try something that is totally unfamiliar. The article “Familiarity breeds investment” by Gur Huberman shows that people prefer to invest in things they know or think they know about, e.g. invest in stocks in the company they are working for. This may lead to that investments with higher return will pass the company by.

Research has found that elderly people stick to the traditional business decisions rather than taking unnecessary risks. But through several tests among his MBA students, Hersh Shefrin has shown that young people as well as old people do not like to gamble when the odds are unknown to them (Shefrin, 2000).

#### 3.3.1.1.2 Regret-aversion

“There is a human tendency to feel the pain of regret at having made errors, even small errors, not putting such errors into a larger perspective. One “kicks oneself” at having done something foolish. If one wishes to avoid the pain of regret, one may alter one’s behavior in ways that would in some cases be irrational unless account is taken of pain of regret.”(Schiller, 1997, p.7)

“Everybody has asked themselves, at some time, whether they have made the right decision, or whether the alternative would have been better” (Goldberg & Von Nitzsch, 2001, p.88).

One thing is certain and that is that in hindsight it is always easy to say what one should have done.

Regret is the emotion experienced for not having made the right decision. Regret is not only the pain of loss; it is also associated with the responsibility for the loss. The lack of not having someone to blame will lead to greater regret (Shefrin, 2000).

Regret theory can also help to explain why investors do not want to sell stocks that have decreased in value and are quick in selling stocks that have increased in value (Shefrin & Statman, 1985). This behavior

affects a company in a negative way, due to the fact the company's liquidity will decrease.

People do not regret opportunity costs in the same way if it depends on whether they have gained or lost money. The opportunity cost is what one could gain from another investment instead of the one chosen. We will continue to look at individual behavior towards losses later on in this chapter when we discuss loss-aversion.

#### 3.3.1.1.3 Self-Control

We all have our habits and routines that we never abandon. It could be everything from drinking a cup of coffee in the morning to saving a monthly sum for retirement.

Self-Control is about controlling our emotions and it is considered to be beneficial to have a high self-control, but individuals that believe they have a low self-control will make irrational decisions in order to follow their plan.

In this part, we have seen different theories explaining why traditions evolve in the first place and in what sense they affect our way to behave. It is hard to predict how traditions affect a company's hedging strategies, because it can be both directions. But with the above discussion in mind traditions may explain why Swedish firms not have changed their hedging strategies despite changes in already investigated variables.

*H (18): Current hedging strategies tend to be a function of previous strategies.*

#### 3.3.1.2 Overconfidence

Hubris or the "Lake Wobegon syndrome" is a phenomenon that most corporate executives suffer from. It refers to their belief that they are smarter than other managers in the same position are (Shefrin, 2000). To see its impact we will look closer on how reliable we as individuals are to make correct predictions and how confirmation-bias and especially home-bias may affect us in a negative way.

In a survey by Lichtenstein, Fish and Philips people were asked to answer simple factual questions. Then they asked the respondents to give the probability that their answer was right. In many cases respondents tended to overestimate their probability to be right (Schiller, 1997)

Mr. Gervais and Mr. Odean show in their article, “Learning to be overconfident”, that traders learn about their ability and how this learning can create overconfident traders. From the beginning traders do not know about their ability, they learnt it through experience. Traders that were successfully to predict the next period stock prices thought this was due to superior ability. By doing so the authors mean that the traders became overconfident.

Different independent studies among students and investors in the United States end up in the same conclusion, according to Mr. Shefrin. Individuals tend to be overconfident about their predictions. The fact is that people with no knowledge within a certain area are more overconfident than experts when it comes to predictions. The fact that people tend to be overconfident would not be a problem if people learned from their mistakes.

However, another study, performed in the U.S., shows that people involved in the study did not learn from their mistakes. Instead they made the same mistakes over and over again (Shefrin, 2000)

A possible explanation to this phenomenon is what Mr. Shefrin refers to as confirmation-bias.

#### 3.3.1.2.1 Confirmation-bias

Confirmation-bias is the fact that people after a prediction have a tendency to look for only confirming evidence and therefore avoid evidence that could lead to the insight that the prediction is incorrect (Shefrin, 2000).

Together with the fact that people have a tendency to remember their correct predictions but not their mistaken ones can be explained by the simple reason that people want to protect their self-esteem (Noteworthy Jargon, 1996).

People by nature are overconfident in their predictions. Together with the fact that we only search for confirming evidence leads to inability to learn from our mistakes.

#### 3.3.1.2.2 Home-bias

Home-bias is the fact that people are overconfident in themselves or things that are close to them. One can say that a nationalistic view is a form of home-bias. In our daily life this phenomenon can be observed in sport events. A good example is that no Swede is going to a soccer game between Sweden and Brazil with the idea that Sweden will lose,

even if Brazil is a far better team. This phenomenon can be viewed in the area of finance as well.

An example of the home-bias phenomenon is a study carried out by French and Poterba (Thaler, 1993, Huberman, 2001) that involves the investigation of institutional investor behavior. Their investigation shows that institutional investors prefer to hold domestic stocks in their portfolios. In other words, American investors hold mainly American stocks in their portfolios and Japanese investors hold mainly Japanese stocks in their portfolios and so on (Thaler, 1993). The explanation for such behavior is that they believe their own domestic economy and stock market will be more successful than those of foreign markets. Since Swedish investors were not included in this study one cannot be certain that Swedish investors act in the same way, but since we act in this way when it comes to sport events this is most likely the case in financial situations.

By considering the theory behind overconfidence it may be so that managers in Swedish firms are so confident in themselves that they do not consider changes in underlying variables since they believe in their ability to handle the situation anyway.

*H (19): The degree of overconfidence is negatively correlated with the percentage hedged.*

### **3.3.1.3 Loss-aversion**

Loss-aversion theory considers the way people make choices when facing risk and uncertainty. This theory deals with how people define a loss and how they respond to such a loss (Shefrin, 2000).

To see that people are inconsistent in their way of defining a loss, consider the following question:

*“Would the average retiree rather see his portfolio appreciate 10% and the cost of living rise 15%, or his portfolio remain flat and the cost of living rise 5%?”* (Noteworthy Jargon, 1996).

The two alternatives give the retiree the same decrease in purchasing power but still independent studies show that most people would strongly prefer the first outcome. The studies also show that virtually everyone would prefer both the above alternatives instead of stable prices together with a 5% decline in their portfolio (Noteworthy Jargon, 1996).

This research leads to the realization that people have problems defining what could be seen as a loss. People are more likely to

gamble when faced with a small loss. A classical example is Nick Leeson and his speculations.

The article “Are investors reluctant to realize their losses” from 1996, concludes that investors demonstrate a willingness to sell stocks that are winners and hold losers. This will lead to lower returns, particularly for taxable accounts.

According to a study, carried out by Kahneman and Tversky (Shefrin, 2000), loss-aversion depends on the fact that people see a decrease in a loss about two and a half times the impact of an increase in a gain of the same magnitude. Therefore it is reasonable to assume that people act in order to avoid situations involving losses.

*H (20): The degree of loss-aversion is positively correlated to the percentage hedged.*

#### 3.3.1.4 Trends

Trends and fashions affect people when it comes to consumer behavior. Trends can also be recognized in the area of finance. To see how one can just look at the speculative “bubble” that took place in the stock market among Internet and communication shares during the end of 1999 and in the beginning of 2000. Even if no one admitted this during the hype it is obvious today that this was the case. The interesting part here is to see how such a “bubble” appears in the first place.

Another example of trends is derivatives. When derivatives became popular during the 1980's many companies started to use this new trend, i.e. derivatives, to hedge e.g. foreign exchange. Many companies did not know exactly how to use the derivatives and they lost millions, e.g. Proctor and Gamble (\$157 million), Orange County (\$1.7 billion) and the Barings Bank (\$1 billion) (Jalilvand et al, 2000) Regret-aversion was discussed earlier and may add another reason to why people have a tendency to bet on trends. Betting on trends means that one is not alone, that is, if one follows the trend there have to be others that have done just the same. If it turns out that it was a bad decision to follow the trend one can always decline the amount of regret by saying; well, at least I was not alone to loose money. The most common explanation to why trends develop and affect people in certain decisions is group pressure. Group pressure is not the only reason to why trends develop. Richard Thaler (1993), one of the most prominent researchers in the field of behavior finance, claims that this kind of behavior can be explained by the grade of uncertainty and limited information.

Uncertainty and limited information are factors that lead to lack of control, which investors do their best to avoid.

According to Mr. Thaler most of us would follow the trend and keep our portfolio intact. In other words, when people are confronted with problems that include limited information and uncertainty, people instead of making an uncomfortable decision prefer to rely on the trend.

It is hard to predict how trends have an impact on the hedging strategies, because it depends what the trend is. Like we mentioned before companies lost billions because they did not really understand the new hedging strategies during the 1980's, it was the trend to hedge. Therefore if the strategy used by a firm is in line with the trend the firm may not change its strategies due to changes in the former researched variables

*H (21): The hedging techniques used by the firm tend to be similar to the techniques that are popular at the moment.*

### **3.3.1.5 Summary**

In this section we have discussed why Swedish firms may not have changed their hedging strategy and the reasons are the following:

- Humans have a tendency to keep deeply rooted traditions alive. Familiarity bias, regret-aversion and self-control are factors that affect people when they make decisions and keep traditions alive.
- People are in general overconfident. This phenomenon leads to both confirmation-bias and home-bias, which affects people in a negative way.
- The fact that people cannot handle a loss in a rational way leads to an irrational behavior, regret-aversion, and even larger losses.
- Trends and fashions influence people in a negative way. Instead of drawing their own conclusion they follow the herd.

### **3.3.2 The affectation between factors**

Another possible explanation to why Swedish firms do not have adjusted their hedging strategies in line with changes in the identified factor may be that most former research have been carried out with only one factor considered at the time.

If one put together all factors into one model and examine their aggregated influence on a firm's hedging strategy the result may have been different. As was discussed earlier in this chapter Jalilvand et al (2000) found that firms in financial distress hedged to a larger extent than firms with no financial problems. On the other hand Smith & Stulz (1985) state that a firm with a significant degree of options in the bonus system would hedge to a lesser extent than a firm with no options in the bonus system. What happens if there is a firm in the bankruptcy zone that at the same time launch a new option program directed to the executives? Will the firm increase the hedging activities as Jalilvand et al argue or will the firm reduce the hedging activities as Smith & Stulz argue?

There is no easy answer to the above question. By testing the interaction between the factors one may get an understanding of in what direction the firm will act. It may very well be so that the firm instead of going in one direction does nothing.

### **3.4 Summary**

To decide a firm's hedging strategy many factors have to be taken into account. In this chapter we have summarized and identified eleven factors, organizational structure to believe in equilibrium relationships, from former research, which affect a firm's hedging strategy. The question is if these factors alone can explain a firm's hedging strategy?

A survey published in "Dagens Industri" (2002-02-27) showed that Swedish firms hold on to their existing strategies despite changes in factors that, according to former researchers, should result in a changed hedging strategy. So, what more is to it then?

We believe that if one wants to explain a firm's hedging strategy more behavioral factors have to be included as well. Factors derived from behavioral finance have the ability to explain behaviors that not can be explained by traditional financial models. Traditions, overconfidence, loss-aversion and trends are factors that have an impact on investors' decision-making process. Since the manager of a firm in many ways is in the same position as the investor these factors may have an impact on a firm's hedging strategy as well.

In the next chapter we will show how we tested the hypotheses and measured the variables.

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**



## Chapter 4

### Empirical framework

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*This chapter will start with an explanation of which sources we used to receive information and why we used the different sources. By describing how we transformed our identified factors into measurable variables the reader will get an understanding of the empirical tests but also an idea of both the strengths and the weaknesses of each single test. Since this thesis to some extent relies on former research carried out by the authors this chapter will end with the prerequisites for this former research.*

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#### 4.1 Choice of companies

This dissertation is sprung from a candidate thesis that was written the fall 2001 (Björkholtz et al) and therefore it has been decided that the same companies that were pick at that time will be used now as well. We will, however, give a brief summary on how we came about the companies in the earlier thesis.

We used the Swedish business magazine “Veckans Affärer” and its annual list of Sweden’s 500 largest companies. Secondly, the homepage of the Swedish organization “Exportrådet” was used to retrieve smaller sized firms. These companies were then categorized under different industries. We divided the firms into 13 industries.

In the candidate thesis we wanted to test if there were a difference between export- and import firms when it comes to hedging. Since some industries are more involved in export and other industries are more involved in import it was decided to pick firms from different industries to avoid skewness. However, this is not as important for this dissertation but since we decided to use the same firms the categorization stands.

We used the sources because they complemented each other, since we wanted a mix of large, mid and small sized firms. The reason for this was that we in our previous research paper wanted to test if there were a difference between small and large firms. Smaller firms most often do not have the same resources as larger firms and therefore hedge to a less extent than larger firms do. We divided them into different categories so that we could make a random selection through a stratified selection procedure, which means that one takes equal percentage from each industry (Svenning, 1996). If this had not been done some categories would have a larger impact on the results than

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**Tutor: Mr. Sven-Olof Collin**

**Authors: Johan Björkholtz**

**Patric Cederholm  
Jonas Lundin**

others. We received 40 answers out of the 150 companies that were selected. Our answers do not give an equal distribution between the industries and the size of the firm. Since the purpose of this thesis's is to test the factors that influence the hedging strategy it will not influence our conclusions as it did in our previous dissertation (Björkholtz et al, 2001)

The survey was conducted through a web-based questionnaire. When the questionnaire was filled in the respondent clicked a button and the answers were sent by e-mail. The questionnaire can be seen in appendix II.

## 4.2 Collection of data

In this section we will explain how we collected the information concerning our dependent and independent variables. We will also give our motivations to why we used the different sources.

### 4.2.1 Collection of secondary data

The secondary data that was gathered was collected from the webpage "Affärsdata", annual reports and our previous survey. The reason to use "Affärsdata" was that it could give us the financial statements of all the firms calculated in the same way. By doing so we got more accurate comparisons. The reason to why we used the annual reports was that it gave us, in some cases, information that we needed and it is always better to receive as much secondary data as possible. The reason to use our previous survey was that we already had been in contact with these firms. This meant that we already had some of the information needed for our survey as well as we had a contact person in each firm.

The information that was gathered from the previous survey was; which currencies the firms were exposed to and how much of these exposures that was hedged. The information was collected through a web-based questionnaire where the respondent was asked to fill out how much of total sales that were in foreign currencies. The respondent had the eight most commonly used currencies to choose from and there were also a box where they could add other currencies. Next, they were asked to estimate how much of each exposure that was hedged. This line of questioning was then repeated for imported goods. The questionnaire was in the form of percent interval of ten.

We used the figures from the year 2000. The reason for this is that the 2001 annual reports in some cases had not been released when this research paper was written. Furthermore, the information received

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

from our previous research paper is from 2000 and by using 2000 as a base year there was no time lag between the information.

#### **4.2.2 Collection of primary data**

The primary data was collected by a telephone interview. The purpose with the interview was to receive information that could not be collected from secondary sources. The advantages with this method was that we, when needed, could follow up the questions immediately with a second question and that we also got access to how the respondent were reflecting around the questions which is of importance when you study behavior. Before the interview an interview guide was sent to each firm. Some questions were of an open character and by using open answer alternatives it is possible to receive information that may be of important but not considered by us in the first place. The interview guide can be found in appendix I.

### **4.3 Dependent variables**

The hedging strategy or more precise to what extent the exposed amount was hedged was set as dependent variable.

- **To what extent the exposed amount was hedged**

#### **4.3.1 Operationalisation**

In order to calculate the total hedge we needed information of how large the internal respective the external hedge was. Our intention was to examine the annual reports and use our previous survey. However, since we did not have access to the annual reports from every firm and some firms gave very little information concerning this matter, we had to solve this in another way.

##### **4.3.1.1 Internal hedge**

We used two different ways to set the percentage a firm uses internal techniques. For the international firm we used the difference between the export and import ratio. If a firm exports for an amount of 100 and import for 50 in the same currency, the import acts as an internal hedge of 50%. For the global firm it was a little bit more complicated. Here we started by looking at the total sale in a specific currency, but we also needed to know to what extent a local subsidiary supplied that market. If the sales were 100 and the local subsidiary supplied 50, we had an internal hedge of 50%. To this 50% we added the import from this currency. If the import was 20% the internal hedge increased to

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**Tutor: Mr. Sven-Olof Collin**

**Authors: Johan Björkholtz**

**Patric Cederholm  
Jonas Lundin**

70%. Left was 30% that could to be hedged externally or remain unhedged.

We have not found any other research papers that describe how internal hedging could be measured and therefore we had nothing to compare the strengths and weaknesses of our method with.

The advantage with the method used is the easiness. There is no difficulty for the firms to answer and therefore the answers would be accurate. The disadvantage is that only two variables are considered.

The import and export ratios were collected from our previous survey where we asked the respondent to estimate the firm's exposure in different currencies. The complete questionnaire can be found in appendix II The information concerning to what extent the firm had production sites outside Sweden, supplying the local market, was collected from the telephone interview (Appendix I, question 2).

#### **4.3.1.2 External hedge**

The information concerning to what extent external techniques were used, were gathered from our previous survey (Appendix II, question 3 and 6). We asked the respondents to estimate how much of the exposure that were hedged. This line of questioning was then repeated for import. The idea was to receive information concerning to what extent firms hedged exposures that not could be hedged internally through currency matching.

#### **4.3.1.3 Total hedge**

By adding the percentage hedged internally to the percentage hedged externally we ended up with one figure stated in percent. This figure was then used as the dependent variable; to what extent the exposed amount was hedged.

### **4.4 Independent variables**

The following factors have been identified and discussed in chapter 3 and were set as independent variables.

- Organization structure
- Capital structure
- Resources
- The overall objective
- Risk attitude

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**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

- Stakeholders
- Macro-price variables
- Executive bonus system
- The product
- Believes in equilibrium relationships
- Trends
- Loss-aversion
- Overconfidence
- Traditions

#### 4.4.1 Operationalisation

Regarding the independent variables it was possible to collect some of the needed information through annual reports and the database “Affärsdata”. However, since we in some cases needed information where the attitude of the firm was important, we used a telephone interview with both open and closed answer alternatives to receive information that not could be found in the annual reports.

##### 4.4.1.1 Organization Structure

In order to make a distinction between global and international firms, we needed information about to what extent the firms had subsidiaries abroad. More precisely we needed information about the number of foreign subsidiaries. But since global firms can be divided into multinational and transnational firms as well, we also needed information about how many different countries they had subsidiaries in. The latter information was needed since a firm with subsidiaries in many countries can use the currency as an internal hedge. The information was, in some cases, collected from the annual reports. However, since not all of our investigated firms are listed and a few firms gave very little information in their annual reports, we in some cases collect the information through the telephone interview (Appendix I, question 2).

##### 4.4.1.2 Capital Structure

To make the firms’ capital structure measurable, we needed the following information.

- Financial distress
- Total debt
- Debt denominated in foreign currency
- Expansion plans

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

By look at how previous researchers have measured financial distress one can see that there is no standardized way to use. Bris & Koskinen (2001) used the cash-liquidity while a study carried out in Canada used the credit rating (Jalilvand et al, 2000). We will measure financial distress in form of cash-liquidity and solidity. The reason to why we use Bris & Koskinen's approach is that cash-liquidity is an exact figure and easy to receive. By using the credit rating one can receive the same rating for two firms with different degree of financial distress. However, the weakness with using the cash-liquidity is that the result one receives today may be different tomorrow. Therefore we also included solidity that is a more sustainable measure. Another reason to include solidity is that hedging in general is used with a long time-horizon in mind and not for short-term crises. The information concerning the firms' cash-liquidity and solidity were collected from the database "Affärsdata".

Regarding the degree of foreign indebtedness we used foreign debt in relation to the total debt as a measure. The figure of the firms' total debt was collected from the database "Affärsdata". To find out to what degree the firms had foreign debts we first of all used the annual reports. If the information could not be found there, we collected the information from the telephone interview (Appendix I, question 6).

Regarding the firms' expansion plans, the information was collected from the telephone interview (Appendix I, question 5). Before this could be analyzed we had to set the expansion plans in relation to something. An investment of 10 million SEK is not that much for a global firm but it is a big investment for a small family business. Therefore, we put it in relation with the turnover. This was done so that there would not be any mismatching between firms.

#### **4.4.1.3 Resources**

As was stated in chapter 3 resources had to do with financial competence. In order to measure financial competence we used the existence of treasury departments as a proxy. The reason why we did so is that financial competence often is synonymous with a treasury department (Carter & Sucher, 1996).

To be able to measure the existence of treasury department we needed to know if the firms had personnel with their only task to deal with questions concerning risk management or if the firms had personnel that dealt with risk management together with other tasks. We made the distinction that if a firm had its own treasury department it also had the acquired resources to use external hedging alternatives

effectively. We received this information with the help of the telephone interview, where we asked the respondent to describe the organization around the risk management program. This was then analyzed as a dummy variable where the appearance of a treasury would be 1 and the lack of it would be 0.

#### 4.4.1.4 The Overall Objective

In order to get an understanding why the firm had a risk management program we needed to identify the firm's target variable. To receive this kind of information the telephone interview were used. The overall objective was divided into reduced variance and maximization of a variable, for example profit. We then asked the respondent to state what was of most importance for the firm. Once again the analysis was conducted with a dummy, this time reducing variance was 0 and maximize any variable was 1.

#### 4.4.1.5 Legislation

Regarding the underlying accounting principles' influence on firms hedging strategies we have not found a good way to measure it. One way would have been to examine if firms standing under different legislation use different hedging strategies. However, since all the investigated firms are under the same legislation any differences cannot be identified and therefore this variable will not be tested empirically.

#### 4.4.1.6 Risk Attitude

One way to measure risk attitude is to investigate whether the firm looks at the treasury department as a profit or a cost center. Previous studies have used the view of treasury departments as a profit center as a proxy for risk-neutral firms and vice versa. However, since not all of our investigated firms have a treasury department we will measure it in another way.

Instead of using a proxy we asked the respondent a direct question to receive the information. This information was collected from the telephone interview, where we asked the respondent to grade the firm after its risk attitude (Appendix I, question 14). The reason to use a scale was because it is hardly correct to say that a firm is either risk-averse or risk-neutral. Two firms could be seen as risk-averse, but one could be much more risk-averse than the other.

However, since it was in our interest to see if the firm's actual risk attitude were the same as the intended as well we also needed a control question. To do so, a scenario was created, where the respondent would explain his/her response to a situation (Appendix I, question 15). Since the expected outcome of each alternative in the scenario was SEK 75 000 the risk-averse firm should choose the alternative with highest probability while the risk-neutral firm should go for the alternative with the highest amount.

We asked the respondent to estimate the risk attitude of the firm in the first question, and the respondents own view in the second question. This was done in order to see if their views corresponded.

#### 4.4.1.7 Stakeholders

In order to receive the information if any stakeholder had influence on the firm's hedging strategy we used the telephone interview. The question used had closed answer alternatives and the respondent was asked to rank the different stakeholders after importance (Appendix I, question 1). This will be treated as a dummy variable where all the stakeholders expect for the owners represent a positive correlation with the percentage hedged.

When stakeholders are evaluated only one measurement will be used. The authors decided to simplify this factor by using a dummy variable. By doing so one will only focus on the most important stakeholder and disregard from the rest. This is also possible since in our argumentation all but one stakeholder lead to the same conclusion. This would also reduce the numbers of variables that had to be tested in the regression. Since we do not have that many questionnaires to evaluate a reduction of independent variables is preferred.

#### 4.4.1.8 Macro-price Variables

To receive information about what macro-price variables that the firm was exposed to we once again used our previous research paper (Appendix II, question 1 & 4). In order to see how risky a specific currency could be considered to be, we tested the volatility of each currency against the Swedish Krona. We used both monthly and quarterly observations since firms' outstanding obligation in most cases last over this period of time.

#### 4.4.1.9 Executive Bonus Systems

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**



In order to investigate if the use of options in bonus systems in one way or another could influence the hedging strategy we tried to collect the needed information from the annual reports. However, in most cases it was not possible to receive to what extent options were used in the bonus system so the telephone interview was used to receive this information (Appendix I, question 4). This was then analyzed through a regression, where we use the percentage hedged as the dependent variable and the option-percentage of executive bonus systems as independent variable. This way of measuring the influence by options has been used before by Smith and Stulz (1985) and Tufano (1996).

#### 4.4.1.10 The Product

In order to receive information concerning the price elasticity of the product/products the best way should be to ask the consumers. However, since we did not have the time needed to carry out such an investigation, we used the respondent's view of how price elastic their product was (Appendix I, question 3). The respondents were in almost every case connected to the finance department and of course it would have been more appropriate to ask the question to someone connected to the marketing department. We used a scale from one to seven to describe the elasticity of the product. One represents no dependence of price and seven total inelastic.

#### 4.4.1.11 Believes in Equilibrium Relationships

Regarding the firm's believes in equilibrium relationships, we described the meaning of the International Fisher Parity and the respondent was then asked if he/she believed in the outcome of the scenario (Appendix I, question 13). This is a dummy variable where belief in IFP is 1 and disbelief is 0.

#### 4.4.1.12 Trends

To receive information on what instruments that might be used because of "trendiness" we ask the respondent on what he or she believe was the most popular methods and why this was so (Appendix I, question 10). If the techniques used were the same as the "trendy" ones, it may be so that trends affect firms' hedging strategies. However, a disadvantage with this question is that the respondent may see its firm as "trendy" and therefore automatically mention the same techniques as the firm is using.

#### 4.4.1.13 Loss aversion

Ferris et al (1988) and Odean (1996b) among others have previously studied loss aversion. Both these studies used volume of trade data. What this means is that they studied stock brokers and their trading and found that there was a much greater probability that the broker would sell of a small gain than a large loss even though the losing stock would continue to decline. Since this method was implemented on the stock market we could not copy the method. We have instead created a scenarios where the respondent where asked to make a decision (Appendix I, question 16). A broker has lost 30% and can either realize the loss now or wait another month with a probability of 70% of losing another 20% or break even with a probability of 30%. These decisions were then tested qualitatively to derive how loss averse the respondent was.

To see if firms take greater risks when they are faced with a loss we combined a question regarding this with a question constructed for risk attitude (Appendix I, question 15). The phenomenon, of greater risk taking, is true when one is examine individuals (Nick Leeson) but is it true for firms as well. By examine if the answers given by the respondent differed it would give an idea if this was the case. One disadvantage with our method to measure loss-aversion, and other questions of behavioral character, is the risk that we achieve the respondent's view and not the firm's.

#### 4.4.1.14 Overconfidence

Regarding overconfidence, previous studies have study the respondents over a longer period of time or under controlled scientific test (Shiller). That is something that we did not have the opportunity to do. Instead we used a proxy, there we investigated if the firm made their own forecasts or if they bought these forecasts from external institutions (Appendix I, question 9). If the firm uses its own forecasts this is an indication that the firm believes more in itself than in other institutions. This was then analyzed through a regression there we used the percentage hedged as dependent variable and four different alternatives as independent variable. The alternatives were no forecasts at all, internal forecasts, external forecasts and both internal and external forecasts. As regards the alternatives, no forecast is the most overconfident method followed by internal, both external and internal and finally external.

Studies carried out by Florovsky (1969) and Fischhoff (1975) show that the lesser a person uses historical data when forecasting the more overconfident the person is. Therefore, in cases firms used internal forecasts we followed up with a question concerning to what extent the firm's forecasts relied on historical data (Appendix I, question 9).

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

#### 4.4.1.15 Traditions

Previous studies have been conducted through tests. The most famous one, and also the first one, is B. F. Skinner (1948) where he fed starved pigeons every 15 seconds. The pigeons started to act as if something in their behaviour was the cause of the feeding and adopted this behaviour. This is called magical thinking. Researchers in behavioural finance have used this study to understand how traditions can have come into play. If a firm makes a decision that turns out to be a great one, and then makes another one in the same line of thinking and this also turns out good, there is a high probability that the firm will continue in same manner even though outside conditions changes. The tradition has been born (Shiller).

To see if traditions were in play we asked the respondent to describe the risk management strategies that the firm used three to five years ago. These strategies were then qualitatively compared with today's strategies to see if there could be any traditions in play. If the hedging strategies were the same this would be an indication that traditions may influence firms hedging strategies. In other words we measured traditions from absence of changes.

The problem by doing so is that there may not have occurred any changes in important factors, e.g. capital structure, legislation and macro price variables that should lead to changes. To come around this problem we made three independent investigations where we examined if there had been any changes in the underlying factors. If all the three investigations showed that changes in one or more factor had occurred, this was seen as a logical change in the hedging strategy. If not, traditions influence a firm's hedging strategy.

## 4.5 Reliability

“If a research finding can be repeated, it is reliable. In other words, if you or anyone else were to repeat the research, you or they should be able to obtain the same result” (Hussey & Hussey, 1997, p.57).

When one is investigating behavior there is always a possibility that an additional survey may come forward with a different result depending on the surrounding environment, the degree of open questions and the interviewer.

Our survey was carried out a few weeks before the coming summer vacation and this may have influenced how much time the respondent spent to find the answers. However, we do not think this have had a significant impact on the results since managers have a pretty tight schedule during the whole year.

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

As regards the degree of open questions it is only the variables derived from behavioral finance that is of an open character. The variables derived from previous research are of a closed character and the result should therefore not differ that much.

All three of us have acted as interviewers and this may have had an impact on the result, but since we in advance constructed the follow up questions in our own interview guide there was very little room for individual follow up questions meaning that all firms have received the same questions.

## **4.6 Validity**

“An effect or test is valid if it demonstrates or measures what the researchers think or claim it does” (Coolican, 1992, stated in Hussey & Hussey, 1997, p.57).

What this means is that a poorly chosen test-population might give you a sound answer but the validity will be extremely low.

Two things can influence the validity negatively. In some question we only asked the respondents for estimations. Secondly, the respondent can misunderstand the question, which in our telephone interview is not likely but during the questionnaire from the former research paper there is a chance of this happening.

However, there are reasons for the validity to be high as well. First of all we had, in the most cases, access to the CFO of the firm. This should rule out the possibility of the estimations to be to far out. Secondly, most of the answers where drawn from the telephone interview and answers collected from the questionnaire where in many instances verified during the telephone interview.

Furthermore, we conducted a semi-random selection of the firms, which should dismiss any accusations of only representing on type of firm or industry.

All this together should give this research paper a fairly high validity.

## **4.7 Limitations**

We have limited us to Swedish firms only, the reason for this is that Sweden has not decided whether or not to enter the EMU and even if Swedish firms have reduced their exposure with 11 currencies they are

still more exposed than their European counterparts. Both the U.K. and Denmark are outside the EMU as well but have been excluded due to lack of knowledge of those markets and time.

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

# Chapter 5

## Analysis

***This chapter will, in order to examine if the variables, identified by previous researchers and by us, influence a firm's hedging strategy, start with an explanation how the analysis have been conducted. Then we will go through each step and present the results.***

### 5.1 Introduction

In chapter three the authors presented eleven variables that former researchers have found to have an impact on a firm's hedging behavior. To these the authors' added four variables derived from behavioral finance. In chapter four the authors' explained how to make the different variables measurable by presenting different, what we from now on will call, sub- variables. All variables can be viewed in the table below.

| <u>Variables</u>                      | <u>Sub-Variables</u>                                                                       |
|---------------------------------------|--------------------------------------------------------------------------------------------|
| Organisation Structure                | Type of Firm                                                                               |
| Capital Structure                     | Cash/Liquidity Ratio<br>Debt/Equity Ratio<br>The Degree of Foreign Debt<br>Expansion Plans |
| Resources                             | Treasury Department                                                                        |
| The Overall Objective                 | The Firm's Target Variable                                                                 |
| Legislation                           |                                                                                            |
| Risk Attitude                         | The Firm's attitude<br>The Respondent's attitude                                           |
| Stakeholders                          | The Most Important Stakeholder                                                             |
| Executive Bonus System                | The Degree of Options                                                                      |
| The Product                           | Price-Elasticity                                                                           |
| Macro-Price Variables                 | 30-days Volatility<br>90-ays Volatility                                                    |
| Believes in Equilibrium Relationships | International Fisher Parity                                                                |
| Overconfidence                        | The Use of Forecasts                                                                       |
| Traditions                            | Todays V.S. Yesterdays                                                                     |
| Trends                                | The Firm V.S. Others                                                                       |
| Loss-Aversion                         | The Firm's Ability to Take a Loss<br>The Respondent V.S. The Firm                          |

**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

### 5.1.1 Reduction of variables

Due to different circumstances the following variables and sub-variables have been removed from the analysis.

- Legislation
- Believes in Equilibrium Relationships
- Executive Bonus Systems
- Expansion Plans
- Debt/Equity Ratio
- 30-days Volatility

The reason to remove legislation was the lack of a reliable way to measure it while the reason to remove believes in equilibrium relationships was connected to the answers received. Since only one out of 29 firms believed in International Fisher Parity there is not much to analyse.

In order to receive reliable results the data have been tested as regards normal distribution and autocorrelation (Appendix III). As can be seen in the appendix, we detected no multi-correlation. However, the variable expansion plans was not normal distributed and neither was the variable options. The reason was that a major part of the firms investigated had none or very small investment plans at the moment and bonus systems were something that was more or less exclusive for the larger firms. After have tried logarithm the result was still negative and therefore the two variables had to be excluded.

We started out with both the debt/equity ratio and the cash/liquidity ratio when measuring capital structure. To reduce the numbers of variables further we decided to use only cash liquidity. These two factors do not measure the exact same thing and therefore they could pass the multi-correlation test. But since they still both measures of capital structure one could be removed. The reason for using cash/liquidity ratio and not the debt/equity ratio is that the former is a more volatile factor that has a larger impact on the day-to-day decisions of the firm. The macro-price variable was the last variable to be modified. Instead of using two different volatilities we settled for one. We decided to use the 90-day volatility. This, because the pay period tends to be closer to a 90-day average than a 30-day average. This data was available in most of the annual reports.

## **5.2 The Analysis**

In this section the results will be presented to the reader. When necessary a short comment will follow but in general all our comments and conclusions will be presented in chapter six. The analysis will consist of two parts, one quantitative and one qualitative. Most of the variables will be analysed quantitatively through a stepwise regression but since a couple of variables cannot be quantified the analysis also consists of a qualitative part.

### **5.2.1 Part one - Quantitatively tests**

The quantitatively test consists of stepwise multiple regressions carried out in SPSS. The reason to use stepwise multiple regressions is that the authors, by using a number of variables, want to investigate which variables that affect a firm's hedging strategy. By using stepwise multiple regressions one receives not only the aggregated impact but also the impact of each variable.

Out of the existing variables the following were tested through stepwise multiple regressions.

- Type of firm
- Foreign debt
- Cash-liquidity
- Stakeholders
- Overall objective
- Existence of treasury department
- The Firms' risk-attitude
- 90-days volatility (weighted average)
- Price elasticity
- The use of prognoses

By running several regressions all of the above sub-variables were tested in different regressions and the following regression showed the most significant result in regards to the tolerance level.



| <i>R</i> | <i>R Square</i> | <i>Std. Error of the Estimation</i> | <i>Significance</i> |
|----------|-----------------|-------------------------------------|---------------------|
| 0.725    | 0.525           | 0.3117                              | 0.022               |

| <i>Factor</i>    | <i>B-value</i> | <i>Std. Error</i> | <i>Significance</i> | <i>Tolerance</i> |
|------------------|----------------|-------------------|---------------------|------------------|
| (Constant)       | -1.336         | 0.707             | 0.075               |                  |
| Price elasticity | 0.0094         | 0.049             | 0.850               | 0.928            |
| Prognoses        | 0.213          | 0.068             | 0.006               | 0.640            |
| Stakeholders     | 0.156          | 0.148             | 0.306               | 0.721            |
| Objective        | 0.384          | 0.145             | 0.016               | 0.749            |
| 90-days vol.     | 0.393          | 0.201             | 0.066               | 0.546            |
| Foreign debt     | 0.433          | 0.151             | 0.010               | 0.712            |

As can be seen the variables price elasticity, the use of prognoses, stakeholders, the overall objective, 90-days volatility and foreign debt explained approximately 53% of firms' hedging behavior.

The regression with the highest explanation value can be found below. It includes all variables and together the variables explain approximately 64% of a firm's hedging strategy.

| <i>R</i> | <i>R Square</i> | <i>Std. Error of the Estimation</i> | <i>Significance</i> |
|----------|-----------------|-------------------------------------|---------------------|
| 0.801    | 0.641           | 0.3073                              | 0.057               |

| <i>Factor</i>    | <i>B-value</i> | <i>Std. Error</i> | <i>Significance</i> | <i>Tolerance</i> |
|------------------|----------------|-------------------|---------------------|------------------|
| (Constant)       | -1.818         | 0.948             | 0.076               |                  |
| Price elasticity | 0.0230         | 0.057             | 0.693               | 0.660            |
| Prognoses        | 0.206          | 0.078             | 0.019               | 0.479            |
| Stakeholders     | 0.329          | 0.169             | 0.072               | 0.536            |
| Objective        | 0.263          | 0.166             | 0.136               | 0.553            |
| 90-days vol.     | 0.678          | 0.289             | 0.035               | 0.447            |
| Cash liquidity   | 0.03343        | 0.121             | 0.787               | 0.781            |
| Risk attitude    | -0.0203        | 0.049             | 0.687               | 0.618            |
| Type of firm     | 0.104          | 0.154             | 0.512               | 0.638            |
| Treasury         | -0.463         | 0.250             | 0.085               | 0.246            |
| Foreign debt     | 0.596          | 0.193             | 0.008               | 0.422            |

As one can see the regression is not as accurate as the first one, neither the whole regression nor the individual factors in themselves (in regards to tolerance). However, since the aim of this thesis is, by using an eclectic approach, to include as many variables as possible in one single model and the model still is acceptable from a statistic point of view and the conclusions will be drawn from this model.

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

## 5.2.2 Part Two - Qualitatively Tests

The following variables have been tested in a qualitatively way

- Traditions
- Trends
- Loss-aversion
- Risk- aversion

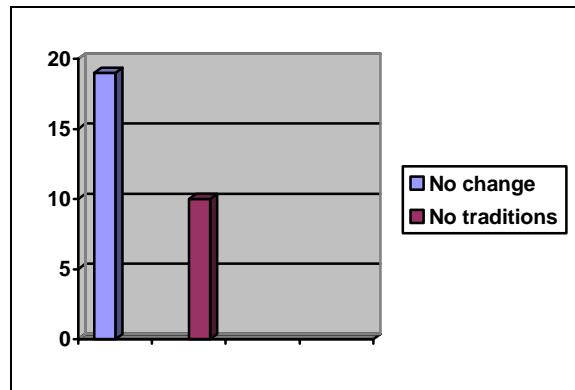
The reasons to test traditions and trends qualitatively are that they in contrast to all other variables not have the percentage hedge as dependent variable. However, they are still of interest when one is studying hedging strategies since they both have an indirect impact on a firm's hedging behavior.

As regards loss- aversion the authors' intention was to include the variable in a regression where the existence of loss-aversion should be used as a dummy variable and the total hedge as dependent. However, the result shows that none of our investigated firms could be seen as loss-averse and therefore it is not possible to run a regression. Since the result probably depends on a poorly constructed scenario and therefore not could be seen as reliable we made a second test.

The firms' risk attitude has been included in the regression. However, since the aim of this thesis is dependent on that the firm's attitude and not the respondent's is captured, the authors included a control question in the interview guide. A scenario was created, where the respondent would explain his/her response to a situation. The answer was then compared to the question related to the firm's risk attitude.

### 5.2.2.1 Traditions

In order to investigate if traditions have an influence on firms' hedging behavior one first needs to know how many firms that had not changed their hedging strategies the past five years.



Out of 29 firms 19 stated that they had not changed their strategies the past five years. However, this test alone cannot show that traditions actually exist. In order to exclude the probability that there have not been any reasons for changes during the period, one has to conduct a second test. In this test the authors decided to look at the following variables in order to see if there had been any changes in them that should have lead to a different hedging behavior.

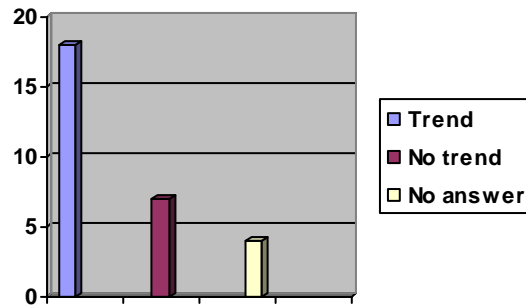
- Solidity
- Bonus system
- Export ratio

One can examine other variables as well as long as the respondent can give a somewhat certain answer. Since some of the participants had not been at the firms for long and some recently had achieved their new position the above variables were chosen. These three variables are fairly simple to obtain historical data from.

The result showed that a majority of the investigated firms had almost the same solidity today as five years ago. However, most of the firms had both changed their bonus system and received a different export ratio. The changes in export ratios varied from a decrease of 20 percent to an increase of 70 percent. These increases combined with most firms' relatively high risk-aversion ought to have influenced the hedging strategies.

#### 5.2.2.2 Trends

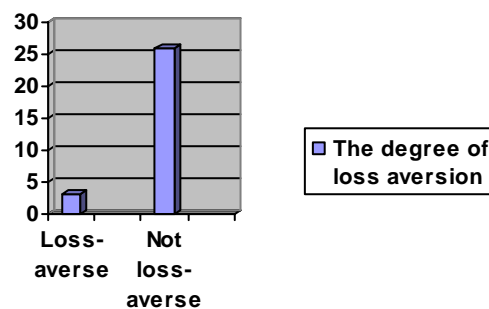
In order to see if firms were influenced by trends we made a comparison of hedging techniques used by the firms and the techniques the firms believed were the most commonly used by other firms.



The result shows that approximately 62% of the total population use the same techniques, as they believed to be the most popular ones while only 24% did not. Since the difference is quite large it may very well be so that firms use the techniques popular at the moment. The only thing that talks against this reasoning is the fact that most firms used forwards since it was an easy and cheap way to reduce the exposure.

### 5.2.2.3 Loss-aversion

When the question regarding the firms' risk-attitude was constructed it was followed by a question in order to examine if firms were willing to take larger risks when faced with financial distress. This line of questioning can be transferred to loss-aversion as well. Firms that are loss-averse are not willing to take a loss and they are therefore more willing to gamble to cover the loss.



From the above figure one can draw the conclusion that the investigated firms have no tendency to be loss-averse. Only three out of 29 firms showed signs of loss-aversion.

#### **5.2.2.4 Risk attitude**

To get clearness if the firm's or the respondent's risk attitude was captured a comparison was made. As can be seen it was only in two cases that the answers differed dramatically. It may be so that the firm's and the respondent's risk attitude is the same, but there is also a chance that we have got only the respondents view and not the firm's.

|    | The Firm | The Respondent |
|----|----------|----------------|
| A  | 2        | 1              |
| B  | 1        | 1              |
| C  | 5        | 1              |
| D  | 5        | 1              |
| E  | 5        | 2              |
| F  | 3        | 3              |
| G  | 1        | 2              |
| H  | 2        | 1              |
| I  | 2        | 5              |
| J  | 3        | 1              |
| K  | 6        | 3              |
| L  | 2        | 3              |
| M  | 2        | 1              |
| N  | 7        | 5              |
| O  | 4        |                |
| P  | 3        | 5              |
| Q  | 3        | 5              |
| R  | 3        | 1              |
| S  | 2        | 1              |
| T  | 1        | 1              |
| U  | 3        | 1              |
| V  | 2        | 3              |
| W  | 2        | 1              |
| X  | 3        | 2              |
| Y  | 4        | 3              |
| Z  | 3        | 2              |
| AB | 4        | 1              |
| AC | 2        | 1              |
| AD | 1        | 1              |

The reason for not including e.g. firm K is that the two scales differs. Where the firms scale goes to seven the individual scale only goes to five. Therefore a difference of three is not as large at it first seems to be. This is, however, our evaluation of this and can therefore be interpreted differently by others.

# Chapter 6

## Conclusions

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*This chapter will give the reader a review of the result. First of all each hypothesis will be commented followed by criticism and a discussion of what conclusions that can be drawn. Finally, suggestions to further studies will be presented.*

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### 6.1 The Results

The aim of this dissertation was to explain what kind of factors that influence a firm and its hedging strategies.

In the previous chapter we presented our analysis. As one can see our final regression model contains the remaining ten variables, with an explanations ratio of 64,1% and a significant level of 0,057, which means that we are wrong in approximately six cases out of a hundred. We will come back to what factors that can explain the remaining 35,9%. However, before we get deeper into that part each hypothesis will be commented.

*H (1): Increased overseas production is negatively correlated with the percentage hedged.*

Our evaluation showed that global firms with overseas production hedge to a greater extent than purely exporting firms, which is the complete opposite of what we predicted. One possible explanation to this behavior is that it is mainly large firms

With a B-Value of 0.104, saying that for every one percentage point increase in overseas production the total hedge will increase with 0.104 percentage points. Hence the type of firm is a factor that has to be considered when one is trying to explain what influences a firm's hedging strategy. Therefore we cannot rule out the hypothesis.

*H (2): The degree of foreign debt is positively correlated with the percentage hedged.*

This hypothesis cannot be ruled out. Our evaluations showed not only that the above hypothesis was true but also that foreign debt was the

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

factor with the second strongest influence. The B-Value 0.596, says that for every one percentage point increase in foreign debt the total hedge will increase with 0.596 percentage points.

*H (3): The cash/liquidity ratio is negatively correlated with the percentage hedged.*

The cash/liquidity ratio was our way to measure financial distress and this factor did have an influence on the firm's hedging strategy, even if it was of minor importance. The B-value was only 0.00334. Furthermore, the variable was not significant in the model and our explanation to this is that the cash/liquidity ratio alone has not an influence on a firms hedging strategy but together with other variables it has, therefore the hypothesis cannot be ruled out.

However, the correlation between the cash/liquidity ratio and the percentage hedged was not negatively as we predicted. Instead the result shows that firms that are less financially distressed hedge to a larger extent than firms that are financially distressed. One possible explanation to such behavior is that financial distressed firms not are willing to increase the cost further today in order to benefit from it in the future.

One can also discuss why the degree of foreign debt has a larger impact than the debt equity ratio. One possible explanation to this may be that firms, instead of stabilizing the cash-flow through hedging, take short- term loans or go into other cash generated activities to come around the problem. For firms with a low exposure this may be more profitably due to high hedging costs.

*H (5): The presence of specialized finance competence in a firm is positively correlated with the percentage hedged.*

The above hypothesis cannot be ruled out. With a B-value of -0.486, meaning that if a firm implement a treasury department the percentage hedge decreases. Since we throughout the thesis have used a treasury department as a proxy for financial competence one could assume either two things. Firstly, those firms without treasury departments have hedged more than 100% by mistake or by a speculative purpose. Secondly, that firms after having implement treasury departments have realized that the hedging costs previously have been too high in comparison to the utility.

Since only two firms out of our 29 had a total hedge over 100% it is more likely that the explanation lies in the hedging costs.



*H (6): Firms with the objective to reduce the variance in any variable is positively correlated with the percentage hedged.*

As we expected firms with the objective to reduce the variance in one variable takes the safe route and hedge to a larger extent than firms with the objective to maximize the value in the same variable. The B-value was 0.263. The hypothesis cannot be ruled out.

*H (8): The degree of a firm's risk-aversion is positively correlated with the percentage hedged.*

The above hypothesis cannot be ruled out. The B-value of -0.00203, means that the less risk-averse a firm is the less percentage is hedged. What is surprisingly is that the firms' risk-aversion had such a small impact than firms' objective to reduce the variance.

This is surprisingly since it is reasonable to believe that there is a connection between risk-averse firms and the objective to reduce the variance. An explanation to this is that we despite a control question still have failed to receive the firm's risk attitude in all cases and instead have received the respondents risk attitude in some cases.

*H (9): The degree of shareholders' influence is negatively correlated with percentage hedged.*

*H (10): The degree of creditors' influence is positively correlated with percentage hedged.*

*H (11): The degree of employees' influence is positively correlated with percentage hedged.*

*H (12): The degree of suppliers' influence is positively correlated with percentage hedged.*

*H (13): The degree of customers' influence is positively correlated with percentage hedged.*

The above hypotheses were used as a dummy and the B-value was 0.329. The B-value says that if one firm has the shareholders as the most important stakeholder and one firm, for example, has the bank as the most important stakeholder the latter will hedge to larger extent.

*H (14): The volatility of a currency is positively correlated with the percentage hedged.*

The above hypothesis cannot be ruled out, which means that fluctuations in the underlying currency influence firms when they set their hedging strategy. With a significance of 0.066 this hypothesis cannot be ruled out.

*H (16): The price elasticity of a product is positively correlated with the percentage hedged.*

The price elasticity of a firm's product also has an impact on a firm's hedging strategy. However, the impact the price elasticity has is the opposite from what we have believed. In cases where firms have the opportunity to change the price towards customers the percentage hedged increases. One reason for this could be, as some people would say, that you cannot measure firms' willingness to change prices as a proxy for price elasticity. Another reason could be that our data is somewhat biased. Most of the firms have indicated a high price elasticity, which means that a price change would not influence sales to a large extent. This means that they could hedge the volatility by a pass through; meaning that if the in price goes up so will the prices towards customers. In comparison to the other variables it is one of the variables with the smallest influence.

*H (18): Current hedging strategies tend to be a function of previous strategies.*

The above hypothesis concerning traditions cannot be ruled out. However, since we had to analyze this variable qualitatively we cannot say anything about the variable's magnitude on firms' hedging strategies, which of course is a drawback.

*H (19): The degree of overconfidence is negatively correlated with the percentage hedged.*

The above hypothesis was rejected. In order to analyze overconfidence we used the use of prognoses as a proxy, where no prognoses was a sign of overconfidence and the use of both internal and external prognoses was a sign of the opposite. In the regression the degree of overconfidence got a B-value of 0.206, which means that a firm not using any prognoses hedge to a greater extent than a firm using, for example, both internal and external prognoses. This is the complete opposite to what the hypothesis states.

Since we find it hard to believe that firms with a high degree of overconfidence hedge to a greater extent, the reason may be that it

was not a good way to use the use of prognoses as a proxy to measure overconfidence.

*H (20): The degree of loss-aversion is positively correlated to the percentage hedged.*

Our analysis showed that the above hypothesis could not be explained. Only three out of 29 firms showed signs of loss-aversion and therefore it is impossible to draw any conclusions. An explanation to this result may be that previous research in behavioral finance has been focused on the individual. Where an individual has rational limitations firms do not. Firms many times have a policy that describes what to do when a loss appears. This could mean that loss-aversion, as a firm specific variable, does not exist.

*H (21): The hedging techniques used by the firm tend to be similar to the techniques that are popular at the moment.*

As regards the above hypothesis, concerning trends, we claim that it is confirmed. Since 62% of the firms used the same techniques as they believed were the most popular at the moment and only 24% did not the difference is of such magnitude that it cannot be ignored.

## **6.1.2 Summary**

The analysis showed that the following variables had an impact on a firm's hedging strategy. Together they explain approximately 64% of the total hedging strategy.

- Organization Structure
- Capital Structure
- Resources
- The Overall Objective
- Risk Attitude
- Stakeholders
- The Product
- Macro-Price Variables
- Overconfidence

The remaining question is to identify what explains the remaining 36%. Since our analysis showed that both traditions and trends had an impact on a firm's hedging strategy, these two variables will count for a part of the remaining 36%. Unfortunately it is not possible to state the influence in percent due to that the variables were tested qualitatively.

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

All in all, the authors have shown that even if the volatility in the underlying currency has the largest impact on a firm's hedging strategy there are several other factors that have to be considered as well. Furthermore the authors have shown that by testing all factors simultaneously in one model and including factors of behavioral character one receives a more accurate picture of what influence a firm and its hedging strategy.

## 6.2 Criticism

In this section we will give our reflection of problems we have faced and not been able to solve during this thesis and why we believe they have had an impact on the results.

Firms consist of people and when one is asking a person within a firm questions of behavioral character one always runs the risk that one gets the respondents view and not the firm's. In order to find a way around this problem we, when possible, followed up the question with a control question to see if the respondent answered the two questions differently. As were discussed in chapter 5 we believe that we received firm related answers. However, when we now look back and are evaluating the results we may be able to have put down more effort on this part.

A second problem that we had to deal with was that we had to measure some variables through proxies. However, this is a usual way when one has no direct measure available but the question is how reliable the proxies are. Since overconfidence showed the opposite impact as suspected and there is no logical explanation to this one can argue that it was not correct to use the use of prognoses as a proxy.

The biggest weakness, however, is that we have not been able to test all the variables in one and the same regression. For some variables we have conducted our own tests and tested them qualitatively. As we already have mentioned qualitatively tests are a bit vague and therefore do not give a clear answer.

Last, only 29 out of 40 companies agreed to help us with this thesis. Although we made the interview guide as easy as possible and let the firms decide when the interview should take place we still have a lot to learn as regards to convince people to set of a couple of minutes and join the investigation. Furthermore one can discuss if it is possible to come up with conclusions of dignity with only 29 participating firms. Since we received a significant regression we believe it is. However, the more answers the more reliable result.

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

## 6.3 Conclusions

So what can be learned from this thesis?

From the students, interested in risk management, perspective we have shown which variables that influences a firm's hedging strategy. Even if many of these variables were known already before, we by testing them all together in one regression came up with the conclusion that some variables are more important than others. Furthermore we have shown that one cannot ignore variables of behavioral character if one wants to get a complete picture.

From the firm's, involved in international trade, perspective the results may not be revolutionary. However, maybe there are some variables that some firms have not paid attention to before and that they find these variables to be of importance. Furthermore this thesis may give firms a deeper understanding of the influence from behavioral variables, such as traditions and trends.

Finally, firms with the objective to sell financial instruments to firms involved in international trade may find this thesis useful. By using the authors idea of implement all variables in a regression they can analyze if the market will grow or decrease when a change occur in any variable.

## 6.4 Suggestions to further studies

This area of research has only been conducted on companies in Sweden. A suggestion to future studies could be to compare companies in Sweden to companies in other countries, for example, the U.S., China, Brazil and South Africa. Do companies in other countries consider the same variables when they conduct their hedging strategy?

Further on there are still room to identify more variables that have not been included and analyzed in this thesis. By adding more variables to the ones evaluated by us the remaining 30% may be explained. If someone decides to include more variables our final tip is to really try to include all variables in a regression. By doing so one receives a clear picture of which and how much impact each variable has.

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**



# APPENDICES

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

## Appendix I

- Rangordna företagets intressenter efter hur starkt inflytande de har på företaget.
- Uppskatta i procent hur stor del av produktionen som sker i varje land.
- Vilken är företagets viktigaste produkt med hänsyn till vinstmarginal och hur pass priskänslig är denna produkt med hänsyn till försäljningsvolym?
- Om bonussystem tillämpas, används optioner och i så fall till vilken utsträckning?
- Uppskatta i kronor hur mycket företaget kommer att investera de kommande två åren.
- Uppskatta i procent hur stor del av företagets totala upplåning som sker i utländska valutor.

- 
- Vilken enhet inom företaget har hand om riskbedömning?
  - Vilka hedgingtekniker använder sig företaget av, t.ex. forwards, risk-sharing och pricing?
  - Använder sig företaget av interna eller externa prognoser gällande den svenska kronans framtida utveckling och vad grundar sig dessa prognoser på?
  - Vilken eller vilka hedgingteknik/tekniker tror Ni är de mest populära bland svenska företag idag och varför tror Ni så är fallet?
  - Vilket är viktigast för Er, att minska variansen eller att maximera en variabel som t.ex. vinst?

- 
- Har företagets hedgingstrategier ändrats under den senaste fem års perioden?
  - Traditionell finansiell teori säger att om den svenska räntan ökar med 5 % jämfört med den amerikanska, kommer den svenska kronan att försvagas med 5 % jämfört med den amerikanska dollarn. Anser företaget att ovanstående samband håller?
  - **Hur skulle Ni vilja beskriva företagets riskattityd?**
  - **Företaget står inför följande valmöjligheter:**

1. Erhålla 100 000 kr med en sannolikhet på 75%
2. Erhålla 250 000 kr med en sannolikhet på 30%
3. Erhålla 500 000 kr med en sannolikhet på 15%
4. Erhålla 750 000 kr med en sannolikhet på 10%
5. Erhålla 1000 000 kr med en sannolikhet på 7,5%

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

Vilket av ovanstående alternativ skulle företaget välja om kassaflödet visade sig vara negativt de senaste kvartalen?

Vilket av ovanstående alternativ skulle företaget välja om kassaflödet visade sig vara positivt de senaste kvartalen?

- En asset manager har tappat 30 % på sin portfölj. Chefen har nu att välja på att 1: realisera förlusten, 2: vänta ut marknaden en månad till för att med 30 % chans att gå break-even och 70 % chans att tappa ytterligare 20 %. Vad skulle du råda chefen att göra?

## Appendix II

**Vi vill poängtera att Ni endast behöver göra uppskattningar när Ni svarar.**

**Med Euro menar vi de 12 valutorna som är knytta till EMU.**

**Uppskatta hur stor del av Er försäljning som sker i utländsk valuta**

| 0%                       | 1-10%                    | 11-20%                   | 21-30%                   | 31-40%                   | 41-50%                   | 51-60%                   | 61-70%                   | 71-80%                   | 81-90%                   | 91-100%                  |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
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**Uppskatta hur stor del av Er utlandsförsäljning som sker i följande valutor**

| Valuta | 0%                       | 1-10%                    | 11-20%                   | 21-30%                   | 31-40%                   | 41-50%                   | 51-60%                   | 61-70%                   | 71-80%                   | 81-90%                   | 91-100%                  |
|--------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
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| GBP    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| JPY    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| NOK    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| DKK    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

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| CHF | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Om Ni handlar med andra valutor skriv ner dessa här:

### 3. Uppskatta hur stor del av varje valuta som valutsäkras

| Valuta | 0%                       | 1-10%                    | 11-20%                   | 21-30%                   | 31-40%                   | 41-50%                   | 51-60%                   | 61-70%                   | 71-80%                   | 81-90%                   | 91-100%                  |
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### 4. Uppskatta hur stor del av Era inköp som sker i utländsk valuta

| 0%                       | 1-10%                    | 11-20%                   | 21-30%                   | 31-40%                   | 41-50%                   | 51-60%                   | 61-70%                   | 71-80%                   | 81-90%                   | 91-100%                  |
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### 5. Uppskatta hur stor del av Era importinköp som sker i följande valutor

| Valuta | 0% | 1-                   | 11-                  | 21-                  | 31-                  | 41-                  | 51-                  | 61-                  | 71-                  | 81-                  | 91-                  |
|--------|----|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
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Tutor: Mr. Sven-Olof Collin  
 Authors: Johan Björkholtz

Patric Cederholm  
 Jonas Lundin

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| USD | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| EUR | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| GBP | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| JPY | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| NOK | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| DKK | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CNY | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CHF | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Om Ni handlar med andra valutor skriv ner dessa här:

### 6 Uppskatta hur stor del av varje valuta som valutasäkras

| Valuta | 0%                       | 1-10%                    | 11-20%                   | 21-30%                   | 31-40%                   | 41-50%                   | 51-60%                   | 61-70%                   | 71-80%                   | 81-90%                   | 91-100%                  |
|--------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| USD    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| EUR    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| GBP    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| JPY    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| NOK    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| DKK    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| CNY    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

|     |  |  |  |  |  |  |  |  |  |  |  |
|-----|--|--|--|--|--|--|--|--|--|--|--|
| CHF |  |  |  |  |  |  |  |  |  |  |  |
|-----|--|--|--|--|--|--|--|--|--|--|--|

I rutan nedanför har Ni själv möjligheten att berätta hur Ni ser på import- respektive exportrisk. Är de identiska eller finns det någon skillnad mellan dem?

Klicka här ifall Ni vill ta del av resultatet:

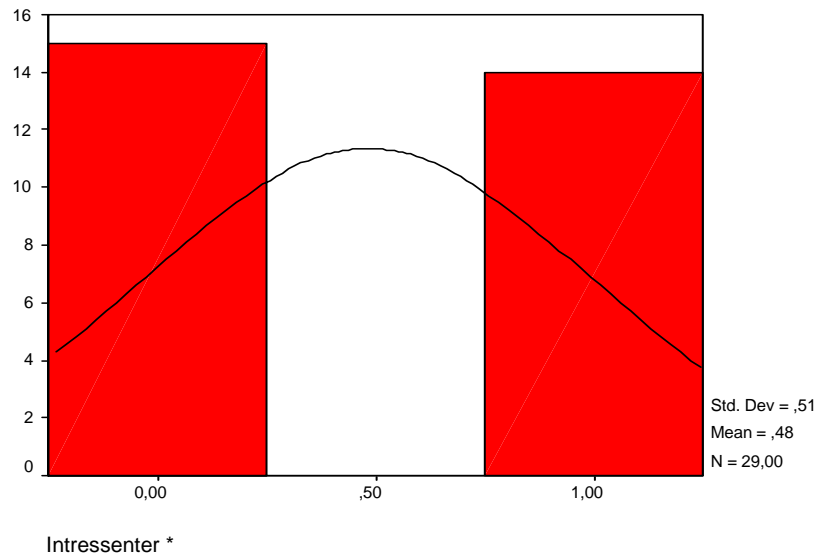
|                                 |                                |
|---------------------------------|--------------------------------|
| <a href="#">Skicka formulär</a> | <a href="#">Rensa formulär</a> |
|---------------------------------|--------------------------------|

**Tack för Er medverkan!**

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## Appendix III

### Stakeholders



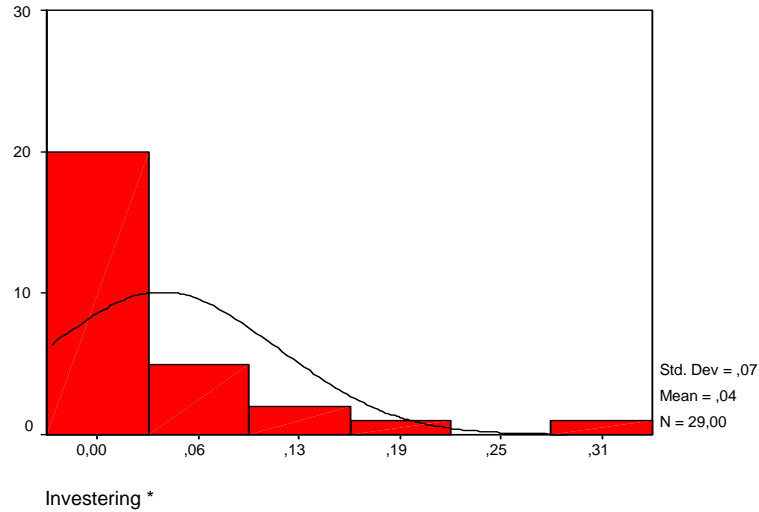
Model Summary <sup>b</sup>

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,356 <sup>a</sup> | ,127     | ,095              | ,3580                      | 1,870         |

a. Predictors: (Constant), Intressenter \*

b. Dependent Variable: T\_-Hedge

### Expansion plans



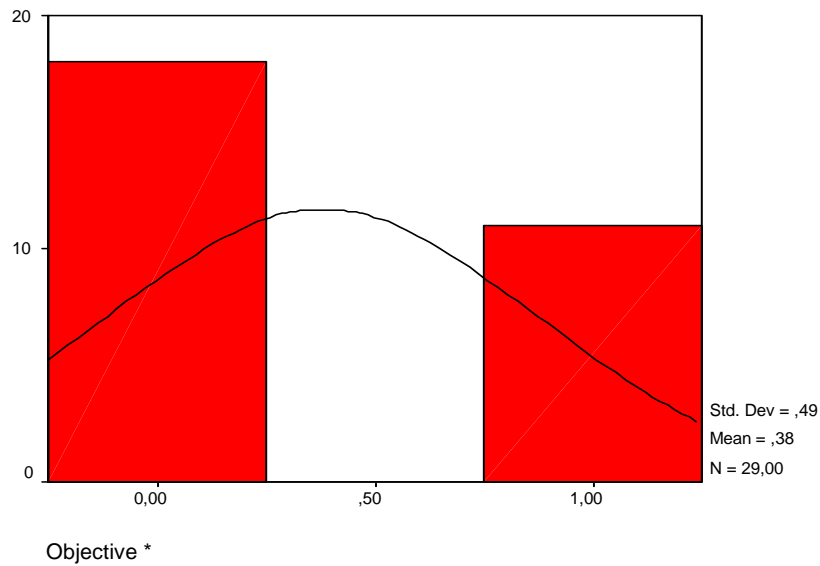
**Model Summary<sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,055 <sup>a</sup> | ,003     | -,034             | ,3826                      | 2,221         |

a. Predictors: (Constant), Investering \*

b. Dependent Variable: T\_-Hedge

## Overall objective



**Model Summary<sup>b</sup>**

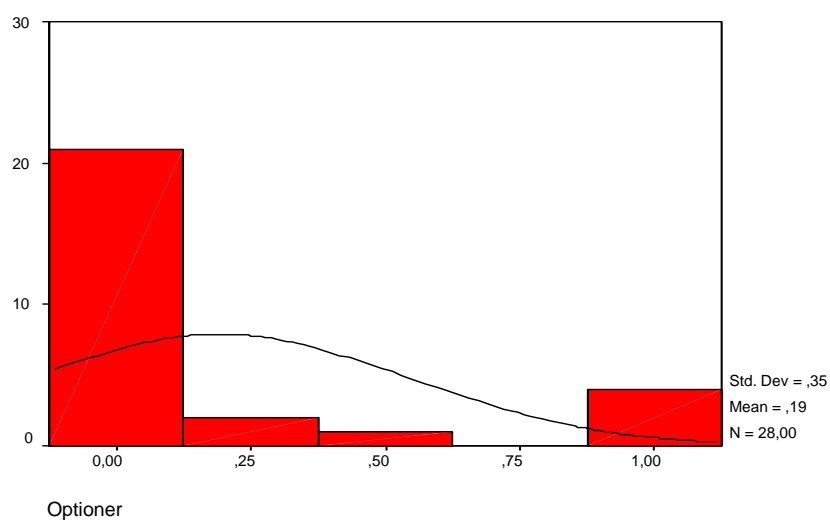
| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,112 <sup>a</sup> | ,013     | -,024             | ,3808                      | 2,167         |

a. Predictors: (Constant), Objective \*

b. Dependent Variable: T\_-Hedge



## Executives bonus systems



**Model Summary <sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,072 <sup>a</sup> | ,005     | -,033             | ,3852                      | 2,275         |

a. Predictors: (Constant), Optioner

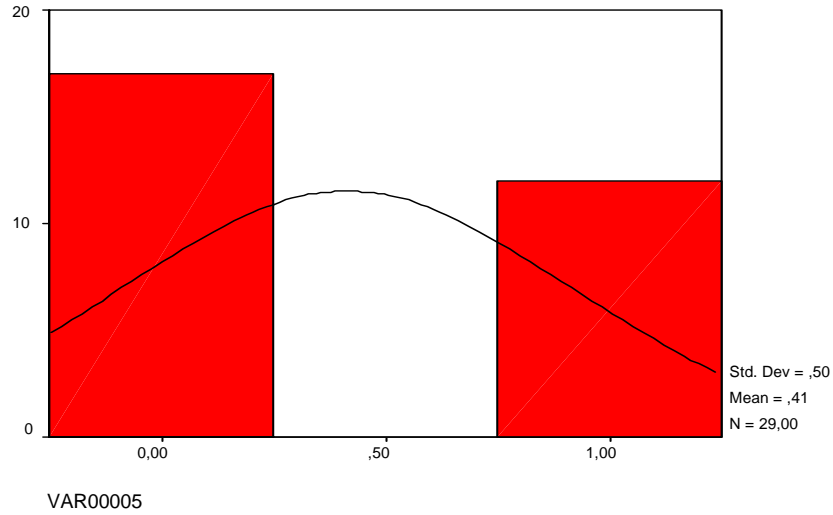
b. Dependent Variable: T\_-Hedge

## Foreign debt

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**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**



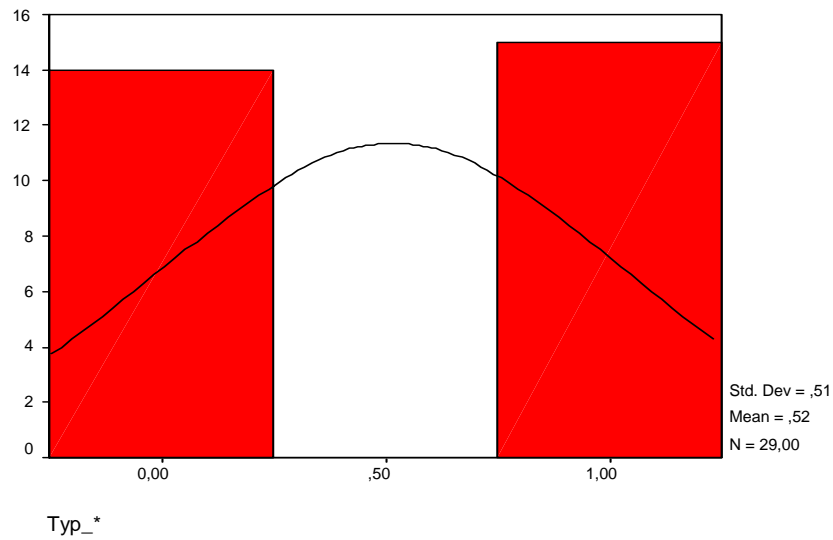
**Model Summary <sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,255 <sup>a</sup> | ,065     | ,030              | ,3705                      | 2,114         |

a. Predictors: (Constant), VAR00005

b. Dependent Variable: T\_-Hedge

## Type of firm



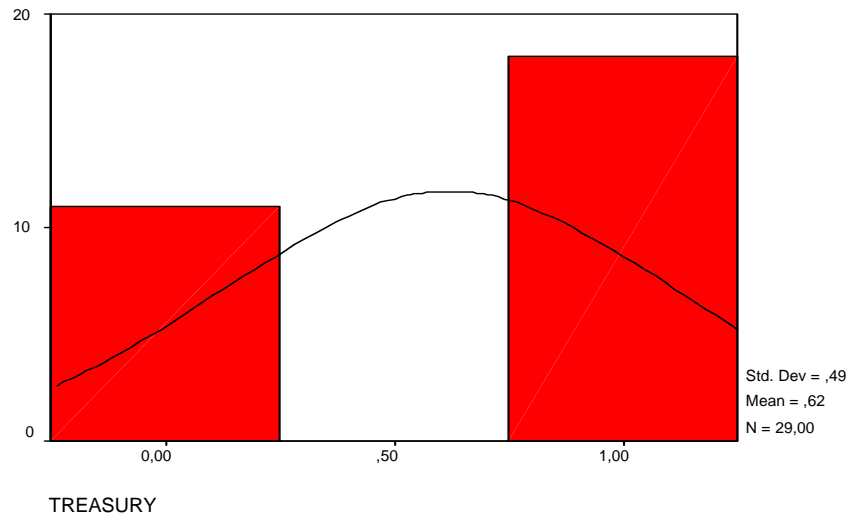
**Model Summary <sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,086 <sup>a</sup> | ,007     | -,029             | ,3818                      | 2,240         |

a. Predictors: (Constant), Typ\_\*

b. Dependent Variable: T\_-Hedge

## Existence of treasury department



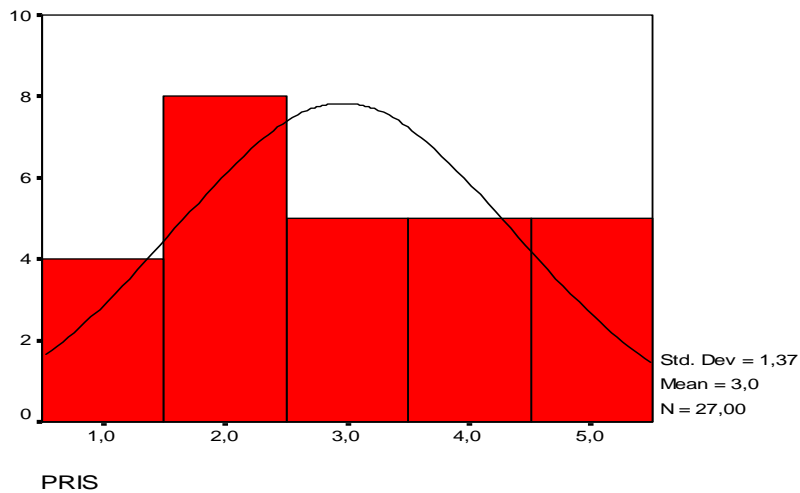
**Model Summary<sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,041 <sup>a</sup> | ,002     | -,035             | ,3829                      | 2,211         |

a. Predictors: (Constant), TREASURY

b. Dependent Variable: T\_-Hedge

## Price elasticity



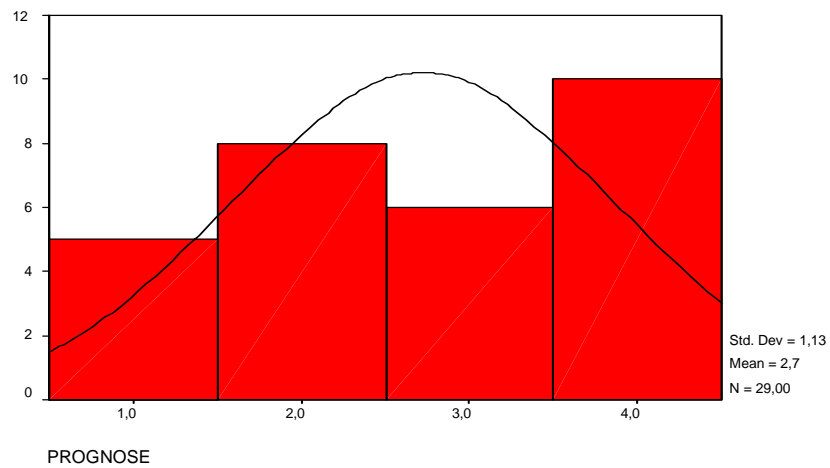
**Model Summary<sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,055 <sup>a</sup> | ,003     | -,037             | ,3933                      | 2,287         |

a. Predictors: (Constant), PRIS

b. Dependent Variable: T\_-Hedge

## The use of prognoses



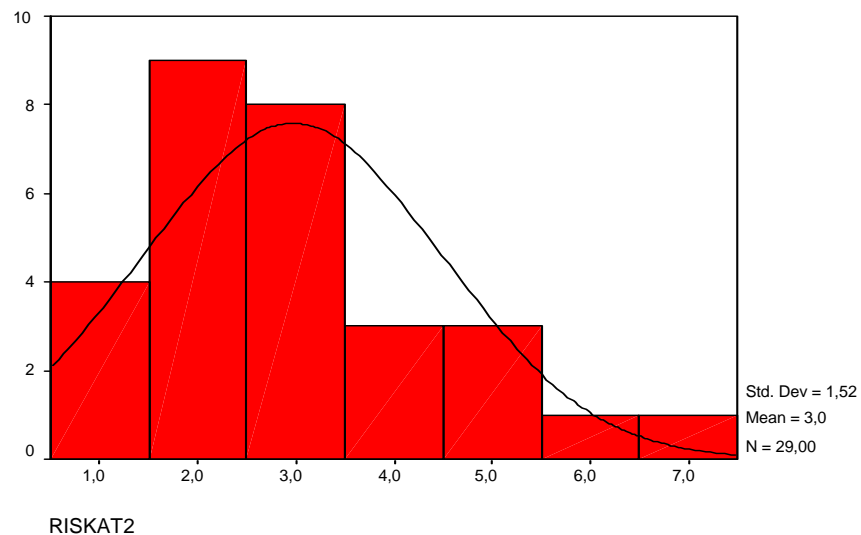
**Model Summary<sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,200 <sup>a</sup> | ,040     | ,004              | ,3755                      | 2,300         |

a. Predictors: (Constant), PROGNOSE

b. Dependent Variable: T\_-Hedge

## The firm's risk attitude



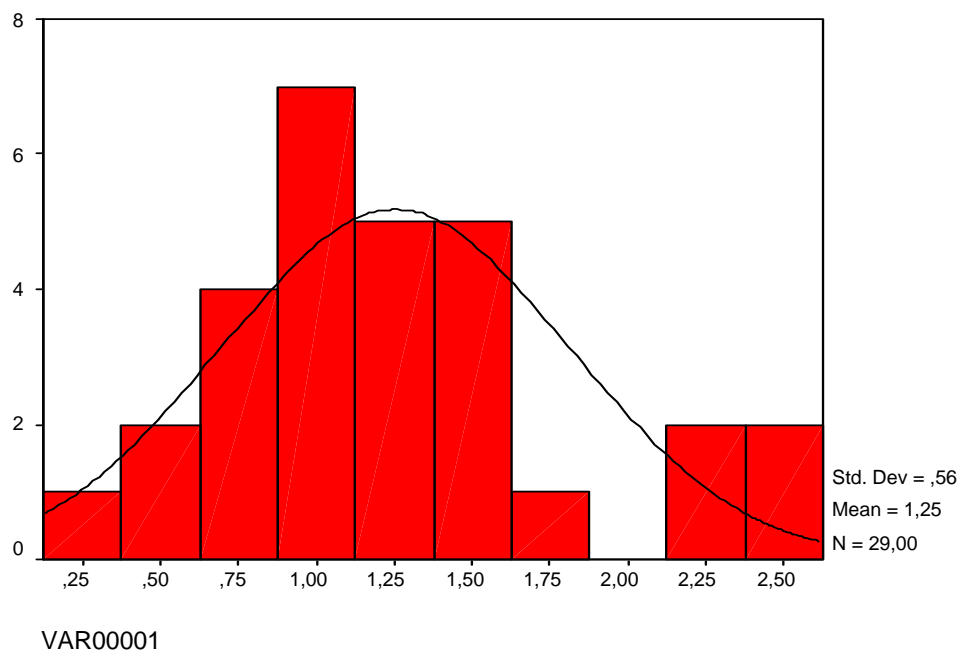
Model Summary <sup>b</sup>

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,136 <sup>a</sup> | ,018     | -,018             | ,3796                      | 2,225         |

a. Predictors: (Constant), RISKAT2

b. Dependent Variable: T\_-Hedge

## Cash-liquidity



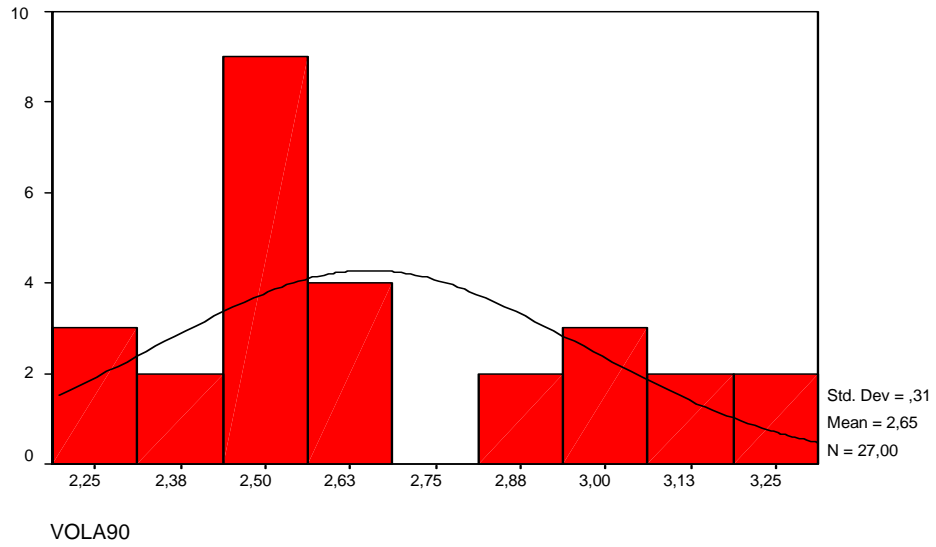
Model Summary <sup>b</sup>

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,188 <sup>a</sup> | ,035     | ,000              | ,3763                      | 2,174         |

a. Predictors: (Constant), VAR00001

b. Dependent Variable: T\_-Hedge

## Volatility



**Model Summary <sup>b</sup>**

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1     | ,159 <sup>a</sup> | ,025     | -,014             | ,3838                      | 2,253         |

a. Predictors: (Constant), VAR00004

b. Dependent Variable: T\_-Hedge

## Correlation

---

**Tutor: Mr. Sven-Olof Collin**  
**Authors: Johan Björkholtz**

**Patric Cederholm**  
**Jonas Lundin**

**Correlations**

|             | tressester      | bjective | vestering | Optioner | Typ_*  | REASUR | PRIS   | ROGNOSI | ISKAT2 | ASHLIQ | VOLA90 | UTLLAN |       |
|-------------|-----------------|----------|-----------|----------|--------|--------|--------|---------|--------|--------|--------|--------|-------|
| Intressente | Pearson Correla | 1,000    | -,186     | ,128     | ,273   | -,310  | ,471*  | -,194   | ,054   | ,022   | -,108  | ,429*  | ,169  |
|             | Sig. (2-tailed) |          | ,333      | ,510     | ,160   | ,102   | ,010   | ,333    | ,783   | ,909   | ,576   | ,026   | ,381  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |
| Objective * | Pearson Correla | -,186    | 1,000     | ,121     | -,131  | ,044   | -,561* | ,247    | ,002   | ,350   | -,066  | -,261  | -,224 |
|             | Sig. (2-tailed) | ,333     |           | ,531     | ,505   | ,820   | ,002   | ,215    | ,991   | ,062   | ,733   | ,188   | ,243  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |
| Investering | Pearson Correla | ,128     | ,121      | 1,000    | -,201  | ,157   | -,121  | -,056   | -,132  | ,393*  | ,212   | -,040  | ,020  |
|             | Sig. (2-tailed) | ,510     | ,531      |          | ,306   | ,416   | ,531   | ,780    | ,494   | ,035   | ,270   | ,843   | ,918  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |
| Optioner    | Pearson Correla | ,273     | -,131     | -,201    | 1,000  | -,345  | ,336   | -,447*  | -,115  | ,061   | -,127  | ,379   | ,272  |
|             | Sig. (2-tailed) | ,160     | ,505      | ,306     |        | ,072   | ,081   | ,022    | ,561   | ,757   | ,520   | ,056   | ,161  |
|             | N               | 28       | 28        | 28       | 28     | 28     | 28     | 26      | 28     | 28     | 28     | 26     | 28    |
| Typ_*       | Pearson Correla | -,310    | ,044      | ,157     | -,345  | 1,000  | -,186  | ,194    | -,240  | ,024   | -,240  | ,043   | -,169 |
|             | Sig. (2-tailed) | ,102     | ,820      | ,416     | ,072   |        | ,333   | ,333    | ,210   | ,902   | ,210   | ,832   | ,381  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |
| TREASUR     | Pearson Correla | ,471*    | -,561*    | -,121    | ,336   | -,186  | 1,000  | -,359   | -,322  | -,018  | ,104   | ,540*  | ,512* |
|             | Sig. (2-tailed) | ,010     | ,002      | ,531     | ,081   | ,333   |        | ,066    | ,088   | ,926   | ,591   | ,004   | ,004  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |
| PRIS        | Pearson Correla | -,194    | ,247      | -,056    | -,447* | ,194   | -,359  | 1,000   | -,156  | ,161   | -,024  | -,176  | -,031 |
|             | Sig. (2-tailed) | ,333     | ,215      | ,780     | ,022   | ,333   | ,066   |         | ,438   | ,423   | ,904   | ,400   | ,879  |
|             | N               | 27       | 27        | 27       | 26     | 27     | 27     | 27      | 27     | 27     | 27     | 25     | 27    |
| PROGNOS     | Pearson Correla | ,054     | ,002      | -,132    | -,115  | -,240  | -,322  | -,156   | 1,000  | -,338  | -,017  | -,393* | -,296 |
|             | Sig. (2-tailed) | ,783     | ,991      | ,494     | ,561   | ,210   | ,088   | ,438    |        | ,073   | ,931   | ,043   | ,120  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |
| RISKAT2     | Pearson Correla | ,022     | ,350      | ,393*    | ,061   | ,024   | -,018  | ,161    | -,338  | 1,000  | ,123   | ,116   | -,027 |
|             | Sig. (2-tailed) | ,909     | ,062      | ,035     | ,757   | ,902   | ,926   | ,423    | ,073   |        | ,526   | ,566   | ,888  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 29      | 29     | 29     | 29     | 27     | 29    |
| CASHLIQ     | Pearson Correla | -,108    | -,066     | ,212     | -,127  | -,240  | ,104   | -,024   | -,017  | ,123   | 1,000  | -,137  | ,070  |
|             | Sig. (2-tailed) | ,576     | ,733      | ,270     | ,520   | ,210   | ,591   | ,904    | ,931   | ,526   |        | ,497   | ,718  |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |
| VOLA90      | Pearson Correla | ,429*    | -,261     | -,040    | ,379   | ,043   | ,540*  | -,176   | -,393* | ,116   | -,137  | 1,000  | ,207  |
|             | Sig. (2-tailed) | ,026     | ,188      | ,843     | ,056   | ,832   | ,004   | ,400    | ,043   | ,566   | ,497   |        | ,300  |
|             | N               | 27       | 27        | 27       | 26     | 27     | 27     | 25      | 27     | 27     | 27     | 27     | 27    |
| UTLLAN      | Pearson Correla | ,169     | -,224     | ,020     | ,272   | -,169  | ,512*  | -,031   | -,296  | -,027  | ,070   | ,207   | 1,000 |
|             | Sig. (2-tailed) | ,381     | ,243      | ,918     | ,161   | ,381   | ,004   | ,879    | ,120   | ,888   | ,718   | ,300   |       |
|             | N               | 29       | 29        | 29       | 28     | 29     | 29     | 27      | 29     | 29     | 29     | 27     | 29    |

\*\* Correlation is significant at the 0.01 level (2-tailed).

\* Correlation is significant at the 0.05 level (2-tailed).