The Determinants of Hedging with Currency Derivatives
- A quantitative study on the Swedish OMX Exchange

Author: Erik Säterborg

Supervisor: Catherine Lions
Summary

Most firms are actively assessing the financial risks exposure and do determine a policy for the hedging activities. It is not solely the risk averse attitude from the managers that need to be overlooked, but to provide sufficient information to the shareholder is desirable for minimizing the gap of information asymmetry, which is by itself considered a tool for value creation (Bergstrand et al. 2009). To narrow this gap, listed Swedish companies have since 2005 been required to disclose their financial risk in their Annual Reports. With the 2005 requirements of accounting disclosure standards set by IASB, there are possibilities for increasing the knowledge of the hedging practices of listed firms on the Swedish OMX. There is also a gap in the knowledge of indentifying firm characteristics as well as determinant variables related to the theoretical arguments on firms depending on whether they utilize currency derivatives or not.

In an open economy, the fluctuations of the foreign exchange rate are a very important determinant of a company’s competitive position. Different characteristics of the firm will affect the management decision to hedge and the research will contribute by statistically explain the firm characteristics impact on the decision to use currency derivatives.

By using a quantitative approach the researcher will review the financial risk note in Annual Reports of 2008 to indentify characteristics and determinant variables on firms depending on whether they utilize currency derivatives or not. This research will act as a compliment and comparison to previous research by Alkebäck et al., (2006). The recognition of the different exchange rate exposures will further describe the hedging incentives of the managers. The investigation of relationship with key variables and the decision to hedge will also be compared to previous studies on determinants of hedging, adding knowledge to research. A hypothesis testing will be conducted to find statistical significance for the findings. The variables will also be examined by a test for correlation in order to validate and explain possible relationships that could have implications for the result.

This study finds that in fiscal year 2008 there was 61.9% of the OMX listed companies who reported use of currency derivatives, which is an increase from previous studies by Alkebäck et al. (2006) on the use of hedging derivatives from 52% in 1997 and 59% in 2003. The proportion of firms that use currency derivatives to hedge foreign exchange risk assesses transaction exposure (95%) and translation exposure (28.4%), an indication that risks related to future contracted cash flows are more common to hedge than the risk of accounting translation of income statement and balance sheet.

On the determinants of currency hedging the study concludes that growth opportunities and liquidity show no statistical evidence of affecting the decision to hedge.

An independent two-sample t-test has showed statistical significance that there difference of the means regarding size, FX exposure and leverage between users and non-users of currency derivatives. The means of currency derivatives users were higher for Size and FX exposure, while lower for leverage. A positive correlation between a firm’s size and FX exposure was found, suggesting that the determinant for hedging FX exposure could be explained by the size of the firm and vice versa.
Acknowledgement

The author wants to thank his supervisor Catherine Lions for her encouragement, opinions and comments.

A special citation to all friends throughout the years at USBE,

“... a fellow's life wasn't worth mentioning if he hadn't shared it with some folks along the way." – MacGyver

Erik Säterborg
Table of Contents
1. Introduction ............................................................................................................................ 7
   1.1 Problem background ........................................................................................................ 7
   1.2 Research questions ........................................................................................................... 10
   1.3 Purpose ............................................................................................................................. 10
   1.4 Delimitations ................................................................................................................... 11
   1.5 Thesis outline .................................................................................................................. 11
2. Theoretical Methodology ......................................................................................................... 12
   2.1 Choice of topic .................................................................................................................. 12
      2.1.1 Preconceptions .......................................................................................................... 12
   2.2 Epistemological considerations ....................................................................................... 13
   2.3 Ontological considerations .............................................................................................. 13
   2.4 Research paradigms ........................................................................................................ 14
   2.5 Research design ............................................................................................................... 14
      2.5.1 Comparative design ................................................................................................... 15
   2.6 Research strategy ............................................................................................................ 15
      2.6.1 Qualitative vs. Quantitative study ............................................................................ 16
      2.6.2 Inductive vs. deductive approach ............................................................................ 16
   2.7 Literature search and criticism ....................................................................................... 17
3. Literature Review .................................................................................................................... 18
   3.1 Previous studies on hedging ............................................................................................. 18
   3.2 Motives for hedging .......................................................................................................... 18
      3.2.1 Hedging reduces expected taxes .............................................................................. 19
      3.2.2 Hedging reduces expected costs of financial distress ............................................ 19
      3.2.3 Hedging reduces agency costs ................................................................................. 19
      3.2.4 Hedging reduces the need for costly external financing ........................................ 20
   3.3 Measuring and recognizing exchange rate exposure .......................................................... 20
      3.3.1 Translation exposure .................................................................................................. 20
      3.3.2 Transaction exposure ............................................................................................... 21
      3.3.3 Economic exposure ................................................................................................... 21
   3.4 Determinants of hedging currency risk ............................................................................. 21
      3.4.1 Size ............................................................................................................................. 21
      3.4.2 Foreign exchange exposure (FX exposure) ............................................................ 22
      3.4.3 Growth opportunities ............................................................................................... 22
      3.4.4 Leverage .................................................................................................................... 22
      3.4.5 Liquidity ..................................................................................................................... 22
   3.5 Methods of hedging currency risk? .................................................................................. 23
3.5.1 Leading and lagging ................................................................. 23
3.5.2 Currency matching ............................................................... 23
3.5.3 Netting ................................................................................. 24
3.5.4 Cash pooling ........................................................................ 24
3.5.5 Currency derivatives ............................................................ 24
3.6 Comments on previous studies in Sweden .................................. 26

4. Practical method ........................................................................ 27
4.1 Data collection method ............................................................. 27
4.1.1 Sample (including excluded observations) ............................... 27
4.2 Description of data ................................................................... 28
4.2.1 Nominal variables ............................................................... 28
4.2.2 Scale variables .................................................................... 29
4.3 Data processing and analysing .................................................. 30
4.3.1 Preparing the data ............................................................... 30
4.3.2 Exploring and presenting ..................................................... 32
4.3.3 Describing using statistics ................................................... 33

5. Empirical Data ............................................................................ 36
5.1 Hedging with currency derivatives .......................................... 36
5.1.1 Hedging which currency risk .............................................. 37
5.2 Industry belonging sector ....................................................... 38
5.2.1 Clustered sectors ............................................................... 39
5.3 Size (Market Capitalization) .................................................... 41
5.3.1 Log transformation and t-test ............................................. 43
5.4 FX Exposure (% of Foreign Sales out of total sales) .................. 45
5.4.1 t-test ................................................................................ 46
5.5 Growth opportunities (Market-to-Book Value) ....................... 48
5.5.1 Log transformation and t-test ............................................. 49
5.6 Leverage (Debt/Equity Ratio) .................................................. 52
5.6.1 Log transformation and t-test ............................................. 54
5.7 Liquidity (Current Ratio) ........................................................ 56
5.7.1 Log transformation and t-test ............................................. 57
5.8 Summary of t-test statistics ..................................................... 59
5.9 Correlation between variables ................................................. 60

6. Analysis ....................................................................................... 61
6.1 Hedging with currency derivatives ........................................ 61
6.2 Hedging which currency risk .................................................. 62
6.3 Determinants of hedging ........................................................ 62
6.3.1 Industry belonging ................................................................................. 62
6.3.2 Size ........................................................................................................... 63
6.3.3 Foreign exposure ...................................................................................... 63
6.3.4 Growth opportunities ............................................................................. 64
6.3.5 Leverage .................................................................................................... 64
6.3.6 Liquidity .................................................................................................... 65
7. Conclusion ....................................................................................................... 66
  7.1 Concluding discussion ................................................................................. 66
  7.2 Truth criteria .............................................................................................. 67
  7.3 Further studies ........................................................................................... 68
8. Reference list ................................................................................................... 69

Table of Tables
Table 2.1 The Four Paradigms ................................................................. 14
Table 4.1 Coding the Hedging Practices .................................................. 31
Table 4.2 Industry belonging ........................................................................ 31
Table 5.1.1 Hedging with CD's ................................................................... 36
Table 5.1.4 Hedging which Currency Risk .............................................. 37
Table 5.2.2 Count of Industry Sector and Hedging Practices .................. 38
Table 5.2.3 Clustered Industry Sector Counts and Averages .................... 39
Table 5.3.1 Size Descriptive statistics over total population .................... 41
Table 5.3.8 Size Test Statistics ....................................................................... 44
Table 5.3.9 Size T-test Statistics Result ...................................................... 44
Table 5.4.1 FX Exposure Descriptive statistics of total population .......... 45
Table 5.4.5 FX Exposure Test Statistics ..................................................... 46
Table 5.4.6 FX Exposure T-test results ....................................................... 47
Table 5.5.1 Growth Opportunities Descriptive statistics of total population 48
Table 5.5.8 Growth Opportunities Test Statistics ...................................... 50
Table 5.5.9 Growth Opportunities T-test results ........................................ 51
Table 5.6.1 Leverage Descriptive statistics of total population ................ 52
Table 5.6.8 Leverage T-test statistics ............................................................ 55
Table 5.6.9 Leverage T-test results ............................................................... 55
Table 5.7.1 Liquidity Descriptive statistics of total populations ............... 56
Table 5.7.8 Liquidity Test Statistics ............................................................... 58
Table 5.7.9 Liquidity T-test results ............................................................... 59
Table 5.8.1 Summary of test statistics ......................................................... 59
Table 5.8.2 Correlation ................................................................................... 60
Table of Figures

Figure 2.2 Comparative Design Study ................................................................. 15
Figure 2.3 The Research Process of Deduction .................................................... 16
Figure 3.1 Forward Contract Payoff .................................................................... 25
Figure 5.1.2 Pie Chart of Hedging with CD’s ..................................................... 36
Figure 5.1.3 Pie Chart of Which Currency Risk .................................................. 37
Figure 5.2.1 Bar Chart of Industry Belonging Sector ......................................... 38
Figure 5.2.4 % component Bar chart of clustered sectors and hedging practice .... 40
Figure 5.3.2 Box plot over Market Cap and hedging Practice .............................. 42
Figure 5.3.3 Size distribution of NO hedging with CD’s .................................... 42
Figure 5.3.4 Size distribution of YES hedging with CD’s ................................ 42
Figure 5.3.5 Size logdistribution of NO ............................................................... 43
Figure 5.3.6 Size logdistribution of YES .............................................................. 43
Figure 5.3.7 Box plot of Log Size, two groups .................................................... 43
Figure 5.4.2 Box plot of sample groups ............................................................... 45
Figure 5.4.3 FX Exposure distribution of NO hedging with CD’s .................... 46
Figure 5.4.4 FX Exposure distribution of YES hedging with CD’s .................... 46
Figure 5.5.2 Box plot of sample groups ............................................................... 48
Figure 5.5.3 Growth opportunities distribution of NO hedging with CD’s.......... 49
Figure 5.5.4 Growth opportunities distribution of YES hedging with CD’s....... 49
Figure 5.5.5 Growth opportunities logdistribution of NO ................................... 49
Figure 5.5.6 Growth opportunities logdistribution of YES ................................ 49
Figure 5.5.7 Box plot of Log Growth, two groups ............................................. 50
Figure 5.6.2 Box plot of sample groups ............................................................... 52
Figure 5.6.3 Leverage distribution of NO hedging with CD’s ............................ 53
Figure 5.6.4 Leverage distribution of YES hedging with CD’s ........................... 53
Figure 5.6.5 Leverage logdistribution of NO ...................................................... 54
Figure 5.6.6 Leverage logdistribution of YES ..................................................... 54
Figure 5.6.7 Box plot of Log Leverage, two groups ........................................... 54
Figure 5.7.2 Box plot of sample groups ............................................................... 56
Figure 5.7.3 Liquidity distribution of NO hedging with CD’s ............................. 58
Figure 5.7.4 Liquidity distribution of YES hedging with CD’s ........................... 58
Figure 5.7.5 Liquidity logdistribution of NO ...................................................... 58
Figure 5.7.6 Liquidity logdistribution of YES ..................................................... 58
Figure 5.7.7 Box plot of Log Liquidity, two groups ........................................... 59
1. Introduction

At this point the reader stands on the shore, looking out over the vast sea of research issues out there. The researcher will guide the reader toward a specific island, where the relevance and importance clarifies the subject of scrutiny. The reader will get a presentation of the background of the problem in a broader perspective which then narrows down to the Research Questions. To further help the reader understand what the study focuses on, a section of delimitations will clarify concepts and intentions of the researcher.

1.1 Problem background

Ever since the fall of the Bretton-Woods fixed exchange rate system in 1973, international monetary transactions have been exposed to increased risk considering the fluctuations in foreign exchange rates (Pramborg, 2002). Miller (1986) argues that the initiative to the changes was influenced by Milton Friedman who considered the British Pound to be overvalued and raised his voice of the ability to be short in currency positions. In recent years there has been an increase in the volatility of the exchange rate, and together with the globalization of the world it has led to more active financial risk management and increasing knowledge in financial derivatives (Alkebäck, 2006).

“Via its business operations, the Group is exposed to a number of financial risks, including fluctuations in earnings, balance sheet, and cash flow resulting from changes in exchange rates, rates of interest, and risks related to refinancing and credit. Group financial policy for risk management has been determined by the board and forms a framework of guidelines and regulations in the form of risk mandates and limits for financial operations.” (Cited in Industrial and Financial Systems AB’s Annual Report, 2008:60)

This is a typical disclosure of the financial risk management note in multinational companies’ annual reports. When a company enters a transaction in a currency different from the operating, or when interest in outstanding loans changes, the company’s earnings will be affected. Companies are working with policies and guidelines to assess this exposure towards risk. The foreign exchange rate risk is the most prominent risk in the economy since it is a major determinant for a firm’s competitive position and of relevance to both academics and managers of the actual firms (Pramborg, 2002).

A number of studies have addressed the topic why firms mitigate foreign exchange rate exposure and aim to reduce the risk it by using a method known as hedging. Pramborg indentifies the following theoretical arguments for hedging in his research (Pramborg, 2002;3-4).

1. Hedging reduces expected taxes – Increased debt capacity increases the payment on interest, and the associated deductions reduce tax liabilities and add value to the firm. This provides a tax incentive to hedge (Pramborg, 2002).

2. Hedging reduces expected costs of financial distress – When a firm is insufficient to meet its payments it is said to be in a financial distress. This could have effect on the operations and the value of the firm, a supplier might cancel its services or an employer would perhaps demand a higher wage due to the uncertainty. Hedging
reduces the volatility of cash flows and thereby lowers the risk of financial distress (Pramborg, 2002). This could add value to the firm (Smith and Stulz, 1985).

3. Hedging reduces agency costs – A company that is close to financial distress might not want to engage in a risky business investment, in contrary to the shareholder even, if the investment would potentially add value to the company. This is known as an underinvestment problem. By reducing the volatility of the cash flow, these conflicts could be reduced, and the firms’ value could be increased. (Pramborg, 2002)

4. Hedging reduces the need for costly external financing – Lessard (1991) and Froot et al. (1993) found that if external sources of finance are more costly than internally generated funds hedging would be beneficial. Hedging might be able to make assure that the company has sufficient internal funds to take advantage of an attractive investment opportunity (Pramborg, 2002)

The policy or strategy of hedging could be approached differently by companies and arguably be divided into three levels of engagement. The first strategy would be to hedge all exposure, a so called perfect hedge, in order to eliminate the risk totally. In practice, when there is a great amount of transactions of all magnitudes, this could be difficult or very costly to mitigate. The second approach is to hedge a certain level of the exposure, which enables the company to have some freedom but leave a possibility for errors and managerial incentives which could either result in gain or losses. The third alternative would be not to hedge currency risk at all, with the motive that currency fluctuations would even out in the long-term or a belief that the home currency will appreciate (Grath, 2004).

Most firms are actively assessing the financial risks exposure and do determine a policy for the hedging activities. It is not solely the risk averse attitude from the managers that need to be attended, but to provide sufficient information to the shareholder is desirable for minimizing the gap of information asymmetry, which is by itself considered a tool for value creation (Bergstrand et al. 2009). To narrow this gap, listed Swedish companies have since 2005 been required to disclose their financial risk in their Annual Reports. The requirements are set by the International Accounting Standard Board (IASB) and briefly regulates that firms should disclose recognition, measurement and presentation of risks divided into different groups (Jiez & Gutierrez, 2009).

In Sweden, there has for many years been a lack of requirement on the disclosure of hedging activities. This has made it difficult to obtain data and is the reason why most studies are based on surveys of the financial managers (see Hagelin (2001), Pramborg (2002), Alkebäck et al., (2006)). Due to the nature of these collection procedures there have been a problem of response rate. The questionnaire or survey methods are also hard to replicate.

Firms have in fact several methods of hedging financial risks, such as credit and refinancing risk, but this study will particularly concern the risk management of the volatile foreign exchange rates. When a firm should identify foreign exchange risks there are generally three different types of exposure that are mentioned concerning hedging.

**Translation exposure**, also known as accounting exposure, arises when companies are reporting and need to convert foreign operation from local currencies into home currencies.
**Transaction exposure** results from the changes in values of the operating inflows and outflows of cash between the period when transactions are contracted and when the payments are transferred.

**Economic exposure** arises when currency fluctuations alter a company’s future revenues and costs and thereby could affect the value of the firm. When an exchange rate changes it could also have implication for the price competitiveness of the firm, this issue also relates to the economic exposure (Shapiro, 2010).

The firm has alternatives on methods of hedging besides the effect of so called “natural hedges”, that occurs when a subsidiary is invoicing in the same currency as expenses before they are translated to the group company’s balance sheet. Firms can for example practice the following methods.

- **Leading and Lagging**: this means the acceleration and delay of payments to suppliers and customers. By altering the credit terms the firm can decrease its overall exposure in currencies so that inflows and outflows are carried out with the smallest time frame possible, decreasing the impact of exchange rates changes, or reduce the magnitude of the exposure (Shapiro, 2010).

- **Currency matching**: when selling abroad, firms can stipulate terms in the invoice contract to match the home currency in which they have their expenses (Kenyon, 1990).

- **Netting**: Multinational firms with payments that flow back and forth between affiliates can postpone the actual transfer of money until a predetermined date when the affiliate’s flows are netted and they pay or receive only one amount. Thereby they reduce both transaction costs and also reducing the impact of currency risks by fixing the exchange rates (Shapiro, 2010).

- **Cash Pools**: Instead of letting affiliates periodically hold large amount of cash, which can be affected by changes in interest rates and currency rates, the multinational firm can set up centrally managed accounts to keep the level of cash to the minimum needed for transaction purposes (Shapiro, 2010).

- **Currency derivatives** are perhaps the simplest alternative of hedging. These financial instruments have the ability to offset a position, and limit the risk involved. These instruments can have several varying purposes, such as swaps, options and forwards. This method will be the one addressed in this thesis, the qualities and functions of it will be assessed and intensively discussed later on.

This study will look at the alternative of currency derivative hedging since it is applicable to all listed companies on the Swedish OMX list and also subject to the requirements of risk disclosure in the Annual Reports. According to previous studies, the uses of hedging derivatives by Swedish listed companies have increased from 52% in 1996 to 59% in 2003 (Alkebäck et al., 2006). Still there are companies doubting to incorporate the use of derivatives. Alkebäck et al. (2006) also shows that in 1996, the greatest concern for the Swedish firms to hedge was the lack of knowledge about the derivatives, but in 2003 there was little concern regarding the knowledge. The issues of concern were by 2003 accounting treatment, transaction costs and liquidity risk.
With the 2005 requirements of accounting disclosure standards set by IASB, there are possibilities for increasing the knowledge of the hedging practices of listed firms on the Swedish OMX. There is also a gap in the knowledge of indentifying firm characteristics as well as determinant variables related to the theoretical arguments on firms depending on whether they utilize currency derivatives or not.

This led to the following research questions.

1.2 Research questions
Primary question:

- To which extent do OMX listed companies use currency derivatives to hedge exchange rate risks?

Secondary question:

- What exchange rate exposures are recognized and mitigated with the currency derivatives and are there any relationships between firm characteristics or key variables and the decision to use currency hedging derivatives?

1.3 Purpose

In an open economy, the fluctuations of the foreign exchange rate are a very important determinant of a company’s competitive position. Different characteristics of the firm will affect the management decision to hedge and the research will contribute by statistically explain the firm characteristics impact on the decision to use currency derivatives.

By using a quantitative approach the researcher will review the financial risk note in Annual Reports of 2008, together with gathering data available by the DataStream database, descriptive statistics will be used to indentify characteristics and determinant variables on firms depending on whether they utilize currency derivatives or not.

By looking at the extent to which OMX listed companies use currency derivatives to hedge exchange rate risks, this research will act as a compliment and comparison to previous research by Alkebäck et al., (2006).

The recognition of the different exchange rate exposures will further describe the hedging incentives of the managers.

By looking at firm characteristics and the decision to hedge with currency derivatives, the study aims to illustrate some interesting similarities or differences among Swedish OMX listed companies.

The investigation of relationship with key variables and the decision to hedge will also be compared to previous studies on determinants of hedging, adding knowledge to research. A hypothesis testing will be conducted to find statistical significance for the findings. The variables will also be examined by a test for correlation in order to validate and explain possible relationships that could have implications for the result.
1.4 Delimitations

The period of time will be limited to 2008 only, with the reason that this is the latest annual report possible to collect for all firms. When the data was gathered (spring 2010), not all firms had published the 2009 report. It would have been interesting to test for a longer period, reviewing additional annual reports. However, the comparative design of the research does not add importance in the analysis, but would only make sense to compare the actual outcome which the researcher wishes can be applied on future studies.

Some Swedish companies have multiple share classes, A and B shares. When dual classes occur the A-class shares will be eliminated with the reasoning that these are traded on different terms, which fundamentally breach Modigliani & Millers (1958) theory on equal access to market prices.

In some instances the purpose of derivative practises is a concern. Financial firms both use and sell derivatives and are therefore excluded is this study (Hagelin, 2000). Specifying what a financial firm is could be an issue and have room for interpretation. Therefore, the classification made by OMX will be the determining factor on what will be eligible as a financial firm or not.

Further, the firm has to have its base in Sweden to be included in the sample, because foreign firms listed on the OMX will have other accounting standards and a different tax base, which could imply bias in the decisions to hedge.

1.5 Thesis outline

In the Introduction, the reader will get a presentation of the background of the problem in a broader perspective which then narrows down to the Research Questions. To further help the reader understand what the study focuses on, a section of delimitations will clarify concepts and intentions of the researcher. In the Theoretical Methodology chapter, methods relevant to the study will be presented, along with the researchers’ views and approaches, which allow the reader to critically examine and understand the nature of the study. In the Literature Review chapter, the researcher will start off by presenting previous studies of the subject, move on to the motive and methods of hedging and finish off by discussing the determinants of hedging, which later are to be examined. In the Practical Method Chapter, the reader will learn how the data was collected and filtered, what qualities the data has and how it will be sorted. The proxy’s for the determinants will be introduced and the methods for testing will be presented. The first part of the Empirical Data chapter will use descriptive statistics such as table, charts and diagrams to illustrate the data in the most informative way possible for the reader. The latter part is more complex with testing of the determinants. The chapter ends with a correlation matrix to further be able to describe the findings and to prepare for the analysis. The Analysis chapter will start by assessing the research questions and then analyzing each determinant. Throughout it all, a mixture of empirical findings and literature will be evident. The Conclusion chapter will highlight the most important findings and assess the purpose and aim of the research. Truth criteria and suggestions for further studies are declared in order to evaluate the quality of the thesis.
2. Theoretical Methodology

The reader is now presented to the first crooked lines from the painting brush, but must surely wonder why the researcher navigated towards this rugged path. Methods relevant to the study will be presented, along with the researchers’ views and approaches, which allow the reader to critically examine and understand the nature of the study. In the end of this chapter, the researcher explains how the relevant literature was found and evaluates the quality of it.

2.1 Choice of topic and perspective

“It is important that you choose a topic in which you are likely to do well and, if possible, already have some academic knowledge.” (Saunders et al. 2007:23)

The author is specialized in the area of finance at a Master’s level and aims to be working within risk management of a multinational firm. By approaching the choice of topic with rational thinking techniques (Saunders et al., 2007), the purpose is to find a proper research idea based on his own strengths and interest.

With the experience of writing a qualitative thesis on bachelor level, the author wishes to broaden his researching skills by engaging in a quantitative study. The nature and differences of these will further be described in upcoming sections. The previous thesis treated Risk management and methods of hedging and the author wants to continue on this path chosen, further developing skills within the area. Finding out that currency derivatives are used to manage risk, one issue which could not be mitigated during that research was the implications of drawing more general conclusions (Lindström & Säterborg, 2009). One problem that was discussed during the previous research was the decision of when or whether a company should use currency hedging derivatives practises and what characterizes a company that chooses to engage in these activities.

Perspective

The choice of perspective can influence how you view and present the financial data and statistics depending on whether you are an investor, shareholder or doubtful scrutinizer. This study is made in a researcher’s perspective, meaning that the data collection and interpretations will be done in line with previous researchers’ findings. The researcher of this study does not have an interest of persuading companies in any direction but does want present the reality of the world in an objective and unbiased way and make room for further research within the area.

2.1.1 Preconceptions

Personal values and beliefs could be a decisive determinant for an outcome of a research and it is therefore important to include the author’s preconceptions about the subject. Bryman & Bell (2007) emphasize the issue that researchers cannot be free from personal values, and therefore may reflect a bias on important parts of the study.

With the bachelor thesis in mind, the author is of the belief that even if there is a whole lot to gain, maintaining a derivative hedging entity is an advanced and costly strategy for companies. In a sense, most or all companies perform some alternative of hedging, for example leading and lagging, on a minor level. The critical level, when the costs of hedging
with derivatives is outweighed by the minimization of risk or value added to the shareholders, is hard, if not impossible, to determine. However, the author is of belief that the company should at least be of sufficient size or engage in international trade to a certain extent, in order for the hedging with derivatives to be rewarding and an acceptable strategy.

2.2 Epistemological considerations

According to Bryman & Bell (2007), epistemology refers to the theory of knowledge and in what perspective knowledge should be considered. Saunders et al (2007) exemplifies this by discussing the view on objects. Either one could consider objects to be ‘real’ and touchable such as machines and computers. The data collected is arguably not exposed to bias in the sense that a computer is not anything else but a computer. On the other hand, objects subject of research could also be feelings or attitudes and those objects are much harder to measure and a possibility of bias arises.

Researchers who thinks that the social world of business is too complex for being viewed as natural science and information as well as rich insights can be lost in the data collection would approach a philosophy known as interpretivism. This perspective is arguably more appropriate in studies concerning fields such as marketing, organisational behaviour and human resources where business situations are not only complex, but also unique (Saunders et al, 2007).

When the research is undertaken in a way that little can be done to alter the data collection, or the researcher claims to be value-free, the philosophy reflects the principle of positivism.

This study is almost entirely based on statistical numbers and figures from firms’ published annual reports in which there is little or no exposure to bias. In line with Bryman & Bell (2007:16), this “epistemological position advocates the application of the methods of natural science to the study of social reality and beyond”. The researcher will not try to interpret and deeper analyze the collected data used for the statistical tests, but still try to have some reflections in the concluding chapters of the results of the tests. For future studies, it is important that the data collected is free from bias and are able to replicate, the researcher will carefully reconsider this when handling the data, also an important feature of the positivist research philosophy.

2.3 Ontological considerations

If epistemology concerns the view of knowledge, ontology can be said to address the view on reality (Saunders et al., 2007). Within ontology there are two different aspects: objectivism that states that “social entities exist in reality external to social actors concerned with their existence”, and subjectivism that “holds that social phenomena are created from the perceptions and consequent actions of those social actors concerned with their existence” (Saunders et al., 2007:108). Subjectivism is often associated with the term constructionism, within which Bryman & Bell (2007) suggest that the researcher presents a specific version of social reality, which is not regarded as definitive.

On the other hand, the objectivist positions suggest that rules and regulations exist. “It adopts standardized procedures for getting things done” (Saunders et al (2007:23). This proposition is aligned with this research, in the sense that the firm has its choice of assessing its policy towards currency derivative hedging and either you do it or not. The researcher does not aim
for creating an understanding of the decisions of the managers, only to look for statistical
similarities, or dissimilarities, among the sample groups.

2.4 Research paradigms

To further clarify the research philosophies one can explore the concept of research
paradigms. As the concepts of objectivism and subjectivism are already explained in the
previous section, a brief description of two other assumptions follows:

“Regulatory – the purpose of business research is to describe what goes on in organisations,
possibly to suggest minor changes that might improve it but not make any judgement about
it.”

“Radical – the point of management and business research is to make judgements about the
way that organizations ought to be and to make suggestions how this could be achieved.”
(Bryman & Bell, 2007:26)

As we can see in the figure below, the assumptions make up a framework for finding four
different paradigm positions for the study. With the conclusion that this study is in line with
the purpose of describing what is going on, and will approach a regulatory assumption rather
than a radical, this research takes place in the functionalist’ paradigm.

Table 2.1 The Four Paradigms

<table>
<thead>
<tr>
<th>Regulatory</th>
<th>Radical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectivist</td>
<td>Functionalist</td>
</tr>
<tr>
<td>Subjectivist</td>
<td>Interpretative</td>
</tr>
<tr>
<td></td>
<td>Radical Humanist</td>
</tr>
<tr>
<td></td>
<td>Radical Structuralist</td>
</tr>
</tbody>
</table>

Source: developed from Burell & Morgan (1979:22)

A functionalist bases the results on a problem solving orientation which leads to rational
explanations (Bryman & Bell, 2007). Saunders et al. (2007) argues that this is the paradigm
where most business and management research operates.

2.5 Research design

“The research design is the overall plan for relating the conceptual research problem to
relevant and practicable empirical research.” (Ghauri & Grønhaug, 2002:47)

It is important to provide a framework for the data collection since the quality of the empirical
research is influenced by this (Bryman & Bell, 2007). The research design should help the
researcher to be more effective in the aspects of time, budget and skill constraints. And most
importantly, the researcher should in this stage think about what he or she really wants to find through the study (Ghauri & Grønhaug, 2002)

This are several research designs to be chosen, the upcoming section will describe the design used in this research.

2.5.1 Comparative design

“The key to the comparative design is its ability to allow the distinguishing characteristics of two or more cases to act as a springboard for theoretical reflections about contrasting findings” (Bryman & Bell, 2007:69)

The comparative design entails the study of similar methods of two or more contracting cases. It examines the logic of comparison in order to make an understanding of social phenomena. The social phenomena is often related to nations, cultures or people but can also be applied to organisations (Bryman & Bell, 2007). Bryman & Bell (2007:66) argues that “the aim may be to seek explanations for similarities and differences to gain a greater awareness of social reality in different national context”, but also states that the method of research should not only be concerning comparison between nations and that it can be applied to understand specific organizational behaviours.

This study will take on the comparative design in different levels. The first aim is to find characteristics which describe similarities and differences on two case groups, whether they are or are not hedging with currency derivatives. Secondary data observations are the firm specific value for each sort of variable. An example of how it could look:

Hedging with currency derivatives: yes or no

Figure 2.2 Comparative Design Study

Case 1: Yes
obs 1
obs 2
obs 3
...
obs n

Case 2: no
obs 1
obs 2
obs 3
...
obs n

Source: Bryman & Bell (2007:72)

2.6 Research strategy

The research strategy describes the general orientation to conduct the study. Many researchers argue that it is important to distinguish between the type of data used for the research and that it is connected with the epistemological and ontological considerations already stated (Bryman & Bell, 2007).
2.6.1 Qualitative vs. Quantitative study

**Quantitative research** is a strategy that focuses on quantification in the data collection, and the analysis often takes on a deductive approach where theory is tested. Usually, the natural science approach as well as and the practices of positivism and objectivism is linked with this form of research (Bryman & Bell, 2007). While the **qualitative research** aims to get in-depth knowledge and understanding of the collected data, quantitative research usually strives towards testing measurement or testing of a hypothesis.

This study incorporates a quantitative research approach since the data collected will be from annual reports and statistical data software, data which are referred to as secondary sources, which will be tested and statistically measured in the analysis section and further described in the practical methods chapter.

2.6.2 Inductive vs. deductive approach

An important part of the strategy is the way one approaches the research. Either one develops a theory and hypothesis and designs a strategy to test the hypothesis with the collected data, known as a deductive approach. Or you gather data and develop theory based on the data analysis, an inductive approach (Saunders et al, 2007).

This study will take the deductive approach which has a clear link to scientific research and natural science. The approach is often aligned with positivism and starts by making a hypothesis from the theory and then deducting a conclusion depending on the result of the test. An example of the steps of the process is outlined by Bryman & Bell (2007:11) and can look like this:

**Figure 2.3 The Research Process of Deduction**

1. Theory
2. Hypothesis
3. Data Collection
4. Findings
5. Hypothesis confirmed or rejected
6. Revision of theory

*Source: Bryman & Bell (2007:11)*

Saunders et al. (2007) clarifies the deduction process by saying that first there has to be a study of the relationship between variables, then after revising the theory on the variables, the researcher can develop a hypothesis and examine the relationship using quantitative data collection and findings.
In this research the deduction process will be evident where in the first chapters there will be a review on previous studies on hedging and the theory backing up those findings. Based on the theories and previous research, the researcher will then select the most interesting and applicable determinants of hedging, whose data will later on be subject of collecting. After collecting, the study will examine the relationship of the data collected by testing the hypothesis whether the means of the determinants are equal for companies using, or not using, currency derivatives for hedging. When the hypothesis is confirmed or rejected, the researcher will compare the result to the previous research and present a thorough discussion on the differences and similarities.

2.7 Literature search and criticism

It is important to plan your search for literature as it otherwise might be a very time consuming effort. A planned approach forces the researcher to critically think about the research strategy and helps refining it during the progress. There is a number of parameters suggested to have particular concern about; the language of publication, publication period and literature type being some of them (Saunders et al, 2007).

When reading the literature, the researcher often stumbles across limits and situations where the relevance might be vague, meaning that it is too broad or insignificant for assessing the research question. It is also important to address the quality and the value of the literature, making sure that it reflects a thorough research where, for example, articles in newspapers could appear weak. The researcher can also arguably be reading too much literature, it is nowadays very easily accessible, but still must cover sufficient enough aspects and views to not lack information in certain areas. A good strategy of assessing this sufficiency issue could be to position the project in a wider context, by citing and referring to the main writer in the field (Saunders et al., 2007).

When searching for proper literature to this study the researcher has started off by utilizing the database Business Source Premier (EBSCO) available at the Umeå University’s information resource to find journals and articles.

Keywords that were used were among others; hedging with derivatives, foreign exchange exposure, currency risk management and determinants of hedging.

Regarding the quality of the literature, some student theses at master level were used and the qualities of these are debatable. However, these are mainly used for structure inspiration and some information used for clarifying or commenting on concepts that can be considered general knowledge. The books that were used are to a great extent the ones used in the syllabus for courses that the researcher has undertaken during his university years, which can be consider of high quality. Pramborg, Hagelin and Alkbäck are known to be some of the most prominent researchers within the Swedish currency risk management area. Most of the other journal articles have been found through the research of the Swedish authors and thus are regarded as high qualitative research literature. Their works and publications form the basis of the Literature review chapter that follows next.
3. Literature Review

The reader is now enlightened with the aspects and the mindset of the researcher when, at this moment, she is approaching the endless source of information that will soon evolve into accurate and unambiguous knowledge. The researcher will start off by presenting previous studies of the subject, move on to the motive and methods of hedging and finish off by discussing the determinants of hedging, which later are to be examined.

3.1 Previous studies on hedging

Modigliani and Miller (1958) are often mentioned in studies regarding hedging. The fundamentals of their theory are that hedging does not create value in a perfect market if the following conditions would hold (Pramborg 2002:2-3):

No market frictions

- No transaction costs: no brokerage fees, no bid-ask spreads or price pressure effects.
- No taxes or other forms of government intervention
- No cost of financial distress: Bankruptcy risks has no impact in cash flows
- No agency costs: Managers attempt to maximize the value of equity

Equal access to market prices

- Perfect competition: No single participant can influence market prices
- No entry barriers or other constraints on capital flows

Rational investors

- Investors perceive more return as good and more risk as bad

Equal access to costless information

In reality these assumptions are violated, which has been shown in many recent studies. For example, according to studies by Stulz (1984), the very idea of hedging arose from managers with risk aversive attitudes. Expected costs of going into financial distress or the structure of the tax function (i.e. convexity) could also be motives for hedging (Smith & Stultz, 1985). DeMarzo and Duffie (1995) believed that even though shareholders can diversify their own portfolio, corporate hedging is a desirable strategy when managers have private information on the firm’s expected payoff.

One of the strongest arguments this assumption is that investors would be able to mimic the financial decisions by the firm perfectly. Firstly, if the firm decides not to hedge or does not hedge optimally, the investor might have information disadvantage about the firm’s exposure or are not able to buy contracts to perfectly offset the cost of financial distress. The costs of buying contracts are also often related to economies of scale and the individual investor would then have excess costs compared to the firm. (Pramborg, 2002)

3.2 Motives for hedging

This section will investigate previous research on motives for hedging and in which circumstances the Modigliani & Miller (1958) theory is breached.
3.2.1 Hedging reduces expected taxes

Smith and Stultz (1985) find that the firm benefits on reducing pre-tax income due to a convexity function of the tax codes in the different countries, meaning that effective tax increases with additional pre-tax income. By practicing risk management strategies the firm can obtain the optimal level of tax.

According to a study by Graham & Smith (1999), 50% of U.S firms are subject to convex tax schemes, but for 75% of all firms there were still little tax-based incentives to hedge. Conclusions that are supported by Graham & Rodgers (2002), who found no evidence on reducing the tax liabilities when having a convex tax shield with the argue that this is a small determinant.

The views in this motive continue to go apart on further research. Howton & Perfect (1998) find that firms are hedging to decrease tax liabilities, while Mian (1996) finds no relation between use of hedging and convex tax schemes or tax loss carry forwards.

An incentive for reducing the volatility of taxable income is that it gives tax benefits due to increased debt capacity. Still the investor faces little or no change in overall risk due to the risk associated to the increased debt capacity (Ross, 1996). The reduced tax liabilities due to increase in interest deductions will increase firm value. Thus the ability to increase debt capacity provides a tax incentive to hedge (Pramborg, 2002)

3.2.2 Hedging reduces expected costs of financial distress

When a firm’s income is not sufficient enough to meet its fixed payments it is said to be in financial distress. Costs of financial distress can be either direct costs, like costs of bankruptcy proceedings, reorganization costs or fees to attorneys and courts, or indirect costs like clientele loss, bad reputation or disturbance, alternatively discontinuance, of operations. Even before a bankruptcy financial distress can have negative impact on a firms value (Pramborg, 2002). By reducing cash flow volatility the risk management can mitigate the illiquidity problem, thus lowering the expected costs of financial distress (Smith & Stulz, 1985)

Previous studies by Graham & Rogers (2002) and Howton & Perfect (1998) find evidence that there exists a motive for hedging with derivatives to avoid expected cost of financial distress. This is contradictory to the study by Mian (1996) who could not find support for the hypothesis that firms would hedge to minimize the expected costs of financial distress.

A recent study by Purnanandam (2008) makes a thorough research on more than 2,000 U.S. companies (fiscal year 1996-97) in order to test if the expected costs of financial distress could be a motive for hedging. Firstly, he finds that hedging incentives increases with the length of a project, since both likelihood and the expected costs of financial distress increases with time horizon. He also found that firms with high leverage hedge more, but eventually the relationship becomes U-shaped because with extreme leverage the hedging incentive decreases. Further, Purnanandam (2008) also found evidence of a positive relationship with the concentration of industry and the level of hedging with firms that are under financial distress.

3.2.3 Hedging reduces agency costs

Agency cost can be described as costs arising from conflict of interest between bondholders, shareholders and the management of a firm (Pramborg, 2002)
In accordance with Modigliani and Miller Theory (1958) managers are risk averse if assumed not to have the same diversified portfolio as investors and are compensated according to the result of the firm (Alyannis & Weston, 1998). One of the conflicts that could arise is that when a firm has a risky, but possible value creating, investment opportunity, the management could refuse to undertake it or demand an increase in salary for the additional risk. The shareholder is often at an information disadvantage and may be better off if the firm were to hedge its exposure (Pramborg, 2002).

Another possible conflict of interest is the one between the shareholder and the bondholder. If the bondholder would receive a fixed return on an investment project while the shareholder receives the cash left over, it would depend on the expected outcome of the project to which party it is more attractive. If the company is close to financial distress, the shareholder might want to take on a risky project even if present value of the project is negative. In literature this is often referred to as an overinvestment problem (Pramborg, 2002). There is also an underinvestment problem if a firm is close to bankruptcy. This occurs when the managers act in the interest of the shareholders and do not undertake a net positive investment because the value of equity may be reduced.

Thus, by hedging the volatility of cash flow, the risk of these conflicts arising may be reduced and the firm value thereby increases (Bessembinder, 1991).

3.2.4 Hedging reduces the need for costly external financing

When an attractive investment opportunity occurs, management has to ensure that it has sufficient internal funds to be able to take advantage of it. If external sources of finance are more costly than internally generated funds, companies will benefit from hedging (Froot et al, 1993). The costs have to include transaction costs as well as costs related to management involvement in the process (Pramborg, 2002).

3.3 Measuring and recognizing exchange rate exposure

The general concept of exposure derives from the measuring of how much a company is affected by exchange rate changes. Firms have in fact several methods of hedging financial risks, such as credit and refinancing risk, but this study will particularly concern the risk management of the volatile foreign exchange rates. Foreign exchange risks are usually recognized as three separate types of exposure; translation exposure, transaction exposure and operating exposure (Shapiro, 2010).

3.3.1 Translation exposure

Translation exposure, also known as accounting exposure, arises when companies are reporting and need to convert foreign operation from local currencies into home currencies. The exchange rate changes will affect the income statement items and the book value of balance sheet assets and liabilities. The resulting gains and losses are not monetary, but paper only, and are measured (translated) in retro perspective of events and activities throughout the whole reporting year.

Pramborg (2002:5-6) definition:
“Translation exposure – Translation exposure arises as the financial accounting statements of foreign affiliates are translated into the currency of the parent firm.”

### 3.3.2 Transaction exposure

Transactions exposure results from the changes in values of the operating inflows and outflows of cash between the period when transactions are contracted and when the payments are transferred. The exchange rate changes will give rise to gains and losses and are, in contrast to translation gains/losses, real in monetary terms. Contracts already in the balance sheet will give effect in retro perspective while contract not yet accounted for will be a part of operation expense. Some elements, such as accounts receivable, are included in the firms’ accounting exposure. Foreign sales contracts, where deals have been made but goods not delivered, are a part of the firms’ operation exposure and belong to the income statement (Shapiro, 2010).

Pramborg’s (2002:5-6) definition:

“Transaction exposure – Transaction exposure to currency risk refers to potential changes in the value of future cash flows (committed or anticipated) as a result of unexpected changes in the exchange rates.”

### 3.3.3 Economic exposure

The economic exposure (or operational exposure) is concerned with the extent to which future revenues and earnings that are not contracted (i.e. not transaction risk) are affecting the value of the company. It could also be viewed as affecting the firms’ competitive position on sales prices when exchange rate fluctuates. This exposure is by definition very difficult to hedge against using currency derivatives, but is possible to assess by pricing- and market selection strategies and other long-term operating adjustments.

### 3.4 Determinants of hedging currency risk

This section aims to describe what determinants of hedging this study will be addressing. The arguments for every determinant will be related to the motives for hedging already discussed, and there will also be a review of previous research on the topics. The proxy’s to be examined for each determinant are discussed and motivated in the practical method chapter.

#### 3.4.1 Size

Warner (1977) found that direct costs of financial distress were not proportional to firm size, meaning smaller companies had relatively higher expected costs. Therefore, Hagelin (2001) suggests that smaller firms could be more likely to use hedging derivatives. However, several studies have shown that the use of derivatives hedging is positive related to firm size (see e.g. Froot et al (1993), Gezcy et al.(1997), Alyannis & Ofek(1997), Hagelin(2001)). The explanation to this is that the activity is often related to high initial fixed cost for starting a hedging function acting as a barrier for smaller companies, evidence which has been found by Mian(1996) being related to economies of scale.
3.4.2 Foreign exchange exposure (FX exposure)

When companies have revenues or expenditures in a currency different from the reporting currency in the annual report future cash flow will be affected due to variation in exchange rates. This is probably the most straightforward determinant of hedging and has been identified in relationship with the use of currency derivative in numerous previous studies. Alyannis & Ofek (2001) found in a research of 500 U.S. companies that there was a link between the use of currency derivatives and FX exposure. Nydahl (1999) made a study on Swedish firms and found evidence that FX exposure increased with the fraction of sales classified as foreign.

Hagelin (2001) found evidence from the Swedish market that companies use currency derivatives to hedge transaction exposure in order to reduce the indirect costs of financial distress or alleviating the underinvestment problem, but there were no evidence found to support that hedging translation exposure was value creating.

Alkebäck et al (2006) conducted a questionnaire survey on Swedish non-financial firms and found that 90% of the companies that use financial derivatives do so to manage foreign exchange exposure.

3.4.3 Growth opportunities

We have already mentioned the underinvestment problem where managers might be reluctant to engage in a positive present value investment opportunity when the firm is close to bankruptcy. If the firm does not have enough internally generated funds to engage take on the opportunity we have also seen that hedging could be an alternative (Froot et al, 1993). Gezcy et al (1997) found that firms with large growth opportunities but financing problems are more likely to hedge. They also found that currency hedging is positively related to R&D expenditure, which is consistent with the use of hedging to reduce underinvestment problems. Pramborg (2002:23) argues that “Because firms with more valuable growth opportunities are more likely to be affected by the underinvestment problem, these firms may be more likely to hedge”.

3.4.4 Leverage

High financial leverage combined with volatile firm value increases the expectations of financial distress, which might give risk-averse managers an incentive to turn down positive present value investments (Myers, 1977). A high leverage would also implicitly mean that the firm value would be more volatile and risk-reward benefits would be demanded by investors (Smith and Stulz, 1985). Therefore, there could be incentives to hedge and the use of financial derivatives should be positively related to an increase in leverage. Previous studies have shown no relationship of the use of currency derivatives and leverage, but there have been found evidence with interest rate derivatives and leverage. (See Hagelin, 2001:112).

Haushalter (2000) found evidence that total debt ratio is positively related to the percentage of production hedged, consistent with theories on transaction cost of financial distress.

3.4.5 Liquidity

When a firm has low liquidity and its cash flow is very volatile, there is a possibility that the firm would not be able to meet the obligations of payment and there would be an increase in the probability of financial distress. Thus, firms with low liquidity have incentives to hedge (Mayers & Smith, 1982). Gay and Nam (1998) find evidence suggesting that firms with large
growth opportunities hedge more when their liquidity is low, which relates to the underinvestment problem.

Bergstrand et al. (2009) suggest that maintaining a high liquidity and stable cash flow could have important influences on negotiating with suppliers and improve trading cost related to hedging activities.

3.5 Methods of hedging currency risk?

The firma have alternatives on methods of hedging beside the effect of so called “natural hedges”, that occurs when a subsidiary are invoicing in the same currency as expenses before they are translated to the group company’s balance sheet. Some of the more comment methods are briefly described in this section. The section ends with the method of hedging with currency derivatives, which will be more thoroughly discussed since it concerns the topic of this research.

3.5.1 Leading and lagging

This method is about regulating the acceleration and delay of payments within the company affiliates. By altering the credit terms the firm can decrease its overall exposure in currencies so that inflows and outflows are carried out with the smallest time frame possible, decreasing the exchange rates changes impacts, or reduce the magnitude of the exposure (Shapiro, 2010).

One of the most obvious advantages of leading and lagging is that it is easy to perform, simply by managerial decisions of when transactions are to be executed (Mathur, 1985). By alternating the time frame of intra-company payments, the group can generate a sort of internal borrowing, without the necessary cost associated to a regular loan (Shapiro, 2010),

The fact that leading and lagging is often a zero-sum game, meaning that one partner benefits and one loses, is a disadvantage. The cost of performing the method could easily outweigh the benefits (Hill, 2001). In some countries the governments have restrictions on the length of the intra-company payments, so there is a possibility that the law is breached (Shapiro, 2010).

3.5.2 Currency matching

When selling abroad, firms can stipulate terms in the invoice contract to match the home currency in where they have their expenses (Kenyon, 1999). Another situation is when a company for example purchase raw material like iron to refine steel; if the purchase is made in dollars, it makes sense to sell the refined steel in dollars as well, minimizing the currency risk. Another possibility is to use a third currency, a so called vehicle currency, which usually is a more stable currency, like dollars. This is a common way of conducting business by two companies from countries with very volatile currencies, where the possibility of exchange rate effect is large (Goldberg & Tille, 2008).

The advantage of choosing invoice currency is that a company can enhance its competitive position by selecting a generally acceptable currency for the industry, or for the needs of the potential customer, and thereby increase the value of the firm (Oi et al, 2004).

A disadvantage might be that the decision process of selecting currencies can be difficult in the sense that it might not be appropriate to constantly change invoice currency depending on what exposure the company might have that month, and might not be accepted by the customer neither.
3.5.3 Netting
Multinational firms with payments that flow back and forth between affiliates can postpone
the actual transfer of money until a predetermined date when the affiliate’s flows are netted
and they pay or receive only one amount. Thereby they reduce both transaction costs and also
reducing the impact of currency risks by fixing the exchange rates (Shapiro, 2010).

Due to the complexity of tracking and organizing the internal payments, the method demands
an extensive, well-educated and expensive netting center. That is why it is most common by
large multinational firms (Javaid, 1985).

3.5.4 Cash pooling
Instead of affiliates periodically holding large amount of cash, which can be affected by
changes in interest rates and currency rates, the multinational firm can set up centrally
managed accounts to keep the level of cash to the minimum needed for transaction purposes.

By keeping a minimum level of cash the company can carry out internal borrowing to
affiliates with lesser liquidity reserves, thereby minimizing interest costs and exchange rate
risk. The decision and control are by the method transferred to the headquarters of the
company; this can both be viewed as an advantage and disadvantage. A multinational firm can
centralize the knowledge and expertise to a controlling entity, but in the meantime, the
responsibilities of the local managers are reduced. This could have implications on the
managers’ motivation as well as local knowledge being lost (Shapiro, 2010).

3.5.5 Currency derivatives
This is perhaps the simplest and most straightforward alternative of hedging. These financial
instruments have the ability to instantly offset a position, and limit the risk involved. These
instruments can have several varying formats, such as swaps, options and forwards. The
purpose of the contracts is not always to minimize risk but also to speculate on movements of
currencies, stock and interest rates, which the financial instruments’ values are derived from
(Shapiro, 2010). There could be many chapters dedicated to the properties and use of
derivatives, in fact the uses and innovativeness of these instruments are of constant progress
and a highly debatable issue in the aftermath of the financial crisis of 2008.

A forward contract stipulates the fixed future value with a fixed exchange rate and at
specified time of delivery. A simple example would be if a Swedish company buys goods for
1 million EUR, where the spot rate is 10SEK per EUR. The payment is due a month from the
current date and the company wants to eliminate a possible change in the exchange rate. The
company can then enter a forward contract agreement with a bank where they pay the 10
million SEK to the bank. When one month has passed the company transfer the payment to
the customer of 1 million EUR and the forward contract will settle with the bank paying 10
million SEK for 1 million EUR. If the future spot price is 11SEK/EUR the company has
avoided a payment of 11 million SEK and made a gain of 0,1million EUR, but they have paid
the amount they decided when the sale was made. The company would lose if the exchange
rate changed in the opposite direction.

This is only the concept of hedging with forwards. In reality, there are transactions costs for
entering the contract, and depending on the anticipated movement of the exchange rate, the
forward could be more or less expensive.
The contract can be entered either long or short depending on whether the company has a future payment or revenue. The example above was entered in long position. Figure 3.1 illustrates the payoff for a long and short position.

Figure 3.1 Forward Contract Payoff

A **futures contract** has the same qualities as the forward contract with the difference that the future contract are standardized and traded on organized futures markets (Shapiro, 2010).

The disadvantages of futures are of course that the fixed date and amount is not very often matching the requirements of the customer. On the other hand, through the organized exchange it is accessible and equal to all, in contrast to forward contract where the intermediary demands a higher premium for entering a contract where the default risk of the customer is higher, meaning the chance that the customer will not be able to meet the payment (Walsh, 1995).

The **options contract** derived from the idea to offer the purchaser a protection from unfavorable movement of the exchange rate, but also the opportunity to gain from favorable movements. By giving the holder the right- but not the obligation – to sell (put) or buy (call) the underlying asset at a set price and fixed date, the buyer has the option to fulfill the contract if desired or not. For this service the seller of the contract demand an extra premium, this depends of the volatility of the underlying asset (Shapiro, 2010).

The **swap contract** is used to arrange financing that reduce borrowing cost and increase control over interest rate risk and currency risk. The swap offers the possibility to trade a perceived risk in one market or currency for liability in another. In a currency swap two parties agree to pay fixed amount of currencies in at settlement and then pay the reverse flow at the maturity date (Shapiro, 2010). The advantages of a swap contract is that both parties that choose to enter a contract are getting their interests affirmed (Chorafas, 2008). Two firms in different markets can enter an agreement where they then get access to a low cost borrowing in the other currency market (Shapiro, 2010). There is also a disadvantage in this, besides have to bear with the credit risk of the other party, the access to another market also adds a new market risk (Chorafas, 2008).
3.6 Comments on previous studies in Sweden

There are many arguments why Sweden is suitable for this type of study. Pramborg (2002) and Hagelin (2001) emphasize that Sweden is an export-oriented country with high dependency on foreign trade, have a highly developed derivatives market and the market is comparatively not heavily regulated.

Previous studies mention the issue of detailed data being unavailable concerning firms hedging practices (Pramborg, 2002). This would be the main reason that most studies on the Swedish market have been conducted by sending out questionnaires to managers of the firms. Even though studies in Sweden, with response rates of 63% (Hagelin, 2001), have received higher response rate than i.e. Nance et al (1993) of 32% and Bodnar et al. (1998) of 26%, there is still a gap in the sample. One could assume that the missing responses could be by firms who are lacking knowledge in derivatives and therefore reluctant to disclose their hedging practices.

After 2005 all European listed companies are to follow new IASB accounting rules, IAS 32, IAS 39 and IFRS 7. These regulations stipulate the presentation, recognition, measurement and disclosure of financial instruments (Diez & Gutierrez, 2009).

In a survey of Swedish non-financial firms in 2003 Alkebäck et al. (2006) found that regarding managers concern about using derivatives, liquidity risk were among the top three (24%), along with accounting treatment (26%) and transaction costs (24%).

According to previous studies, the uses of hedging derivatives by Swedish listed companies have increased from 52% in 1996 to 59% in 2003 (Alkebäck et al., 2006).
4. Practical method

A solid foundation of knowledge and theory has been laid out where the tools and material are now of essence for molding the creation. In this section the reader will learn how the data was collected and filtered, what qualities the data has and how it will be sorted. The proxy’s for the determinants will be introduced and the methods for testing will be presented.

4.1 Data collection method

Previous research on the Swedish market has been mostly conducted through surveys (see Alkebäck et al (2006), Hagelin(2001) or Pramborg(2002)) where the problem of response rate has been an issue. Other studies have limited the sample size by only including mid- and large cap firms (Bergstrand et al, 2009). This study aims for the whole population of companies listed on the Stockholm OMX exchange (www.omxnordicexchange.com) and instead of risking a low responsiveness the researcher bases the information on secondary sources such as Annual Reports and reliable database software, called DataStream (www.datastream.com). To identify the companies the researcher uses the OMX official website, this should be the most reliable source of data regarding update of current companies listed.

The OMX website also classifies which list the firms belong to depending on the market capitalization (large cap, mid cap and small cap). Later this study will use the scale number of each firm’s market capitalization, but as Alkebäck et al (2006) showed it could be interesting to compare ordinal classified groups’ practices on derivative hedging.

Regarding the choice of the type of the industries firms belong to, there is a classification provided on the OMX website. Alkebäck et al. (2006) wanted to replicate and compare their study to Alkebäck and Hagelin’s previous research from 1999, where the categories were primary products, manufacturing and services. It could be implication of bias if the researcher themselves should classify the firms because e.g. Ericsson could be argued belonging to both the manufacturing and service industry. To reduce the bias, this study has used the OMX own classification, so it also would be possible to replicate the sample selection in the future, even if firms move in between industries.

4.1.1 Sample (including excluded observations)

Currently there are 290 numbers of firms listed on the Stockholm OMX in the sample base. However there are some criteria which will exclude observations.

The period of time will be limited to 2008 only, with the reason that this is the latest annual report possible to collect for all firms. When the data was gathered (spring 2010), not all firms have published the 2009 report. It would have been interesting to test for a longer period, reviewing additional annual reports. However, the comparative design of the research does not add importance in the analysis, it would only make sense to compare the actual outcome which the researcher wishes can be applied on future studies. Another reason for this chosen period is because of the new accounting standards presented in 2005, that the firms were not required to implement the standards until the reporting year of 2006 (Diez & Gutierrez, 2009). The new standards require companies to change the accounting on derivatives from fair-value to market-value and this affects balance sheets as well as income statements (Bergstrand et al. 2009).
The second is the issue that some Swedish companies have multiple share classes, A and B shares. In this study the A-class shares will be eliminated with the reasoning that these are traded on different terms, which fundamentally breach Modigliani & Millers (1958) theory on equal access to market prices.

The third criterion concerns the purpose of derivatives practises. Financial firms both use and sell derivatives and are therefore excluded in this study (Hagelin, 2000). To be able to identify the financial firms, the classification made by OMX will be the determining factor.

Fourth and last, the firm has to have its base in Sweden, because foreign firms listed on the OMX will have other accounting standards and a different tax base, which could imply bias in the decisions to hedge.

4.2 Description of data

4.2.1 Nominal variables

Hedging activity

This is the most difficult variable to obtain. The firms have to report disclosure of financial risk management and often the presentation of this is quite similar. There still exist different reporting practises, especially within the smaller firms. The practises have to be manually interpreted and there is a risk of bias. To deal with this the researcher will include an alternative, “no disclosure”, if there is not sufficient information in the researchers’ opinion.

According to studies of Swedish firms hedging behaviour Hagelin & Pramborg (2004, p. 1) finds the following:

“We find that transaction exposure hedges significantly reduce exposure, and that translation exposure hedges also reduce exposure. A possible explanation for the latter is that translation exposure approximates the exposed value of future cash flows from operations in foreign subsidiaries (i.e. economic exposure). If so, by hedging translation exposure, economic exposure is reduced”

According to the new accounting standards set by IASB, the firms are required to disclose the measure and recognition of foreign exchange exposure. This data will also be collected and treated in the subsequent question (see below). Once again the risk of bias or misinterpretation is evident, and the research follows the same arguments as for the main question and adds a “no disclosure” possibility when the information is not sufficient.

The alternatives on currency derivative hedging are divided into two questions, the main question is: Hedging with currency derivatives?

  - No Disclosure
  - No
  - Yes

The subsequent question: Provided that the firms use currency derivatives (answer is Yes), which exposure is hedged?
- No disclosure
- Only transaction exposure
- Only translation exposure
- Both

**Industry belonging**

This nominal value is, as mentioned, obtained from the OMX website. OMX classifies the companies into ten different categories, of which one of the, financial firms are removed. The nine remaining are:

- Energy
- Materials
- Industrials
- Consumer discretionary
- Consumer staples
- Healthcare
- Information technology
- Telecommunication Services
- Utilities

**4.2.2 Scale variables**

In this section there will be a description of the proxy’s used for the hedging determinants from the literature review.

**Size**

The proxy for size will be the firm’s **market capitalization**. This is a commonly known measure for a company’s size and it is calculated by multiplying the number of outstanding shares with the current price of one share. The value of this variable will be obtained from DataStream.

**FX exposure**

The proxy for FX exposure will be the **percentage of foreign sales out of total sales (\% of FS)**. It is calculated by dividing the firm’s sales outside Sweden with the Total Sales. It will give knowledge of the exposure towards international sales. This variable could be argued to be not that accurate since the sales outside Sweden could still be conducted with the Swedish currency or the company’s foreign subsidiary could have the production cost in the same currency as the sale and therefore provide a natural hedge. This variable could not be extracted from DataStream and had to be manually collected from the annual reports. The argument for still using this variable is that several previous studies have found the FX exposure being an important determinant when hedging with derivatives.

**Growth opportunities**

The proxy for growth opportunities is the **Market-to-Book ratio**. Studies by Myers (1977) and Bessembinder (1991), states that hedging reduces the incentives to underinvest. Firms with attractive growth opportunities are likely to be affected by the underinvestment problem and thus, more likely to hedge. A high Market-to-Book ratio indicates that the investor has higher expectations of creating value from assets which implies that the firm has opportunity of growth (Pramborg, 2002). The Market-to-Book ratio is calculated by dividing the book value of the firm with the market value of the firm.
Leverage

Hedging can reduce the variance of the value of the firm and thereby the risk of financial distress. The proxy used for leverage is the same as has been used in studies by Hagelin (2001) and Pramborg (2002). That is the Debt/Equity ratio, which can be defined as the book value of debt divided by the book value of assets.

Liquidity

Hedging can be expected to reduce the cost of financial distress. Nance et al (1993) hypothesized that by maintaining more liquid assets, the need for hedging could be reduced. The proxy used for the liquidity variable will be the Current ratio; it measures the company’s ability to pay short-term obligations and is calculated by current assets divided by current liabilities.

4.3 Data processing and analysing

Quantitative data in raw form could be difficult to interpret before processed and is of little meaning to most people. With techniques such as graphs, tables and statistics it is possible to present, illustrate and describe data in ways to simplify for the interpreter and clarify the objectives of the research (Saunders et al, 2007). In order to utilize the statistical techniques for the presentation, the data has to be prepared in such way that it can be applicable to statistical software such as Excel and SPSS.

4.3.1 Preparing the data

The data needs to be classified into specific data types depending on the attributes. Categorical data refers to data whose attribute cannot be measured numerically. The data is either ranked into placing order provided that they hold such attributes that it is possible, known as ordinal data. When the data is not possible to rank it is divided into separate categories and serves as nominal data. If the data is measurable in each point, for example weight, it holds a different set of attributes and is classified as scale data (Saunders et al., 2007).

After classifying into the data types the researcher has to address the issue of data coding, as it is not possible to have the answer “yes” and “no” directly input in the data analysing software. Since the answers “yes and “no” possess the attributes of nominal data, they will rather be transformed into “0” and “1”.

This study deals with nominal data, ordinal data and scale data. The hedging activity variable aims firstly to answer the question whether the firms use currency hedging derivatives or not, and secondly which type of risk, translation risk or transaction risk, they use the hedge for. These are nominal data and will be coded in the following way:
Nominal data

Table 4.1 Coding the Hedging Practices

<table>
<thead>
<tr>
<th>Q1. Hedging with currency derivatives?</th>
<th>Q1.1 Which risk?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0=No disclosure</td>
<td>0=No disclosure</td>
</tr>
<tr>
<td>1=No</td>
<td>1=Translation Risk</td>
</tr>
<tr>
<td>2=Yes</td>
<td>2=Transaction Risk</td>
</tr>
<tr>
<td>3=Both</td>
<td></td>
</tr>
</tbody>
</table>

The industry belonging variables are categorical and therefore nominal data, and have also to be coded appropriately. If there are too few in each group and analysis cannot be performed the researcher will cluster the categories to get sufficient amount to perform proper analysis. The choice of cluster is based on similarities between industries, but are made by the researcher and could be debateable and cause bias. This will be taken into consideration when analysing the data.

Table 4.2 Industry belonging

<table>
<thead>
<tr>
<th>Industry belonging</th>
<th>Industry belonging, clustered</th>
</tr>
</thead>
<tbody>
<tr>
<td>0=Energy</td>
<td>0=Energy, Material, Utilities</td>
</tr>
<tr>
<td>1=Materials</td>
<td>1=Industrials</td>
</tr>
<tr>
<td>2=Industrials</td>
<td>2=Consumer discretionary + consumer staples</td>
</tr>
<tr>
<td>3=Consumer discretionary</td>
<td>3= Healthcare</td>
</tr>
<tr>
<td>4=Consumer staples</td>
<td>4=Information techn. + Telecommunications</td>
</tr>
<tr>
<td>5=Healthcare</td>
<td></td>
</tr>
<tr>
<td>6=Information technology</td>
<td></td>
</tr>
<tr>
<td>7=Telecommunication Services</td>
<td></td>
</tr>
<tr>
<td>8=Utilities</td>
<td></td>
</tr>
</tbody>
</table>

Scale data

The key variables are scaled data and do not have to be coded. The data is obtained from DataStream (except % of FS) and each observation is automatically converted into Excel by the program.

The % of FS are also scaled but could not be obtained from DataStream. The data has been manually collected from the annual reports note on segment reporting. Requirements on segment reporting are stated by the IASB:

“The objective of IAS 14 (Revised 1997) is to establish principles for reporting financial information by line of business and by geographical area. It applies to entities whose equity or debt securities are publicly traded and to entities in the process of issuing securities to the public. In addition, any entity voluntarily providing segment information should comply with the requirements of the Standard.” (www.iasplus.com)
Unfortunately the reporting of geographical area can differ depending on the opinions and nature of business of the firm. Some companies include the Sweden sales into a larger segment, like Scandinavia, Northern Europe or Europe. In these situations it is not possible to collect the data and the variable will be treated as missing data.

4.3.2 Exploring and presenting

When the data has been collected and checked for errors it is ready for exploring and presenting. Saunders et al (2007) emphasizes the importance of using diagrams to explore and understand the data, the importance of data being used to guide the choices of analysing techniques. This study will use varying diagrams and charts best suited for the different data to be presented. All statistical calculations and graphical creations are made in the Statistical software SPSS for windows. It is probably the most common tool used for analyzing quantitative data for social studies (Bryman & Bell, 2007).

Charts and diagrams

When presenting the nominal data which deals with calculating the frequency of each value of the nominal variable there are two graphical methods to use, pie charts and bar charts. While bar charts are often used to display frequencies, pie charts graphically show relative frequencies where each slice is proportional to the percentage corresponding to that category.

When describing the relationship of two nominal variables it is preferable to use a contingency table or a cross-classification table to present the data. The contingency (or cross-tabulation) table shows a combination of the values of two nominal variables and lists the frequency of each one. To graphically illustrate the relationship of two nominal variables, which in this study will be the answers to the main and subsequent questions as well as the industry belong of the firm, two-dimensional bar charts will be used (Keller, 2005).

A percentage component bar chart is useful when comparing the proportions between two or more nominal variables (Saunders et al., 2007), this will be used to compare the clustered industry sectors to graphically being able to identify differences.

Box plots

Box plots are a more advanced technique of graphically presenting data. It grasps five different statistics; the minimum and maximum observation, the first, second and third quartiles. These quartiles are the names of the 25th, 50th and 75th percentiles which describe the location of the values within a set of data. “The Box” is the interquartile (third quartile – first quartile) range and measures the spread of the middle 50% of the data and the line in the box is the second quartile which shows the median of the sample. The whiskers are a measure of 1.5 times the interquartile range and observations outside that range are classified as outliers. Outliers are unusually large or small observations; these should be checked for error or investigated.

Missing values

It is not unusual that the data set is incomplete. In some instances there could have been a fail in recording some observations or sometimes the respondent may refuse to answer the question. If the number of nonresponses is high, the result of the study could be invalid because of the distortion of randomness of the sample. There are ways to deal with missing
values. Either one could just simply eliminate them or recode them into for example “refuse to response” or “no disclosure” (Keller, 2005). The latter is utilized in this study concerning the nominal variables, but with scaled data it is a tougher issue since for example coding them into a 0 would also be an answer. For these variables the data will be eliminated, there exists a possibility for observations from DataStream to be complimented by manual calculations by the researcher. However, there are not that many observation missing and the researcher is confident in that the randomness of the sample still is intact.

### 4.3.3 Describing using statistics

To further analyze the data and be able to draw conclusion more firmly than plots and diagrams are able to do, one can use statistic test. The relationship between variables will be examined and this process is known as **significance** or **hypothesis testing**. The data collected are being compared on what would theoretically expect to happen and the hypothesis is either supported or rejected (Saunders et al., 2005).

**Normality test**

A normality test is importing for determining whether the goodness of fit for the data, meaning that we are able to have assumption about the randomness and to make judgments about the underlying variables. One way of testing for normality is to use a histogram that divides the observations into intervals which then are measured with the frequency within each interval. The histograms are usually illustrated together with a normality curve (Mendenhall et al., 2008).

**Log Transformation**

When there is a tendency where the residuals are getting bigger for bigger values of the dependent variable it is proper to use log transformation. This often occurs with data where the error or change in the value of an outcome variable is a percent of the value rather than absolute value. By using log transformation the bigger values are scaled down.

One has to be careful with log transformations because the back transformed mean of the transformed variable will never be the same as the mean of the original variable. Log transformation generates a geometric mean which is not easily interpreted. Since log transformed mean is not interesting for this study and thus not needs to be explained, analyzing the difference of the mean is still valid (www.sportsci.org).

For every observation $n$ the researcher now use equation $n_T = \ln(n)$

**Student’s t-test**

The objective of the t-test (or student’s t-test) is to compare the difference of the means of two samples. There are various test statistics depending on the characteristics of the samples. The sampling plan requires random variables and is preferably assumed to belong to a normal distribution (Keller, 2005).

The t-test will be performed on all scale determinant variables to see if there is statistically significance difference between the means of two groups, separated on whether they use currency derivatives for hedging or not. If differences of the means exist, the determinant is deemed having affect on the decision to use currency derivatives for hedging.
With the motivation of avoiding unnecessary repeating, the formulas for the test statistics and the hypothesis for each scale determinant has been left out of the empirical findings and is only mentioned in this section (4.3.3).

\[ t = \frac{\bar{X}_1 - \bar{X}_2}{s_{\bar{X}_1-\bar{X}_2}} \]

where,

\[ s_{\bar{X}_1-\bar{X}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}. \]

The difference of the sample group means \((\bar{X}_1 - \bar{X}_2)\) is compared using a measure of the spread of the scores. Where \(s\) is the standard deviation and \(n\) is the number of firms for groups 1 and 2 (in this study; 1.Hedging with currency derivatives, 2.No use of currency derivatives). If the likelihood of any difference between these two groups occurring by chance is low, it will be represented by t-statistics with a probability less than 0.05. It is then termed statistically significant (Saunders et al., 2007).

The test has the following hypotheses:

\[ H_0: \bar{X}_1 = \bar{X}_2 \]
\[ H_A: \bar{X}_1 \neq \bar{X}_2 \]

**Levene’s test for equality of variances**

When performing the t-test in SPSS, the software automatically tests for the possibility of assuming equal variance.

The test has the following hypotheses:

\[ H_0: \sigma_A^2 = \sigma_B^2 \]
\[ H_A: \sigma_A^2 \neq \sigma_B^2 \]

**Correlation**

There is possibility for misinterpreting results when testing for relationship between variables. These results could indicate that changes in the independent variable cause changes in the dependent variable. However, there is a risk that the dependent variable could be affected by other variables. For example, a statistical analysis similar to this study could show that currency hedging activity is more common the larger market capitalization of the firm, however there could hypothetically also be a relationship such as if the size of the firm increases, the FX exposure also increases. This could mean that the result of the analysis
could be handled with caution and the researcher should not make explicit assumptions when interpreting and explaining the results (Keller, 2005).

To check for this relationship there is a method that measures the strength of the relationship between two variables, the **Pearson coefficient of correlation**. The method tests the hypothesis that the variables are independent from each other (\(\rho=0\)) with a predetermined statistically significance. If the result is +1 it is indicated that the variables have a perfect positive (increasing) relationship and if it is -1 the relationship is perfectly negative (decreasing) (Saunders et al 2007).

This study will test for relationship between all scale variables and present them in a cross-tabulation table.
5. Empirical Data

The reader is now prepared to enter the parallel universe of numbers and statistics, a place where it is so easily to get lost without the right directions and maps. The first part of the empirical data will use descriptive statistics such as table, charts and diagrams to illustrate the data in the most informative way possible for the reader. The latter part is more complex with testing of the determinants. The chapter ends with a correlation matrix to further be able to describe the findings and to prepare for the analysis.

5.1 Hedging with currency derivatives

The question of whether firms use currency derivatives to hedge foreign exchange rate risk was collected from annual reports of 2008. Data was collected from all firms within the population and the result is presented in descriptive statistics below. The researcher chose to show the distribution in percentage of the whole to get a good visual display of the outcome.

Table 5.1.1 Hedging with CD's

<table>
<thead>
<tr>
<th>Hedging with CD's</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valid No Disclosure</td>
<td>11</td>
<td>5.7</td>
<td>5.7</td>
<td>5.7</td>
</tr>
<tr>
<td>No</td>
<td>63</td>
<td>32.5</td>
<td>32.5</td>
<td>38.1</td>
</tr>
<tr>
<td>Yes</td>
<td>120</td>
<td>61.9</td>
<td>61.9</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>194</td>
<td>100.0</td>
<td>100.0</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.1.2 Pie Chart of Hedging with CD's
5.1.1 Hedging which currency risk

This section assesses the subsequent research question of which currency risk, the firms that use currency risk, hedge against. Once again, pie chart and cross-tabulation table of the percentage of distribution is visualized. There was only one observation that hedge against currency risk but where the researcher felt that there was not enough disclosure to be able to understand which risk the firm hedge against. Keep in mind that one of the possible answers are “both” which includes both transaction and translation risk, which could be decisive at a quick glance. Missing data are firms that do not use currency derivatives or do not disclose their practices.

Figure 5.1.3 Pie Chart of Which Currency Risk

![Pie Chart of Which Currency Risk]

Table 5.1.4 Hedging which Currency Risk

<table>
<thead>
<tr>
<th>Which currency Risk?</th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Disclosure</td>
<td>1</td>
<td>0,5</td>
<td>0,8</td>
<td>0,8</td>
</tr>
<tr>
<td>Transaction Risk</td>
<td>85</td>
<td>43,8</td>
<td>70,8</td>
<td>71,7</td>
</tr>
<tr>
<td>Translation Risk</td>
<td>5</td>
<td>2,6</td>
<td>4,2</td>
<td>75,8</td>
</tr>
<tr>
<td>Both</td>
<td>29</td>
<td>14,9</td>
<td>24,2</td>
<td>100,0</td>
</tr>
<tr>
<td>Valid</td>
<td>120</td>
<td>61,9</td>
<td>100,0</td>
<td></td>
</tr>
<tr>
<td>Missing System</td>
<td>74</td>
<td>38,1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>194</td>
<td>100,0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.2 Industry belonging sector

This section divides the observation into which sector they belong. With the use of a bar chart the researcher aims to indentify different hedging practices among sector of industry. The table shows the number of observation of each sector, which are varying to a large extent and drawing conclusions, can be difficult.

Figure 5.2.1 Bar Chart of Industry Belonging Sector

Table 5.2.2 Count of Industry Sector and Hedging Practices

<table>
<thead>
<tr>
<th>Hedging with CD's</th>
<th>Energy</th>
<th>Materials</th>
<th>Industrials</th>
<th>Consumer Discretionary</th>
<th>Consumer Staples</th>
<th>Healthcare</th>
<th>Information Technology</th>
<th>Telecommunications</th>
<th>Utilities</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>NoDisclosure</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>7</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>0</td>
<td>15</td>
<td>7</td>
<td>2</td>
<td>15</td>
<td>21</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>10</td>
<td>51</td>
<td>22</td>
<td>4</td>
<td>9</td>
<td>18</td>
<td>2</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>3</td>
<td>10</td>
<td>67</td>
<td>31</td>
<td>6</td>
<td>25</td>
<td>46</td>
<td>5</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>
5.2.1 Clustered sectors

In this section the sectors have been clustered in order to get a more fair distribution among the sectors. A percentage component bar chart has been used to enhance the different practices among the clustered sectors. There is still difference of the number of observations in the clustered sectors. The calculated variance for each sector and determinant has been added to the table.

Table 5.2.3 Clustered Industry Sector Counts and Averages

<table>
<thead>
<tr>
<th>Hedging with Currency Derivatives</th>
<th>Energy, Material, Utilities</th>
<th>Industrials</th>
<th>Consumer Discretionary, Consumer Staples</th>
<th>Healthcare</th>
<th>IT, Telecom</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Disclosure</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>7</td>
</tr>
<tr>
<td>No</td>
<td>0</td>
<td>15</td>
<td>9</td>
<td>15</td>
<td>24</td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>51</td>
<td>26</td>
<td>9</td>
<td>20</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>67</td>
<td>37</td>
<td>25</td>
<td>51</td>
</tr>
<tr>
<td>Average:</td>
<td>Market Captal.</td>
<td>11875</td>
<td>11199</td>
<td>12913</td>
<td>3166</td>
</tr>
<tr>
<td>% of FS</td>
<td>78.7</td>
<td>60.8</td>
<td>45.9</td>
<td>45.4</td>
<td>46.9</td>
</tr>
<tr>
<td>Market-to-Book</td>
<td>1.51</td>
<td>5.00</td>
<td>3.58</td>
<td>3.85</td>
<td>2.78</td>
</tr>
<tr>
<td>Debt/Equity</td>
<td>101.0</td>
<td>76.8</td>
<td>108.7</td>
<td>33.99</td>
<td>19.44</td>
</tr>
<tr>
<td>Current Ratio</td>
<td>1.56</td>
<td>1.57</td>
<td>1.77</td>
<td>3.65</td>
<td>1.65</td>
</tr>
</tbody>
</table>
The bar chart indicates that it could seem that the “healthcare” and “IT, Telecommunications” uses currency derivative to a lesser extent.
5.3 Size (Market Capitalization)

The data for this section was obtained from DataStream. The Market Capitalization is calculated by the number of outstanding shares times the share price at the time of the publication of the annual report. DataStream has a selection where the data retrieved is related to the year end.

Table 5.3.1 Descriptive statistics over total population

<table>
<thead>
<tr>
<th>Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Capitalization</td>
<td></td>
</tr>
<tr>
<td>N Valid</td>
<td>187</td>
</tr>
<tr>
<td>Missing</td>
<td>7</td>
</tr>
<tr>
<td>Mean</td>
<td>10108.9028</td>
</tr>
<tr>
<td>Median</td>
<td>1176.4500</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>31154.58690</td>
</tr>
<tr>
<td>Minimum</td>
<td>34.58</td>
</tr>
<tr>
<td>Maximum</td>
<td>261460.30</td>
</tr>
<tr>
<td>Percentiles</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>470.8400</td>
</tr>
<tr>
<td>50</td>
<td>1176.4500</td>
</tr>
<tr>
<td>75</td>
<td>5025.0000</td>
</tr>
</tbody>
</table>

As we can see from Table 5.3.1 there are seven missing values failed to be obtained from DataStream, the sample size is still sufficiently large enough for analysis. Noticeable is the high stand deviation of the sample indicating that firms’ size differs remarkable. The large difference of mean value and median value is an indication of skewness in the sample. When using a box plot and separate the yes and no categories, the number of outliers’ confirm a wide range of observation.
There seem to be a lot of small firms and very few large firms in terms of size. The proxy used, the market capitalization variable, is a product of two underlying variables; number of shares and price of one share. This could mean that it has a somewhat of an explosion effect which could explain the skewness of the distribution shown in graph 5.3.1 and graph 5.3.2. To mitigate this issue there is a technique called logarithm transformation that scale the distribution according to the natural logarithm.
5.3.1 Log transformation and t-test

In this section we transform the original data to the logarithm of the variable. So, for every observation \( n \) we now use equation \( n_T = \ln(n) \). The distributions of the sample groups are displayed in two separate histograms.

Figure 5.3.5 Size logdistribution of NO

Figure 5.3.6 Size logdistribution of YES

Figure 5.3.7 Box plot of Log Size, two groups
The distributions are now approaching a normal distribution and we can perform an independent-sample t-test to see whether there exists a difference of the means. The box plot gives the reader an understanding of the difference between the distributions to be tested. The data to be tested is listed in table 5.3.1.1.

Table 5.3.8 Size Test Statistics

<table>
<thead>
<tr>
<th>Hedging with CD's</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>LogMV No</td>
<td>61</td>
<td>6,3717</td>
<td>1,30118</td>
<td>.16660</td>
</tr>
<tr>
<td>Yes</td>
<td>116</td>
<td>7,9906</td>
<td>1,80801</td>
<td>.16787</td>
</tr>
</tbody>
</table>

Table 5.3.9 Size T-test Statistics Result

<table>
<thead>
<tr>
<th>Levene's Test for Equality of Variances</th>
<th>Equal variances assumed</th>
<th>Equal variances not assumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>11,823</td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
<td>.001</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>t-test for Equality of Means</th>
<th>Equal variances assumed</th>
<th>Equal variances not assumed</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>-6,197</td>
<td>-6,845</td>
</tr>
<tr>
<td>df</td>
<td>175</td>
<td>158,461</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.000</td>
</tr>
<tr>
<td>Mean Difference</td>
<td>-1,61895</td>
<td>-1,61895</td>
</tr>
<tr>
<td>Std. Error Difference</td>
<td>.26125</td>
<td>.23651</td>
</tr>
</tbody>
</table>

95% Confidence Interval of the Difference

<table>
<thead>
<tr>
<th>Lower</th>
<th>Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>-2,13456</td>
<td>-1,110333</td>
</tr>
<tr>
<td>-2,08606</td>
<td>-1,15183</td>
</tr>
</tbody>
</table>

The group sample variances are unequal so the sigma control variable to use is highlighted in yellow. The T-test statistics indicates that there is a significant difference of the sample means with a 95% confidence (0.000).
5.4 FX Exposure (% of Foreign Sales out of total sales)

This section illustrates the statistics on % of foreign sales out of total sales categorized into yes and no groups. The data has been manually collected from the Annual Reports of 2008 for 194 companies. There are a lot of missing values, explained by the fact that disclosure on segment reporting does not demand companies to report sales explicitly outside Sweden, but can be reported outside other regions.

Table 5.4.1 Descriptive statistics of total population

<table>
<thead>
<tr>
<th>Statistics</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Foreign Sales</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Valid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>74</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>54.18</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>55.00</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>29.827</td>
<td></td>
</tr>
<tr>
<td>Percentiles</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>32.00</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>55.00</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>78.75</td>
<td></td>
</tr>
</tbody>
</table>

Figure 5.4.2 Boxplot of sample groups
The properties of this variable differs somewhat from the other since it is measured as a fraction of total sales and the values cannot exceed 100% or fall short of 0% and is therefore interval data. The box plot shows that in both sample groups the minimum and maximum value is 0 respectively 100%. The box plot gives visualize the two samples groups to be tested. There seems to be differences in the distributions of the groups but there would not be any benefit from a log transformation. In the histograms we can observe high frequencies of observations in the tails and this indicates a non-normal distribution. This will be commented in the analysis. The testing of the variable is still similar to the other by using t-test to compare the difference of means.

### 5.4.1 t-test

By using independent-sample t-test, the difference of the means will be scrutinized. Table 5.4.5 displays the sample means and standard deviation to be tested.

<table>
<thead>
<tr>
<th>Hedging with CD's</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Foreign Sales</td>
<td>No</td>
<td>39</td>
<td>41.41</td>
<td>31.813</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>75</td>
<td>61.35</td>
<td>26.163</td>
</tr>
</tbody>
</table>

The graphs show the distribution of FX Exposure with and without hedging with CD's.
Table 5.4.6 FX Exposure T-test results

<table>
<thead>
<tr>
<th></th>
<th>% of Foreign Sales</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equal variances</td>
<td>Equal variances</td>
<td></td>
</tr>
<tr>
<td></td>
<td>assumed</td>
<td>not assumed</td>
<td></td>
</tr>
<tr>
<td>Levene's Test for Equality of Variances</td>
<td>F</td>
<td>2.534</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
<td>.114</td>
<td></td>
</tr>
<tr>
<td>t-test for Equality of Means</td>
<td>t</td>
<td>-3.580</td>
<td>-3.366</td>
</tr>
<tr>
<td></td>
<td>df</td>
<td>112</td>
<td>65,283</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>Mean Difference</td>
<td>-19,936</td>
<td>-19,936</td>
</tr>
<tr>
<td></td>
<td>Std. Error Difference</td>
<td>5,569</td>
<td>5,923</td>
</tr>
<tr>
<td>95% Confidence Interval of the Difference</td>
<td>Lower</td>
<td>-30,970</td>
<td>-31,764</td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>-8,903</td>
<td>-8,109</td>
</tr>
</tbody>
</table>

The test assumes unequal variances and the resulting number of importance are highlighted in yellow in table 5.4.x. The results of the t-test indicate that there is a significant difference of the means with 95% confidence (0.001).
5.5 Growth opportunities (Market-to-Book Value)

The Market-to-book value is calculated by dividing the market value of the firm by the book value of the firm and the data is obtained from DataStream. There are an insignificant number of missing values, noticeable is also that one observation had to be manually eliminated because it returned a negative value which should not be possible, and is regarded as an error. We can also observe that the standard deviation of the sample is high indicating there are one or more extreme observations.

Table 5.5.1 Descriptive statistics of total population

<table>
<thead>
<tr>
<th>Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Market-to-Book Ratio</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>181</td>
</tr>
<tr>
<td>Valid</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>13</td>
</tr>
<tr>
<td>Mean</td>
<td>3,7887</td>
</tr>
<tr>
<td>Median</td>
<td>2,2500</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>7,28623</td>
</tr>
<tr>
<td>Minimum</td>
<td>.36</td>
</tr>
<tr>
<td>Maximum</td>
<td>73,72</td>
</tr>
<tr>
<td>Percentiles 25</td>
<td>1,4200</td>
</tr>
<tr>
<td>Percentiles 50</td>
<td>2,2500</td>
</tr>
<tr>
<td>Percentiles 75</td>
<td>3,5950</td>
</tr>
</tbody>
</table>

Figure 5.5.2 Boxplot of sample groups

The Box plot confirms the assumption of outliers which evidently occurs in both sample groups, the explanation for this could be that some firms have a heavily overvalued compared to the book value and should therefore not be treated as error data.
The histograms show that the distribution is skewed and do not fulfill the requirements of normal distribution and therefore have implications for the test statistics. The fact that the observed value is a fraction could imply that there is uniformity in the distribution. A logarithm transformation will be performed to scale the variable.

5.5.1 Log transformation and t-test

In this section we transform the original data to the logarithm of the variable. So, for every observation \( n \) we now use equation \( n_T = \ln(n) \). The distributions of the sample groups are displayed in two separate histograms.

As we can observe in the histograms the distribution now seems to approach a normal distribution and is ready to be tested. The box plot below gives the reader an indication of the properties of the two sample groups.
Figure 5.5.7 Box plot of Log Growth, two groups

Table 5.5.8 shows the two sample’s mean and standard deviation that will be tested. The t-test examines if the mean of the distribution are significantly different from one another.

Table 5.5.8 Growth Opportunities Test Statistics

<table>
<thead>
<tr>
<th>Hedging with CD’s</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>LogMtB No</td>
<td>57</td>
<td>.8738</td>
<td>.83186</td>
<td>.11018</td>
</tr>
<tr>
<td>LogMtB Yes</td>
<td>115</td>
<td>.8717</td>
<td>.75301</td>
<td>.07022</td>
</tr>
</tbody>
</table>
## Independent Samples Test

<table>
<thead>
<tr>
<th></th>
<th>LogMtB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equal variances assumed</td>
</tr>
<tr>
<td>Levene’s Test for Equality of Variances</td>
<td>F 1.271</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td>t-test for Equality of Means</td>
<td>t .017</td>
</tr>
<tr>
<td></td>
<td>df 170</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td>Mean Difference</td>
<td>.00215</td>
</tr>
<tr>
<td>Std. Error Difference</td>
<td>.12633</td>
</tr>
<tr>
<td>95% Confidence Interval of the Difference</td>
<td>Lower -24723</td>
</tr>
<tr>
<td></td>
<td>Upper 25152</td>
</tr>
</tbody>
</table>

The independent-sample t-test indicates that there is no significant difference of the means of the two samples with 95% confidence (0.987).
5.6 Leverage (Debt/Equity Ratio)

The Debt/Equity ratio is calculated by dividing the debt of the firm with the firm equity, and is therefore fraction. The data is collected via DataStream. There are an insignificant number of missing values, noticeable is also that one observation had to be manually eliminated because it returned a negative value which should not be possible, and is regarded as an error. This was the same observation as in the Growth Opportunity case. Again, we can observe that the standard deviation of the sample is high indicating there are one or more extreme observations.

Table 5.6.1 Descriptive statistics of total population

<table>
<thead>
<tr>
<th>Statistics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt-Equity Ratio</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>Valid</td>
</tr>
<tr>
<td></td>
<td>Missing</td>
</tr>
<tr>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td></td>
</tr>
<tr>
<td>Std. Deviation</td>
<td></td>
</tr>
<tr>
<td>Minimum</td>
<td></td>
</tr>
<tr>
<td>Maximum</td>
<td></td>
</tr>
<tr>
<td>Percentiles 25</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
</tr>
</tbody>
</table>

The box plot confirms that there are a number of extreme observations at the high-end range of both sample groups. The box plot also gives the reader an understanding of the difference of the two sample groups. The large number of outliers could have implications of normal distribution of the sample.
The histograms show once again that the distribution is skewed and do not fulfill the requirements of normal distribution and therefore have implications for the test statistics. The fact that the observed value is a fraction could imply that there is uniformity in the distribution. A logarithm transformation will be performed to scale the variable.
5.6.1 Log transformation and t-test

In this section we transform the original data to the logarithm of the variable. So, for every observation $n$ we now use equation $n_T = \ln(n)$. The distributions of the sample groups are displayed in two separate histograms.

Figure 5.6.5 Leverage logdistribution of NO

Figure 5.6.6 Leverage logdistribution of YES

As we can see in the histograms above the distribution of the sample groups can be assumed to have a normal distribution with more observations around the center. The box plot illustrates the two sample group to be tested.

Figure 5.6.7 Box plot of Log Leverage, two groups
Table 5.6.8 shows the two sample’s mean and standard deviation that will be tested. The t-test examines if the mean of the distribution are significantly different from one another.

**Table 5.6.8 Leverage T-test statistics**

<table>
<thead>
<tr>
<th>Hedging with CD's</th>
<th>LogDE</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>46</td>
<td>3.1418</td>
<td>1.62079</td>
<td>.23897</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>108</td>
<td>3.9124</td>
<td>1.35166</td>
<td>.13006</td>
</tr>
</tbody>
</table>

**Table 5.6.9 Leverage T-test results**

<table>
<thead>
<tr>
<th></th>
<th>LogDE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Equal variances assumed</td>
<td>Equal variances not assumed</td>
</tr>
<tr>
<td>Levene's Test for Equality of Variances</td>
<td>F</td>
<td>2.638</td>
<td></td>
</tr>
<tr>
<td>Sig.</td>
<td></td>
<td>.106</td>
<td></td>
</tr>
<tr>
<td>t-test for Equality of Means</td>
<td>t</td>
<td>-3.047</td>
<td>-2.832</td>
</tr>
<tr>
<td>df</td>
<td></td>
<td>152</td>
<td>72.917</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.003</td>
<td>.006</td>
</tr>
<tr>
<td>Mean Difference</td>
<td>-1.77057</td>
<td>-1.77057</td>
<td></td>
</tr>
<tr>
<td>Std. Error Difference</td>
<td>.25293</td>
<td>.27207</td>
<td></td>
</tr>
<tr>
<td>95% Confidence Interval of the Difference</td>
<td>Lower</td>
<td>-1.27029</td>
<td>-1.31282</td>
</tr>
<tr>
<td></td>
<td>Upper</td>
<td>-1.27085</td>
<td>-1.22832</td>
</tr>
</tbody>
</table>

The group sample variances are unequal so the sigma control variable to use is highlighted in yellow. The T-test statistics indicates that there is a significant difference of the sample means with a 95% confidence (0.006).
5.7 Liquidity (Current Ratio)

The Current ratio is calculated by dividing the current asset of the firm with the firm’s current liabilities, and is therefore a fraction. The data is collected via DataStream. There are an insignificant number of missing values. In relation to the mean and median, the standard deviation looks rather large. The maximum and minimum observation value indicates that there are extreme observations and a large range of the samples.

Table 5.7.1 Descriptive statistics of total populations

<table>
<thead>
<tr>
<th>Statistics</th>
<th>Current Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>190</td>
</tr>
<tr>
<td>Valid</td>
<td></td>
</tr>
<tr>
<td>Missing</td>
<td>4</td>
</tr>
<tr>
<td>Mean</td>
<td>1,9022</td>
</tr>
<tr>
<td>Median</td>
<td>1,5350</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>1,43944</td>
</tr>
<tr>
<td>Minimum</td>
<td>.42</td>
</tr>
<tr>
<td>Maximum</td>
<td>9.57</td>
</tr>
<tr>
<td>Percentiles</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>1,0875</td>
</tr>
<tr>
<td>50</td>
<td>1,5350</td>
</tr>
<tr>
<td>75</td>
<td>2,1300</td>
</tr>
</tbody>
</table>

The box plot gives the reader an idea of the difference and distribution of the two sample groups. As we can see there are a number of extreme observations in the high-end of the distribution. The standard deviation of the “No” sample group also seem larger.

Figure 5.7.2 Boxplot of sample groups
The histograms show once again that the distribution is skewed and do not fulfill the requirements of normal distribution and therefore have implications for the test statistics. The fact that the observed value is a fraction could imply that there is uniformity in the distribution. A logarithm transformation will be performed to scale the variable appropriately.

### 5.7.1 Log transformation and t-test

In this section we transform the original data to the logarithm of the variable. So, for every observation \(n\) we now use equation \(n_\ell = \ln(n)\). The distributions of the sample groups are displayed in two separate histograms.

As we can see, the logarithm transformed observations seem to approach a normal distribution, it is therefore proper to use in the test statistics. Further description of the two sample groups is shown in the box plot below.
From the box plot we can see that the distribution seem somewhat similar, and the line in the box suggest that the median of the yes-group is lower than for the no-group. Table 5.7.8 shows the two sample’s mean and standard deviation that will be tested. The t-test examines if the mean of the distribution are significantly different from one another.

Table 5.7.8 Liquidity Test Statistics

<table>
<thead>
<tr>
<th>Group Statistics</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hedging with CD's</td>
<td>No</td>
<td>62</td>
<td>.5299</td>
<td>.67022</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>118</td>
<td>.4312</td>
<td>.51030</td>
</tr>
</tbody>
</table>
Table 5.7.9 Liquidity T-test results

<table>
<thead>
<tr>
<th></th>
<th>LogCR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Equal variances assumed</td>
</tr>
<tr>
<td>Levene’s Test for Equality of Variances</td>
<td>F</td>
</tr>
<tr>
<td></td>
<td>Sig.</td>
</tr>
<tr>
<td>t-test for Equality of Means</td>
<td>t</td>
</tr>
<tr>
<td></td>
<td>df</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>Mean Difference</td>
</tr>
<tr>
<td></td>
<td>Std. Error Difference</td>
</tr>
<tr>
<td></td>
<td>95% Confidence Interval of the Difference</td>
</tr>
</tbody>
</table>

The independent-sample t-test indicates that there is no significant difference of the means of the two samples with 95% confidence (0.313).

5.8 Summary of t-test statistics

In table 5.8.1, the test statistics of significant difference of means have been summarized. The last column tells us if the mean for the yes group is significantly higher or lower than for the no group.

The tests have shown that 3 of the 5 determinants are deemed to have influence on the decision to use currency derivatives. The determinants Market Capitalization (Size) and % of FS out of total sales (FX Exposure) have a positive effect on the use of currency derivatives, meaning the larger the company or the greater Foreign Exchange exposure, the higher incentives to use currency derivatives. The determinant Debt/Equity ratio (Leverage) indicates that the higher ratio, the less incentives for the firms to hedge using currency derivatives.

Table 5.8.1 Summary of test statistics

<table>
<thead>
<tr>
<th>Determinant</th>
<th>Significance level</th>
<th>Sign. Difference</th>
<th>Higher/Lower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Capitalization</td>
<td>0.000</td>
<td>Yes</td>
<td>Higher</td>
</tr>
<tr>
<td>% of FS out of total sales</td>
<td>0.001</td>
<td>Yes</td>
<td>Higher</td>
</tr>
<tr>
<td>Market-to-Book ratio</td>
<td>0.987</td>
<td>No</td>
<td>-</td>
</tr>
<tr>
<td>Debt/Equity ratio</td>
<td>0.006</td>
<td>Yes</td>
<td>Lower</td>
</tr>
<tr>
<td>Current ratio</td>
<td>0.313</td>
<td>No</td>
<td>-</td>
</tr>
</tbody>
</table>
5.9 Correlation between variables

To further analyze the results of the empirical findings, a test for correlation between the variables has been conducted. The Pearson correlation coefficients are presented in a matrix along with the significance levels of correlation. The significant variables will be highlighted in yellow to help the reader. The researcher has decided to have to separate tables, one for the original variables and one for the logarithm transformed variables.

**Table 5.8.2 Correlation**

<table>
<thead>
<tr>
<th>Correlations</th>
<th>Market Capitalization</th>
<th>% of Foreign Sales</th>
<th>Market-to-Book Ratio</th>
<th>Debt-Equity Ratio</th>
<th>Current Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market Capitalization</td>
<td>Pearson Correlation</td>
<td>1</td>
<td><strong>.248</strong></td>
<td>.005</td>
<td>.064</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td></td>
<td>.007</td>
<td>.950</td>
<td>.389</td>
</tr>
<tr>
<td>N</td>
<td>187</td>
<td>119</td>
<td>181</td>
<td>184</td>
<td>184</td>
</tr>
<tr>
<td>% of Foreign Sales</td>
<td>Pearson Correlation</td>
<td><strong>.248</strong></td>
<td>1</td>
<td>-.035</td>
<td>.132</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.007</td>
<td>.708</td>
<td>.155</td>
<td>.292</td>
</tr>
<tr>
<td>N</td>
<td>119</td>
<td>120</td>
<td>116</td>
<td>118</td>
<td>117</td>
</tr>
<tr>
<td>Market-to-Book Ratio</td>
<td>Pearson Correlation</td>
<td>.005</td>
<td>-.035</td>
<td>1</td>
<td>.094</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.950</td>
<td>.708</td>
<td>.210</td>
<td>.539</td>
</tr>
<tr>
<td>N</td>
<td>181</td>
<td>116</td>
<td>181</td>
<td>181</td>
<td>180</td>
</tr>
<tr>
<td>Debt-Equity Ratio</td>
<td>Pearson Correlation</td>
<td>.064</td>
<td>.132</td>
<td>.094</td>
<td>1</td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.389</td>
<td>.155</td>
<td>.210</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>184</td>
<td>118</td>
<td>181</td>
<td>190</td>
<td>189</td>
</tr>
<tr>
<td>Current Ratio</td>
<td>Pearson Correlation</td>
<td>-.049</td>
<td>.098</td>
<td>.046</td>
<td><strong>-259</strong></td>
</tr>
<tr>
<td>Sig. (2-tailed)</td>
<td></td>
<td>.511</td>
<td>.292</td>
<td>.539</td>
<td>.000</td>
</tr>
<tr>
<td>N</td>
<td>184</td>
<td>117</td>
<td>180</td>
<td>189</td>
<td>190</td>
</tr>
</tbody>
</table>

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

There was statistical significance of the Pearson correlation coefficient on the following variables:

- Market Capitalization and % of FS out of TS have a small positive linear correlation (0.248) at a 99% confidence level
- Debt/Equity Ratio and Current Ratio have a small negative correlation (-0.259) at a 99% confidence level
6. Analysis

The reader has now found her way through the maze of information, a sense of relief is prospering from within, a relief of finally attaining the answers. The chapter will start by assessing the research questions and then analyzing each determinant. Throughout it all, a mixture of empirical findings and literature will be evident.

6.1 Hedging with currency derivatives

- To which extent do OMX listed companies use currency derivatives to hedge exchange rate risks?

The study started with 290 firms listed on the Swedish OMX list. Non-financial firms were excluded due the argument that they use currency derivatives for other purposes. Next, for the firms that had both A- and B-classed share, the A-class share were excluded due to that they are traded on different terms. Firms that were based outside Sweden were also eliminated due to differences in tax schemes and reporting standards.

There were now 194 companies that served as base for the sample. Out of these companies successful information on currency derivative hedging was to be collected from 183 of them. This is equivalent to a response rate of 94.3%, compared to Alkebäck et al (2006) of 51.3% (134 out of 261 companies) and Alkebäck & Hagelin (1999) of 76.6%, this represent a substantially higher result. The reason for this was that this study used disclosure on the financial risk management note in the Annual Reports instead of questionnaires in the other two studies. The results are therefore not entirely comparable, but with the new IASB rules on disclosure, the researcher hopes that further studies will adapt this technique.

On the issue if companies use currency derivatives 11 observations were on “no disclosure”, 63 observations on “No” and 120 observations on “Yes”. This represents a percentage of 61.9% of the companies using currency derivatives to be compared with previous studies by Alkebäck et al (2006) who found that the use of derivatives had increased from 52% in 1996 to 59% in 2003. Notice that this study included both currency and interest derivatives. They reported that 90% of the users of derivatives do so to manage foreign exchange risk, so the actual comparable result falls short of 59%. The analysis still concludes that the use of currency derivatives has increased from 2003 to 2008.

The reason for this increase could be the related to the findings from Alkebäck et al (2006) study were they examined the biggest concerns for managers and the use of derivatives, where liquidity issue, accounting treatment and transaction costs were the top three. They also found that the reason of limited knowledge about derivatives had significantly decreased from 1996 to 2003 and reported this as a possible factor for the increase of derivatives usage. As we already have seen the issue of limited knowledge decline, it is debatable whether this still should be the seen as the factor for the continuing decrease. Due to financial crisis of 2008 the issues of low liquidity and transactions costs should rather increase the concerns of the managers and decrease the use of derivative hedging. This leads to the idea that it is not the managers concerns that affects the hedging decision, but rather the argument that choose not to hedge because of limited foreign exchange exposure or other personal beliefs. In their study they also asked companies that do not use derivatives why they do not. If the share of firms that do not use derivatives for hedging has decreased in 2008, this could be linked with the answers of that study. Firms that do not choose to hedge argued that the limited foreign
exchange exposure was the number one reason, and that exposure is hedged by other means were the succeeding reason. For the 2008 study it is difficult to draw conclusions without proper statistics, but one could assume that the firms with limited foreign exchange exposure have decreased due to recent year’s globalization, and the globalization could have affected shareholders demands on more active financial risk management.

6.2 Hedging which currency risk
- What exchange rate exposures are recognized and mitigated with the currency derivatives?

Of the 120 companies that were observed using currency derivatives. Only one had insufficient disclosure on what risk that was mitigated. 85 firms (70.8%) only hedged transaction risk, 5 firms (4.2%) hedged only translation risk and 29 firms (24.2%) hedge both transaction and translation risk. To give a fair view on the mitigation of transaction and translation risk, we should include the “both” observations in the two other groups. The overall picture then indicates that 95% use currency derivatives to hedge against transaction exposure and 28, 4% use currency derivatives to hedge against translation exposure.

Hagelin (2001) found evidence from the Swedish market that companies use currency derivatives to hedge transaction exposure in order to reduce the indirect costs of financial distress or alleviating the underinvestment problem, but there were no evidence found to support that hedging translation exposure was value creating.

This means that the findings in this study are aligned with the literature why a dominant part hedges transaction risk or both. The remaining 5 observations that only hedged translation risk could be either that transaction risk is mitigated by other means or more likely that managers are risk averse and as Hagelin & Pramborg (2004) argued; hedging translation risk reduces exposure.

6.3 Determinants of hedging
- Are there any relationships between firm characteristics or key variables and the decision to use currency hedging derivatives?

6.3.1 Industry belonging
The first part of the analysis deals with which type of industry the firms belongs to. The researcher have used the Stockholm OMX Nordic’s own division of sectors, with the motivation that even if firms enters and leaves the exchange a similar approach of ranking the sectors will provide opportunities for replicating in future research.

It resulted it nine different sectors with large variation of observations within the sectors. The researcher then took the liberty to pool small sectors into larger clusters, for replicability of future research this is arguable and have to be conducted similar to be able to compare.

The currency hedging practices was then illustrated in a percent component bar chart to simplify for the viewer does understand the difference. We saw that the clusters “Healthcare” and “IT, Telecommunications” seem to use currency derivatives to a lesser extent. It is difficult to analyze the result of this only based on the sectors, since the companies characteristics can vary to a large extent from sector to sector. In table 5.2.3 the researcher
presented the average of each determinant, which will be examined more in detail later, to see if there were any differences among sectors.

The two sectors with lesser use of currency derivatives were ranked with the significantly lowest averages of Market Capitalization and Debt/Equity ratio. This would imply that size and leverage could be important determinants for the use of currency derivatives and not necessarily the industry of belonging.

### 6.3.2 Size

The first determinant that was tested was the size of the firm and the proxy used for this was market capitalization. The descriptive statistics showed a high standard deviation with many extreme observations in the sample and when divided into the two sample groups, it did not seem to be normally distributed. The extreme observations are not supposed to be errors, but more likely due to the fact that Sweden has a few number of really large world market dominating firms and that the market capitalization value is a factor of two numbers which could imply an explosive effect in the residuals. A log transformation was made to fit the data for a two-sample t-test. The test showed that there is a significant difference of the sample means. The result showed that the “Yes”-group had a higher mean, with the conclusion that with increasing firm size there is a higher activity of practicing currency derivative hedging.

Previous research agrees that firm size and economies of scale is positively related the use of derivative hedging (see e.g. Froot et al (1993), Gezcy et al.(1997), Alyannis & Ofek (1997), Hagelin(2001)). It is contradictory to the arguments by Warner (1977) that smaller firms have relatively higher expected costs of financial distress and should therefore have bigger incentives to hedge.

The reason for size being a determinant for hedging could be partially explain by Mian (1996) findings that hedging activity is often related to a high initial fixed cost for implementing a hedging function. The high cost could be directly affecting the probability of financial distress which then would work against the hypothesis of smaller firms are more likely to use hedging derivatives. In this research, the currency derivative hedging has been particularly addressed, and there is a possibility that larger firms have more internationally diversified operations and thus more expose to both transaction and translation risks, and thus have larger incentives to hedge currency exposure. At the same time international diversified operations could also imply larger chance of natural hedges occurring, however obtaining perfect hedges in all currencies can be regarded as unusual.

### 6.3.3 Foreign exposure

The proxy for foreign exposure was percentage of foreign sales out of total sales, a proxy used in other studies (see Hagelin, 2000). The issue of validity associated with the proxy was of concern before the test was conducted since it only assesses transaction exposure. The firm could still have assets and liabilities denoted in foreign currency, related to translation exposure, needed to hedge against fluctuations in exchange rates. Hagelin(2000) and Nydahl (1999) both found statistical significance for a positive relationship between foreign sales and the use of derivative hedging. Since this study have shown that transaction risk is the most common risk to assess, the motive for testing % of foreign sales are deemed acceptable. The motives for hedging FX exposure could be explained by the incentive to hedge transaction
exposure in order to reduce the indirect costs of financial distress or mitigating the underinvestment problem (Hagelin, 2001).

There were 74 out of 194 variables missing, which could indicate a weakness of the test but the remaining 120 was considered large enough for testing. The t-test proved that there was a significant difference of the mean, and it was observed that there was a positive relationship, in line with previous research. There was also statistical significance of a positive correlation between FX Exposure and the Size of the firm, suggesting that the determinant for hedging FX exposure could be explained by the size of the firm and vice versa. However, the correlation was significant but rather weak (0.248), an indication of that an increase in one variable does not mean a major increase in the other one. The issue of the proxy not being a proper test variable is evident in the distribution of the observation. There were more observations in the outskirts of the range, especially for the firms that choose to not use currency derivatives. Companies that had extensive FX exposures (over 80%) and still choose not to hedge, by looking on the raw data, were rather small. This further explains the significant correlation between FX exposure and size.

### 6.3.4 Growth opportunities

The proxy used for Growth opportunities was the Market-to-Book value. A high value of the proxy indicates that the investor has higher expectations of creating value from assets and thus has growth opportunities (Pramborg, 2002). The distribution plots showed a number of extreme observations on the high-end side for both sample groups, indicating that a low value of the denominator (here, the book value of equity) could give an “explosive” effect. The data was log transformed to fit in the t-test, which could not reject the hypothesis that there were significant differences of the means.

Previous studies showed that firms with underinvestment problems are more likely to hedge (Myers 1977 and Bessembinder (1991)), and firms with more valuable growth opportunities are more likely to be affected by the underinvestment problem (Pramborg, 2002).

This relationship could not be evident in this study, in fact, when looking at the statistics of the sample groups we see that that firms that do not use currency derivatives even had a higher log transformed mean. Since the properties of log transformed data does not provide the same properties as the original data, there will be no formal conclusions regarding this.

The growth opportunity proxy proved no significant correlation with any other determinant. Still, Gay and Nam (1998) found evidence suggesting that firms with large growth opportunities hedges more when their liquidity is low, which could mean that if correlation between these variables were found, they could have affect the decision to hedge in the opposite directions, eliminating each other, and thus be the reason of no difference between the sample groups.

### 6.3.5 Leverage

The proxy used for leverage was the Debt/Equity ratio. The descriptive statistics showed that there was skewness in the distribution due to a number of extreme observations in the high end tail. The data was log transformed in order to be t-tested. The independent two-sample t-test gave result of significant differences of the means.
Hagelin (2001) and Pramborg (2002) used the same proxy to test if leverage was a
determinant of hedging but found no evidence supporting this. High financial leverage
combined with volatile firm value increases the expectations of financial distress which might
give risk-averse managers an incentive to turn down positive present value investments
find evidence that there exists a motive for hedging with derivatives to avoid expected cost of
there was a U-shaped relationship with high leverage and the use of hedging, where there was
a positive relationship until extreme values of leverage where incentives to hedge decreased.

During 2008 the world markets, as in Sweden, suffered a massive economic downturn later
referred to as a financial crisis, the value of many firms dropped massively and arguable many
firms increased their expected cost of financial distress. This could have had an impact on the
findings in this study. Either risk-averse managers assessed the financial distress issues by
engaging more in the use of currency derivatives or the drastic impact on firms debt/equity
ratio saw a substantial change which affected the sample groups so extensively that a
relationship became evident. The evolvement on leverage and hedging activities in a time-
series ranging over the fiscal year 2008 would definitely be interesting for scrutiny and further
research.

6.3.6 Liquidity
The proxy used for the determinant liquidity was the current ratio. The literature suggests that
maintaining more liquid assets reduce the expected cost of financial distress and thereby the
need for hedging (Nance et al. (1993), Mayers & Smith (1982). Being illiquid can also be
related to the underinvestment problem when the manager of the firm might be reluctant to
undertake positive present value investments.

The statistics showed that the samples groups not looked normally distributed there were once
again a number of observations in the high-end tail. The standard deviation of the “No”-group
also seemed larger. The values were log transform to fit the t-test, which gave the result of no
significant difference of the means.

Having the same underlying incentive to hedge as for leverage, the reduction of expected cost
of financial distress, hypothetically there should be a link between maintaining a low liquidity
and a high debt/equity ratio. Still, we could see significant difference of means in the leverage
determinant, but not in the liquidity determinant. However, the Pearson correlation coefficient
indicated a significant, but small, negative linear relationship between the variables
supporting the reasoning.
7. Conclusion

As the last page is turned over and book is carefully positioned on the nightstand, the reader can slowly seal her eyes and be seized by dreams of new adventures. This chapter will highlight the most important findings and assess the purpose and aim of the research. Truth criteria and suggestions for further studies are declared in order to evaluate the quality of the thesis.

7.1 Concluding discussion

This study aimed to assess the currency hedging activities of OMX listed companies in Sweden regarding exchange rate risk and exposure. Further the researcher wanted to identify characteristics of firms that could act as determinants for the decision to use currency derivatives. Using a quantitative research approach and statistical tools, the relationship between users and non-users of currency derivatives has been examined and related to previous research by prominent researchers within the financial risk management area.

In fiscal year 2008 there was 61,9% of the OMX listed companies who reported use of currency derivatives, which is an increase from previous studies by Alkebäck et al. (2006) on the use of hedging derivatives from 52% in 1997 and 59% in 2003. By collecting data from the Annual Reports disclosure on Financial Risks, a response rate of 94,3% has been obtained, compared to sending questionnaires which had a response rate of 51,3% (Alkebäck et al., 2006) and 76,6% (Alkebäck & Hagelin, 1999). The reasons for the choice of using currency derivatives or not has been discussed, and led to the idea that it is not the managers concerns that affects the hedging decision, but rather the argument that choose not to hedge because of limited foreign exchange exposure or other personal beliefs. Without being able to show statistical evidence, there researcher assumes that recent year’s globalization could have increased the average foreign exchange exposure of firms in general, and thus increased to use of currency derivatives.

The proportion of firms that use currency derivatives to hedge foreign exchange risk assesses transaction exposure (95%) and translation exposure (28,4%), an indication that risks related to future contracted cash flows are more common to hedge than the risk of accounting translation of income statement and balance sheet. The matter of that the belonging to a certain industry sector could affect the choice of hedging with currency derivatives was argued to be too insufficient to be able to conclude anything about or compare to other studies. Though it seemed that the sectors of “Healthcare” and “IT, Telecommunications” hedged to a lesser extent, it was argued that the significantly lower size and leverage compared to the other sectors could explain it better.

On the determinants of currency hedging the study concludes that growth opportunities and liquidity show no statistical evidence of affecting the decision to hedge.

An independent two-sample t-test has showed statistical significance that there difference of the means regarding size, FX exposure and leverage between users and non-users of currency derivatives. The means of currency derivatives users were higher for Size and FX exposure, while lower for leverage. A positive correlation between a firm’s size and FX exposure was found, suggesting that the determinant for hedging FX exposure could be explained by the size of the firm and vice versa. Out of the firms that choose not to hedge with currency derivatives, the ones with high FX exposure were found to be rather small in size, which
supports the idea on the correlation effect. A significant but small negative correlation was found between the significant leverage determinant and the insignificant liquidity determinant, arguably explained by the similar motives on hedging the expected cost of financial distress.

The evidence of the impact of the leverage determinant is contradicting to previous studies made in Sweden. Theories on that high financial leverage increases the expectations of cost of financial distress motivates hedging support the findings. This could be further explained by the impact of the 2008 financial crisis on the leverage proxy. Either risk-averse managers assessed the financial distress issues by engaging more in the use of currency derivatives or the drastic impact on firms debt/equity ratio saw a substantial change which affected the sample groups so extensively that a relationship became evident.

7.2 Truth criteria

When dealing with quantitative data and secondary sources it is important to assure that they will be able to meet the objectives of the research. Saunders et al. (2007) suggest that the data is evaluated by its overall suitability and precise suitability.

Overall suitability deals with the measurement validity of the data set and that the observations you collect actually is intended for the purpose of the research. The data set to collect for this study were company explicit financial data that have the quality of being key figures. The motivation for the proxy’s used in this study is based on previous research, so even if % of foreign sales out total sales does not exactly measures FX exposure the value is still valid to use and even evaluated in the study.

Another criterion is the coverage, that the data covers the whole population of the study. Often a problem of randomness occurs when data is retrieved from a sample part of the entire population. In this study, it is not a problem since the whole intended research population was included, listed firms on the Swedish OMX exchange.

The precise suitability deals with the reliability of the data. Saunders et al. (2007) suggest that the source of the data is assessed. Data from large, well-known organisations are likely to be trustworthy; transparency and creditability are of essence for listed companies to satisfy investors and shareholders and mitigating agency costs. While organisation may argue that there data is trustworthy and reliable, there is a chance that it could be inaccurate or inconsistent. In this study however, the researched need to trust the information in the published annual report and not make own interpretations. The figures or ratios of financial data are daily used by investors and analyst to evaluate firms.

The methods and means the data is obtained by deals with collection validity. The data used for the proxy’s are commonly used key ratio statistics that were easily identified and collected by DataStream (except the % of foreign sales out of total sales). The statistical software offered a choice to retrieve data from reporting dates, which ensured that the date was in line with the published annual report were the other information was gathered. A disadvantage of using statistical software to retrieve data is that the researcher is not entirely sure that the data was collected correctly, on the other hand the software treats every data the same, and eliminates the bias. The collection of company’s currency hedging activities is the weakness of the truth criteria, as discussed in the text, the interpretation of the researcher creates a risk
for bias. The researcher has tried to minimize the bias by adding a “no disclosure” alternative when there is insufficient information.

The final criterion is the comparison of cost and benefits to the research. The researcher agrees that it would have been interesting to fully replicate previous studies by Alkebäck et al (2006), to compare results straight off. However, these researches involve questionnaires being sent out to close hundreds of Swedish companies, with follow-up questionnaires if they were not to respond within a certain time period. This would have been costly in both monetary terms and time. The researcher have therefore used data software (such as SPSS and DataStream) and services (article data bases and library) provided by the home University. A couple of years ago there could have been a problem in getting hold of companies Annual Reports, but nowadays all are published on their respective website.

7.3 Further studies

Some ideas about further research have already been mentioned in the text. Perhaps the most interesting one would be the findings on leverage as a determinant for hedging. Since previous research in Sweden was unable to indentify this, and the same proxy was used, it would be interesting to investigate the effect of the debt/equity ratio properties over a time period that at least covers the fiscal year of 2008 and the financial crisis. Or perhaps a study of fiscal year 2010 or onward is enough, maybe the significance of the determinant is no longer evident when economic climate is stable and the effects financial crisis has vanished.

Another interesting topic for further studies was one of the questions in the researcher mind at the very start of the study. Are there levels for the determinants where a company statistically should start to hedge? The researcher ruled out this as being out of his breach because of the statistical complexity, but after a few days in front of statistical software and with the inspirations of some good friends, he found out that it even should be possible to develop a statistical model for this.

It would be very interesting to narrow down even further on currency risk and exposure. Some companies already disclosed the total exposure of each currency, at least in revenues and costs, and if the European Union continues to enhance the regulation on financial derivative disclosure it will not be long until the instruments for each hedged exposure have to be in the accounting.
8. Reference list

Books


Ross, M.P., 1996, Corporate Hedging: What, why and how, University of California, Berkeley


Journal Articles


Allayannis, G. and Ofek, E., 2001, Exchange Rate Exposure, Hedging, And the Use Of


DeMarzo, P., Duffie, D., 1995, Corporate Incentives for Hedging and Hedge Accounting, the Review of Financial Studies Vol. 8:743-771


Lessard, D.R., 1991, Global Competition and corporate finance in the 1990’s, Continental Bank: Journal of applied Corporate Finance, 59-72


**Thesis papers**


Diez, J., Gutierrez, J., 2009, *Risk Management: Disclosure Effects*, University of Gothenburg


**Annual Reports in text**

Industrial and Financial Systems AB’s Annual Report, 2008:60

**Internet:**

[www.datastream.com](http://www.datastream.com)


[www.omxnordicexchange.com](http://www.omxnordicexchange.com)