LUND UNIVERSITY
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Is There a Link Between Risk Management and Company Value?

A study on large Swedish corporations

Master Thesis – Corporate and Financial Management

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ABSTRACT

Title: Is There a Link Between Risk Management and Company Value?

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Key words: Risk Management, Company Value, Tobin's q, Risk Management Disclosure, Regression Analysis.

Purpose: This research aims to investigate whether there is a relationship between the use, measured by the disclosure, of risk management in large Swedish corporations and the companies' relative value, measured by *Tobin's q*. Our goal is that this study will contribute to the already existing but ambiguous research.

Methodology: Quantitative, deductive approach with multiple regression analysis.

Theoretical Perspectives: The theoretical perspective gives the reader insight to risk management in general and how it can be value creating. This is followed by earlier empirical research regarding the specific question.

Empirical Foundation: The research includes a sample of 52 companies that are all listed on Nasdaq OMX Stockholm, Large cap. We find that there are large variations in the data sample. The individual coefficients in the regression analyses are insignificant to describe variations in *q*. However both the complete models, including control variables are significant.

Conclusions: The study cannot conclude whether or not risk management increases company value.

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This chapter is an introduction to the study presented in this report. A short background about risk management, the problem discussion, question of issue, purpose and the motivation behind the report will be presented in this part. In the end of the section the study's limitations will be determined as well as its disposition and target audience group.

1.1 Background

The principle behind financial risk management is the practice of using financial instruments to reduce the company's exposure to financial risks. These instruments should protect the company against financial risks that can occur due to future uncertainties. Common to all types of risk management activities is that the most essential part is the identification and measurement of the risks a company faces. (Horcher, 2005)

What can be observed from the literature regarding risk management is that its importance and popularity has steadily increased, in particular during the last two decades. Companies have started to realize that to be a competitive player it is no longer enough to have the most advanced technology, cheapest labor or the best marketing. Macroeconomic factors such as fluctuations in exchange rates, commodity prices and interest rates can have a large impact on a company's financial performance. (Horcher, 2005)

The reason behind the popularity increase can be attributed to various factors. First of all, companies around the world are operating in an increasingly international environment following the continuous globalization. Companies today have the ability to exploit many new opportunities but they also face larger risks, such as political risks, foreign exchange risks and limited information. Further, factors as foreign exchange rates, interest rates, commodity and securities prices have become more volatile. (Schroeck, 2002)

As the globalization will continue, it will become even more important for companies to be able to protect themselves against these risks. Risk management can be seen as

strategically meaningful for companies and will help them to reach and ensure business and operational goals, performance, results and long-term survival. (Swerma, 2013) When the financial crisis hit the world in 2008, it became even clearer how different markets are interdependent and the attention on financial risk management has never been as high as now.

1.2 Problem Discussion

As Miller and Modigliani (1961, 1958) imply, under the assumption that a market is without imperfections, the use of risk management is irrelevant. This since the market participants easily can diversify their portfolio and thereby replace the risk management activities executed by the companies. Risk management only leads to safer investments and thereby a lower return that creates no additional value for the investors.

Other research within the area claims that risk management should have the potential to increase company value. Myers (1977) and Froot, Scharfstein and Stein (1993) argue that risk management can reduce the costs associated to the conflict among equity and debt holders. Smith and Stulz (1985) imply that risk management can be value adding in the sense of lower cost of financial distress. Graham and Smith (1999) argue that the convex tax curve is an incentive for risk management. Although these studies contribute to theoretical incentives behind risk management - they lack empirical evidence.

The first paper to actually investigate whether there is any correlation between risk management and company value was made by Allayannis and Weston (2001). The report implies that companies that use risk management can enjoy a value premium of close to 5%. Following this study, the interest to investigate the relationship has increased and researchers have contributed with additional findings. Common to many of these studies are however that they tend to have a specific focus and thereby it is hard to apply the results more generally.

One issue that is frequent for all previous studies that investigate the subject is derived from the way to measure risk management. Many researchers, including Allayannis and Weston (2001), measure the use of risk management in absolute terms, either a company uses risk management or they do not. The problem with this method is that it oversees the relative value of the use of risk management.

As a reaction to financial crises and large scandals, the attention regarding companies' requirements to disclose their risk management practices has increased. The *International Financial Reporting Standards* (IFRS) provides, in chapter 7, requirements of how companies are mandatory to report their work with financial instruments. This give rise to the belief that a company's risk management work should somehow be reflected by the disclosure in their annual reports and hence it could be used as a proxy for measuring the use of risk management.

Based on the discussion presented above, we conclude that the existing research regarding the topic is incomplete. This applies both when it comes to the method used for measuring the use of risk management and research done on the Swedish market. This study will therefore try to broaden the existing evidence by using a new measurement method as well as applying it on companies' primary listed on Nasdaq OMX Stockholm, Large Cap.

1.3 Question of Issue

- *Is there any relation between risk management and company value?*

1.4 Purpose

This research aims to investigate whether there is a relationship between the use, measured by the disclosure, of risk management in large Swedish corporations and the companies' relative value, measured by *Tobin's q*. Our goal is that this study will contribute to the already existing but ambiguous research.

1.5 Limitations

We limit the study to cover Swedish corporations registered on Nasdaq OMX Stockholm, Large cap. We will only measure the relative company value with *Tobin's q* and not any further methods. The study will cover one year and risk management will only be measured in quantitative terms, not by qualitative research.

1.6 Target Group

This study is primarily aimed to researchers and university students with prerequisite knowledge corresponding to Master level. The intention is also that other people will find the report interesting, especially people working with risk management.

1.7 Disposition

Figure 1.1 – Overview of disposition

Chapter 1 - Introduction

This chapter is an introduction to the study presented in this report. A short background about risk management, the problem discussion, question of issue, purpose and the motivation behind the report will be presented in this part. In the end of the section the study's limitations will be determined as well as its disposition and target audience group

Chapter 2 – Theoretical Framework

This chapter gives a short introduction to the concept of financial risk management followed by its fundamentals. Further, theories of value creating and non-value creating risk management are presented. The chapter ends with a section on earlier research within the specific area.

Chapter 3 - Methodology

The coming section outline the study's approach used to answer the question of issue. The chapter describes what scientific methods have been used for collecting data and analyze the empirical results. The methodology section ends with a critical reflection of how chosen sources of information affect the quality of the study.

Chapter 4 - Empirical Findings

This chapter starts by presenting some descriptive statistics for our sample. This is followed by a presentation of the results from the data tests and findings from the regression analysis. The chapter is concluded with a description of how to interpret the results.

Chapter 5 - Analysis

This chapter put the empirical results together with theory. First we present a discussion around the measurement of risk management. This is followed by an analysis of the coefficients and the complete regression models. The chapter ends with a critical examination of the results and evaluates the validity of the selected proxy of risk management usage.

Chapter 6 - Conclusion

This section presents the theoretical and empirical conclusions that have been discussed in the analysis. The chapter ends with suggestions to further research within the same empirical and theoretical field

Chapter 7 – References

In this section the references used are presented in alphabetical order.

Appendix

The appendix contains full lists and tables of, companies, search words and data used.

2 THEORETICAL FRAMEWORK

This chapter gives a short introduction to the concept of financial risk management followed by its fundamentals. Further, theories of value creating and non-value creating risk management are presented. The chapter ends with a section on earlier research within the specific area.

2.1 Financial Risk Management

The concept of *financial risk management* addresses the problems that arise due to future uncertainties on the financial markets. When managing a company, it is important to be able to make decisions about which risks to be considered acceptable and which risks that are considered too high for the company to bear. The decision not to hedge at all implies that a company accepts all risks by default. (Horcher, 2005)

Companies can use a variety of strategies that include different products in their effort to protect themselves against future financial uncertainties. For these products to be effective, they require a management that is well aware of both the characteristics of the company's risks as well as the characteristics of the products they use. It is also important that the use of these products reflect the company's objectives in question of risk tolerance (Froot, Scharfstein & Stein, 1994).

The most commonly used type of risk management strategy involves certain types of derivatives. The price of the derivative is a reflection of the value of the underlying asset (Smithson, Smith, & Wilford, 1995). Derivatives are usually categorized into two types, *forward-based* and *option-based*. The distinction between these two is that the option-based derivatives have values that are linear in the price of the underlying asset and have a maximum loss known by the trader. Forward-based derivatives instead have unlimited liabilities. (Culp, 2001)

2.2 Fundamentals Behind Risk Management

The striving goal for a company with an active risk management policy must be that the risk management activities should result in a higher company value. Froot (1994) describes this as if hedging activities cannot add company value then the company

should not pursue hedging. Since the value of a company could be seen as a reflection of the present value of future cash flows, the fundamental behind value creation is derived from the simple argument that hedging activities must either increase cash flows or decrease the discount rate (Schroeck, 2002). There are also analysts who argue that the use of risk management can be a strategic weapon. This is based on the notion that market participants tend to experience risks higher than they actually are, and punish companies disproportionately because of that. (Damodaran, 1997)

Literature as well as earlier research within the corporate finance field differs on whether it is possible for risk management to add value to the company or not. Theories also differ in the way they describe the utilization of risk management advantages.

2.3 The Irrelevance of Risk Management Decisions

The most basic theories behind risk management seem to suggest that the use of instruments to mitigate financial risks cannot be value adding for the company's shareholders.

The irrelevance of risk management and why it does not create company value is derived from different perspectives. First, according to the proposition made by Miller and Modigliani (1958), decisions made within the corporate finance field cannot add company value in a perfect market since its shareholders can easily replicate by hedging themselves (Aretz & Bartram, 2010). The second perspective argues that the *Net Present Value* (NPV) of an unhedged company is the same as the hedged company's *NPV*, since fairly priced derivatives cannot have any impact on expected value (Culp, 2001).

2.3.1 Miller and Modigliani

Miller and Modigliani (1958, 1961) base their theory on four assumptions.

1. Perfect capital markets
2. Symmetric information
3. Given investment strategies
4. Equal access to remain in force

These assumptions imply important results that are of great relevance for decisions within financial risk management. The implications are presented in the following section.

The *irrelevance of capital structure* implies that the value of a company is not affected by the company's leverage. The profit of an investment will always be the same, independently of whether it is financed with debt or equity. Miller and Modigliani describes this in their *Proposition I* as: If an investor stands in front of the decision to buy shares in either the levered company A or the unlevered company B, the investor can always buy shares in B and then borrow the same relative amount that is in company A. This means that the potential return will always be the same for the two investments. (Fama, 1978)

Miller and Modigliani (1958) describe *irrelevance of debt and leverage* in their *Proposition II* as: A company's cost of capital is unaffected by the amount of leverage even though debt appears to be a cheaper source of finance. This comes from equity holders' increased expected return as a function of investing in a company that bears more debt and by that is more risky.

The *indifference of security holders* cannot really be accepted by just assuming the aforementioned assumptions. The four Miller and Modigliani assumptions can only guarantee that the company itself is independent of its security holders but not that its security holders are independent. To be able to accept this statement, additional assumptions are required.

5. Assigned seniority to existing debt holders
6. Early retirement of debt should begin with the most junior issuers

If including these assumptions the company's security holders also become indifferent of its financing decisions. (Culp, 2001)

The last implication, *the irrelevance of hedging and insurance*, states that a company's value is not only independent of the company's capital structure but also by actions taken to control risks. This can be trough hedging and insurance. If all shareholders

hold perfectly diversified portfolios, then the impact of a company that starts to hedge will possibly ruin the investors 'own' hedge instead of increasing the company value. (Fama, 1978)

It is important to understand that investors might simply choose to invest in a particular company due to the exposure to a specific risk. It can be that the investor holds a negatively correlated stock so that the effect of a possible downturn in the stock price will be reduced when it comes to the investor's wealth.

This comes down to the argument, underlying the Miller and Modigliani propositions, that whether or not the investors hold portfolios that are perfectly correlated, they are indifferent to risk management decisions. (Culp, 2001)

2.3.2 Equilibrium Asset Price

The concept behind this theory states the basic precept that you get what you pay for. In a world that is free from arbitrage opportunities and where its inhabitants prefer more to less, the equilibrium price of all assets will always be reflected by the risk that the assets bear. This theory includes all types of assets, such as stocks, bonds, forwards, futures, swaps and options etc. If all investors are compensated for the risk they have by holding a specific asset, it must lead to the conclusion that risk management cannot be value adding (Copeland & Weston, 1988).

There are many famous researchers within finance that have tried to come up with the right asset pricing model that will be able to both discount risky assets in the absence of arbitrage and in equilibrium. The model with most recognition is the single-factor *Capital Asset Pricing Model* (CAPM). What the model does is expressing the return of an asset as a linear function with respect to a combination of risk factors. According to the model, the only thing that matters is the systematic risk. The unsystematic risk can instead be diversified away by the investors. Dufey and Srinivasulu (1983) emphasize the fact that, according to *CAPM,* the only thing that happens when entering into a contract is moving along the *security market line*, thus no value is created.

Although *CAPM* is the most well known model, there are many other models that do not use a stochastic discount variable that is not linear but instead try to identify discount factors directly. What they all have in common is that they show the relationship that the price of an asset equals the discounted expected present value on the cash flows on that specific asset assuming perfect capital markets. (Culp, 2001)

2.3.3 Theories Behind Value-Adding Risk Management

This section will bring up theories behind how risk management can create additional value for companies. As Miller and Modigliani show in their propositions, risk management cannot be value adding in a perfect market. This implies that increased company value can arise from risk management that utilizes the capital market imperfections. Shareholders would then not be able to perfectly replicate the risk management activities of the company. Several theories exist on how risk management can be beneficial and most of these arise from violations to Miller and Modigliani assumptions. They can also be associated back to the conception made by Jensen and Meckling (1976) of a company as a nexus of contracts. Existing literature use several ways of describing theories behind value creating risk management. Three main areas where risk management can be value adding are identified and will be described in the following section.

1. *Reducing transaction costs*
2. *Reducing agency costs*
3. *Reducing taxes and market imperfections*

2.4 Reducing Costs as a Rationale for Risk Management

2.4.1 Costs of Financial Distress and Bankruptcy

One of the most widespread reasons for companies to manage risks might be the attempt to mitigate the risk for financial explosions that can result in financial distress and even bankruptcy. Companies cause these kinds of situations when their cash flows are not sufficient to cover payment obligations on time. Larger portion of leverage and more volatile cash flows make companies more vulnerable to this risk. Although risk management can reduce the likelihood of default, it is not by that, the

value is created. Instead, the increased value is connected to the reduced agency and transaction costs. (Smith & Stulz, 1985)

In a situation of bankruptcy, both creditors and shareholders look to recover as large parts as possible of their investments by their claims on the residual value of the company. Often this is a process that ends up in a costly dispute (Warner, 1977a). Due to the Miller and Modigliani assumptions, risk management would however not have any impacts. If transaction costs did not exist, a bankruptcy would be costless and only result in proportional asset redistribution to the company's liability holders (Culp, 2001).

Warner (1977b) revealed that there are relatively small costs that are directly connected to a bankruptcy, 1% to 3% of shareholder value. Instead much of the costs are indirect costs. According to Cutler and Summers (1988) these costs corresponds to 20% of shareholder value and occurs when suppliers and customers expect near future insolvency and require premiums to engage in transactions with the company.

When a company uses risk management it reduces the volatility of the company's cash flows, which mitigate the likelihood of default and thus lower the expected cost of financial distress. Lower expected costs of financial distress result in increased company value (Stulz, 2003, 1996). This can be described with the following two formulas:

$$Company\ Value = Company\ Value\ without\ Transaction\ Costs \\ -PV(Expected\ Financial\ Distress\ Costs)$$

Formula 2.1 – Company value

$$E(Financial\ Distress\ Costs) = Prob.(Default) \times E(Default\ Costs)$$

Formula 2.2 – Expected financial distress costs

Given what is stated above, that risk management can lower the cost of future financial distress, it must be more value adding for companies with high leverage and hence more payment obligations to get engage in risk management activities (Tufano, 1996).

As an additional advantage, by increase the use of risk management, the company will be able to take on more debt and enjoy better use of their tax shield, which also leads to increased company value (Graham & Rogers, 2002).

2.4.2 Agency Costs as a Rationale For Risk Management

In a Miller and Modigliani world, with symmetric information, given investment decisions, and equal access to remain in force, the value of risk management regarding contractual relations would be zero. (Aretz & Bartram, 2010)

Jensen and Meckling (1976) see a company as a set of contracts between different parties, such as, managers, creditors, shareholders and employers that have different interest, which can cause costly conflicts. It can be that managers who are more involved in the company's activities have an information advantage over its shareholders and that these two parties do not share the same interests.

Since the conflicts among the different parties give rise to agency costs, which hence cause a reduction of company value, the value of risk management lies in the reduction of these costs. (Schroeck, 2002)

2.4.2.1 Managers and Security Holders

The conflict between managers and security holders can often be derived to two different problems, the *overinvestment problem* and the *risk preference problem*.

Managerial discretion and hence the *overinvestment problem* becomes particularly relevant for a company with a large amount of free cash flows (Jensen, 1986). Agency costs arise when equity holders have to control managers' behavior so they do not spend free cash flow on non-value creating activities such as empire building or unnecessary benefits (Jensen, 1986). This problem increases when the managerial ownership in the company is low. One way to prevent these problems is by active

monitoring. Since shareholders usually do not have incentives to engage in that kind of monitoring, it is not a very effective mechanism. (Aretz & Bartram, 2010) By using risk management, the volatility of free cash flows will be limited and result in fewer opportunities for managerial discretion (Tufano, 1998). A company that uses risk management may also be a more attractive investment for an undiversified investor who wants to hold a large stake. This in turn results in a more concentrated ownership followed by increased incentives for monitoring and thus higher cash flows (Stulz, 2003).

The *risk preference problem* is a foundation based on the problem that arises due to managerial risk aversion. Managers use to have a relatively undiversified wealth position with their welfare strongly connected to the company. This leads to managers becoming very risk averse, alternatively demand a higher compensation. None of which are in line with shareholders best interests (Stulz 1990, 1984). Risk management will result in a less volatile company and thereby a lower probability of default. This would in turn mean a lower compensation needed by the managers (DeMarzo & Duffie, 1995). An additional potential is that corporate hedging might increase company value by preventing managers to spend money on expensive diversification strategies (Bodnar, Tang & Weintrop, 1997).

2.4.2.2 Conflicts Among Security Holders

Conflicts between security holders and managers can give rise to value creating risk management. As will be shown in this section, there are also opportunities to implement risk management due to conflicts among security holders. These conflicts can be divided into the *asset substitution problem* and the *underinvestment problem*. Both problems arise due to the likelihood of default when a company to some extent is financed with debt, which clearly brings benefits due to the tax shield. (Culp, 2001)

The *asset substitution problem* arise due to the fact that shareholders have a residual claim and incentives to switch from projects with low variance, which was agreed to the bondholders, to high variance projects (Jensen & Meckling, 1976). This behavior results in increased value of shareholders' claims but at the same time reduced value

of bondholders' fixed claims. Not only will this behavior reduce the value of bondholders' claims, it also often results in reduced value of the company as a whole. (Schroeck, 2002)

The value destroying costs arise since rational debt holders will understand that this problem might occur, and because of that, either require higher premiums or want to pay a lower bond price. It is also likely that bondholders try to prevent this from happening by writing strict covenants or issuing convertible debt. The consequences of this can lead to a suboptimal investment policy and reduce the company's needed flexibility and hence increasing the agency cost of debt. (Stulz, 1999)

With risk management, companies will be able to decrease the costs arising from the *asset substitution problem* by lowering the cash flow volatility. Less volatile cash flows increase the debt capacity without increasing the risk of default, hence *risk shifting* would be less of an issue. By reducing the probability of default, the bond price or coupon rate would decrease since the investment becomes less risky. (Schroeck, 2002)

The *underinvestment problem* addresses the risk that managers might reject positive *NPV* projects when the profit will primary accrue to the bondholders. To prevent this problem, costly negotiations and debt contracts are often needed. One way to reduce problems associated with underinvestment is to reduce the amount of debt outstanding, but this would instead lead to a reduction of the tax shield. (Smith, Smithson & Wilford, 1990)

When a company uses risk management, it reduces the volatility of the company's cash flows and by that, makes it less likely to default on their obligations. A company with a lower risk of default has fewer costs associated with underinvestment conflicts since the payments to debt holders are safer with less volatile cash flows. The consequence of safer payments to debt holders also reduces the incentives for managers to skip positive *NPV* project and hence increases company value. (Smith, 1995; Smith et al., 1990)

2.4.3 Taxes and Other Market Imperfections

2.4.3.1 Taxes

Due to Miller and Modigliani, the value of a company is a linear function of assets and liabilities. One of the strongest assumptions is perfect capital markets and nonexistence of institutional frictions, which includes corporate taxes. This means, for tax reasons, it would not matter if a company decided to hedge or not. (Culp, 2001)

Smith and Stulz (1985), Bartram (2000), Santomero (1995), Mayers and Smith (1990), Smith et al. (1990) argue that the structure of tax code can make it beneficial for a company to use hedging instruments such as futures, forwards and options. This since the effective marginal tax rate is an increasing function of a company's pre-tax value. This means that the after-tax value is a concave function of the pre-tax value. The consequences of this implies that if hedging can reduce the volatility in the pre-tax value of the company, it would lead to reduced corporate tax liabilities and by an increased after-tax value of the company.

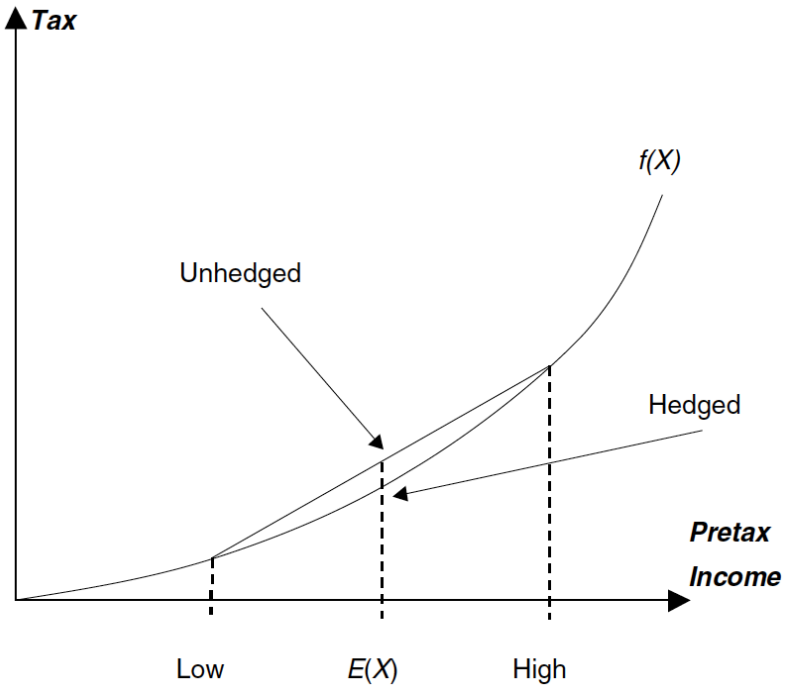

Figure 2.1 – Effects of convex tax schedule on liabilities. Source: Schroeck, 2002 (Adapted from Smithson et al. (1995), p. 104.)

As figure 2.1 and 2.2 shows, if hedging can reduce the pre-tax value volatility of the company, then the company's expected tax liability will fall, which leads to an increase in the expected after-tax value of the company.

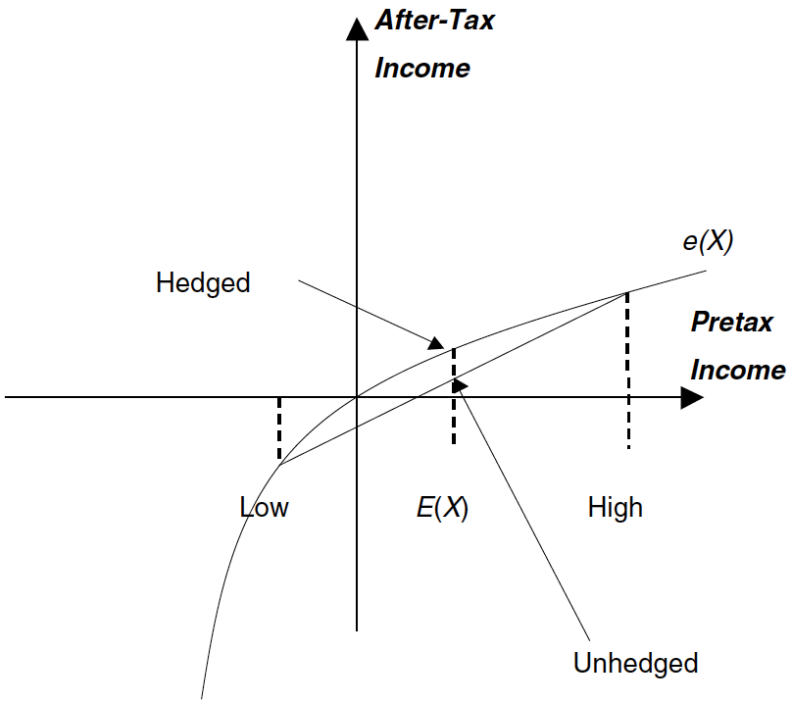

Figure 2.2 – Effects of convex tax schedule on income. Source: Schroeck, 2002 (Adapted from Smithson et al. (1995), p. 104.)

The level of convexity that a company faces is often due to statutory progressivity, but as Mayers and Smith (1990) imply, statutory progressivity is relatively limited in most tax systems. Aretz and Bartram (2010) also highlight the indirect effects that might result in a more convex tax function, which can come from special tax preference items. The consequences of this imply that companies with larger amounts of income in the convex region of the tax curve or with a large amount of special tax items would benefit more from hedging. Aretz and Bartram (2010) emphasize the fact that companies facing low tax rates can benefit more from the convexity since the tax schedules in most countries apply a curve that is convex up to the a certain level and then becomes linear. Corporations in Sweden face a fixed tax

rate that has been changed from time to time. In 2011 the tax rate was 26.3%. (Ekonomifakta, 2013)

2.4.3.2 Other Market Imperfections

In addition to what have been mentioned, other market imperfections can be a reason for companies to engage in risk management to increase company value.

Dividend Policy: Since dividends tend to have signal effects, companies like to have stable dividend payouts. Companies are worried about future volatility in cash flows and the fact that they can be forced to reduce the dividend payouts. When managers get too much free cash flow, there is a risk that they will invest in negative *NPV* projects, which in turn leads to value destruction. With risk management, the cash flows will be more stable and result in managers taking on less value destroying projects. (Damodaran, 1997)

Perceived risk: This imperfection is based on the notion that market participants have a tendency to experience risks higher than they actually are. This in turn leads to a market that punishes companies with higher risks disproportionately. (Schroeck, 2002)

2.4.4 Summary of Value Creating Risk Management

Theory Summary	
Reduce Transaction Costs	Costs connected to the probability of future bankruptcy makes it rationale for companies to engage in risk management since it will lower their cash flow volatility and hence the risk of default.
Reduce Agency Costs	*Conflicts Between Managers and Security Holders* The monitoring costs of managerial discretion will be reduced since the conflict between managers and security holders will be lowered with reduced free cash flows. The cost of managerial risk aversion will be lowered since the fluctuation in company value will be reduced.
Reduce Agency Costs	*Conflicts Among Security Holders* Risk management will reduce free cash flows and due to that, the costs that arise because of conflicts between shareholders and debt holders. The savings can often be traced to a reduction of the underinvestment problem and the asset substitution problem.
Reduce Taxes and Other Market Imperfections	Regimes with convex tax curves make it rationale for companies to engage in risk management since it will lower their tax burden due to reduced volatility of the companies' pre-tax income. Dividend policy and perceived risk also make it rational to engage in risk management.

Table 2.1 – Summary of theories behind value creating risk management

2.5 Earlier Research

Due to most of the theories described above, risk management has the capacity to increase company value. The question is if the reality matches the theories. This part brings up previous research that has focused on the particular question 'Does risk management creates additional company value?'

Even though risk management has been used for many years, the question on whether it is value creating or not came into focus relatively recently. Allayannis and Weston (2001) aimed to examine the direct relation between company value and hedging. 720 large, non-financial companies are studied between 1990 and 1995. *Tobin's q* measures the companies' values and their hedging activities are measured in

absolute terms, either they hedge or not. They find significant results that the market values of companies that engage in hedging activities are on average 4.87% higher than for companies that do not use hedging instruments.

Although this contribution is of economical importance it should not be taken as obvious evidences. Guay and Kothari (2003) conclude that corporate derivative positions are in general not sufficient to account for an increased value of 4.87% as suggested by Allayannis and Weston (2001). Guay and Kothari instead argue that the existing correlation between company value and the use of derivatives stem from the tendency that successful companies use derivatives to a greater extent.

Graham and Rogers (2002) studied 442 companies within different sectors, showing the potential of derivatives to increase company value by an average of 1.1%. This increase is assigned to companies' capabilities to take on more debt due to the tax shield. Nain (2004) show that companies that decide to use financial derivatives in hedging intensive sectors have a 5% higher *Tobin's q* compared to companies without hedging activities.

Regarding the relation between risk management and commodity price hedging, a few studies have been made. Smithson and Simkins (2005) consolidate these studies with the result that none of them show a positive relation between commodity hedging and equity value. The results either show no relation or negative effects. Smithson and Simkins bring up the most important paper by Jin and Jorion (2004), who studied 119 oil and gas producers based in the U.S. between 1998-2001. The outcome of the study is that even though hedging activities can reduce the exposure to fluctuations in oil and gas price, it does not result in increased company value. The authors also conclude, that investors may decide to invest in oil producers with the aim to gain the exposure to oil the price. If this is the case, a company that starts to hedge will reduce the investors' exposure to the oil price against their will.

Allayannis, Lel and Miller (2011) find that companies with strong engagement in internal corporate governance tend to have a higher company value. The study

enhances the important aspect, that for risk management to result in a high-risk premium, it is of great importance to have a strong presence of corporate governance.

Clark and Judge (2009) indicate that different kinds of hedging instruments could increase company value in a range between 11-34%. The result shows that foreign exchange derivative strategies contribute with an average value premium of 14%, but debt-based strategies do not contribute with any significant value creation. The average result, including all hedging strategies, is that hedging increases company value by 12%. This is well above the results found by Allayannis and Weston (2001) as well as Nain (2004).

2.5.1 Risk management transparency

In addition to the findings above, and due to our selected method of measuring risk management, it is of relevance to mention empirical findings regarding increased transparency and value creation. These theories are based on the fact that increased transparency will reduce information asymmetry. But like many other theories, they often fail to provide real evidence. Muller and Verschoor (2008) were the first ones to investigate whether the disclosure of risk management can show any positive relation to company value. They find no strong correlation between risk management disclosure and company value.

3 METHODOLOGY

The coming section outline the study's approach used to answer the question of issue. The chapter describes what scientific methods have been used for collecting data and analyze the empirical results. The methodology section ends with a critical reflection of how chosen sources of information affect the quality of the study.

3.1 Selection of Approach

This study has a quantitative approach in collection of data since it is more suitable and in a better way will answer the question of issue. The results are dependent on large amounts of data, which is better and more correctly obtained by a quantitative examination rather than a qualitative approach.

As the study is based on previous empirical findings and literature it has an approach that is deductive. Since the results should reflect the reality and not be biased with our thoughts and experiences, information has been collected without any expectations. Empirical data is primary collected from a sample of Swedish companies' annual reports and Thomson Reuters DataStream.

3.2 Primary and Secondary Data

The data used in this study is solely secondary and retrieved from annual reports, databases, relevant literature and earlier research. These documents are the basis to answer the study's questions of issue. Scientific articles have been used to access results from earlier research within the specific area. No interviews or other primary collection of data have been conducted.

3.3 Selection of Sample

We choose to do the study on the Swedish market, on companies that have their primary listing on Nasdaq OMX Stockholm, Large Cap. The criteria for a listing on Large Cap is that the company has a market capitalization over 1 billion EUR (Nasdaq OMX, 2012). We exclude Autoliv, Lundin Mining Corporation, and Stora Enso since OMX Stockholm is not their primary listing. BillerudKorsnäs is as of today one company, in 2011 Billerud was a separate entity and thereby the company included in this survey is Billerud. Castellum is excluded due to lack of data in

Thomson Reuters DataStream. Banks (Swedbank, SEB, Nordea and Svenska Handelsbanken) are excluded from the study due to their special assets structure. The complete list of companies included in the study can be found in Appendix A.

The study is conducted on the Swedish market because Sweden is one of few countries in Europe that still have their own currency. Many of the companies listed on Nasdaq OMX Stockholm, Large Cap also have large scale of import and export. The combination of international operations and the fact that Sweden has its own currency makes Swedish corporations exposed to several macroeconomic factors such as volatile exchange rates, fluctuating interest rates and commodity price risks. The above arguments give rise to the consideration that Swedish companies should have significant incentives to engage in risk management and hence it is an interesting market to study.

3.4 Laws of Risk Management Disclosure

As the study applies an approach where risk management is measured as a proxy of risk management disclosure it is important to understand the restrictions that companies have, regarding risk management disclosure. It also enhances the arguments for the study's selected approach regarding the measurement of risk management.

The Swedish stock exchange operates under *IFRS*. Since all companies in the sample are registered on Nasdaq OMX Stockholm, they are required to follow these standards. *IFRS 7 (Financial Instruments: Disclosure)* brings up the requirements regarding disclosure of financial instruments and hence the hedging activities.

According to *IFRS 7*, which is a complement to *International Accounting Standards 32* (IAS 32), companies are required to disclose their risk exposure. This should be done at such level so that the reader of the financial statements has the possibility to evaluate the nature and extent of the risks that the company is facing. The focus of the disclosure should be on the risks that financial instruments give rise to and how these instruments are managed. The types of financial instruments should be divided

into groups that are suitable due to the characteristic and nature of the instruments. (Deloitte, n.d.)

All companies are required to do both quantitative and qualitative disclosure. Risks that are most often included, but not limited to, are: liquidity risk, market risk and credit risk. Table 3.1 shows a summary over what should be disclosed with regards to *IFRS* paragraphs 7.33 and 7.34. (Deloitte, n.d.)

IFRS 7, Requirements of Quantitative and Qualitative Risk Disclosure		
Paragraph	*Regulation Issue*	Disclosure requirements
7.33	*Qualitative Disclosures*	All type of risks that arise due to use of financial instruments should be disclosed by the entity. This includes a description of the risk exposure and how it arises, it also includes the objectives, policies and processes for managing the risk and methods used to measure the risk.
7.34	*Quantitative Disclosures*	All types of risks that arise due to use of financial instruments should be disclosed by the entity. This includes a summary of quantitative data about its exposure.

Table 3.1 – Summary of risk disclosure IFRS 7

3.5 Measuring the Use of Risk Management

The risk management concept can be considered slightly vague and there are no clear directions of what is included in the concept. The fact that different companies use different approaches makes it difficult to measure. Most researchers including, Allayannis and Weston (2001), measure the use of risk management by categorizing the companies as users or non-users. This can however oversee important aspects when it comes to the degree of risk management.

The measurement of risk management in this study is based on how much the selected companies emphasize risk management in their annual reports. The result from this measurement is used as a proxy for determining how much risk management the selected companies' use. *IFRS 7* require companies to communicate

their risk management activities to their shareholders: We assume that the level of risk management should be reflected in the selected companies annual reports, hence the more risk management the company uses, the more it should be emphasized in the annual report.

A list of risk management related word and combinations of word has been developed and matched to the different companies' annual reports, a computer program[1] does the matching. The results rendered in this scan are used as a proxy to estimate the grade of risk management used by the companies.

To get a 'hit' in the annual report, the standalone words needs to be mentioned as they are in the list. For the combination of words the program will only return a 'hit' if the complete combination is located within ±200 characters, independently of order of the words. The complete list of words and combinations of words can be found in Appendix B.

The results from the scan of the annual reports are consolidated in two forms, number of 'individual hits' (RMI) and number of 'total hits' (RMT). See the following section for an explanation of the two.

3.5.1 Explanation of RMI and RMT

RMI, every word or combination of words is just counted once, regardless of how many times it is mentioned in the annual report, i.e. if *risk* is found twenty times in one annual report it is just counted once.

RMT, every word and combination of words is counted as many times as they appear in the annual report, i.e. if *risk* is mentioned twenty times it is counted twenty times.

By using a large amount of risk management related words we have tried to capture all the different ways that the companies might use to mediate their risk management activities.

[1] Thanks to Anders Vilhelmsson, Associate Professor, Department of Business Administration, Lund University.

3.6 Selection of Words

The words that have been selected as risk management related words have carefully been picked referring to literature, annual reports and laws of disclosure. All the selected words and combination of words have characteristics of usually being connected to risk management. Our measure of risk management is somewhat unique although it builds on previous work by Desender (2007), Hoyt and Liebenberg (2011).

3.7 Collection of Data

The data is mainly collected from Thomson Reuters DataStream, some data is found in the different companies' annual reports. We have collected static series from 2011-12-31 and all numbers expressed in currencies are in SEK. The data is cross-sectional since it is not time series data. The reason for conducting the survey on 2011 is because there is a lag in reporting of accounting data.

3.7.1 Definitions of Data

The following section describes the definitions from Thomson Reuters DataStream for the various types of data collected. Tables with complete data can be found in appendix C.

CAPEX: Funds used to acquire fixed assets other than those associated with acquisitions.

Common Equity: Common shareholders' investments in the company.

Current Assets: Cash and other assets that are reasonably expected to be realized in cash, sold or consumed within one year or one operating cycle.

Current Liabilities: Debt or other obligations that the company expects to satisfy within one year.

Dividend Paid: Total and common dividends paid to shareholders. (Used to create dummy variable)

International Sales: Revenues generated from operations in other countries than Sweden. (Used to create dummy variable)

Long-Term Debt: All interest bearing financial obligations, excluding amounts due within one year. It is shown net of premium or discount.

Market Capitalization: Market Price at year-end × Common Shares Outstanding.

Revenues: Gross sales and other operating revenue less discounts, returns and allowances.

Total Assets: The sum of total current assets, long term receivables, investment in unconsolidated subsidiaries, other investments, net property plant and equipment and other assets.

3.8 Tobin's q

Tobin's q was introduced by Brainard and Tobin (1968), the *q*-ratio is a measure of a company's market value and the replacement cost of its assets. The model was originally developed to predict investment decisions. To exemplify, if a company has a *q* between 1 and 0 that means that the replacement costs of the company's assets are greater than the value of the company's stock, hence the implication that the stock is undervalued. If on the other hand the company has a higher *q* than 1, this implies that the company's stocks are valued higher than the replacement cost of its' assets, hence the stock is overvalued.

The *q*-ratio is a measurement that will work as a proxy for company value from an investor's perspective (Wolfe & Sauaia, 2003). Since it is a ratio it makes the *q* of one company comparable to the *q* of another company. *Tobin's q* is used because unlike other measures of performance, it does not require risk adjustment (Lang & Stulz,

1994). *Tobin's q* also reflects the market expectations and is relatively free from managerial manipulation (Lindenberg & Ross, 1981).

The original formula for *Tobin's q* requires complicated calculations and complex data that are out of the scope of this study. We use a simplified approximation of *Tobin's q*, introduced by Chung & Pruitt (1994), which renders a 96.6 % approximation of the original formula for *Tobin's q*.

$$q = \frac{MVE + DEBT}{TA}$$

Formula 3.1 – Tobin's q

$$DEBT = (AVCL - AVCA) + AVLTD$$

Formula 3.2 – DEBT

Where:

MVE = Market value of equity, i.e. stock price * outstanding shares

TA = Accounting value of the company's total assets

AVCL = Accounting value of the company's current liabilities

AVCA = Accounting value of the company's current assets

AVLTD = Accounting value of the company's long term debt

3.9 Multiple Regression Analysis

To determine if there is any relation between risk management and company value we conduct a multiple regression analysis using Eviews 7. The analysis is performed with the *Ordinary Least Squares* (OLS) methodology and accordingly to the equations presented in section 3.9.2.

3.9.1 OLS Estimation - Assumptions

When conducting a multiple regression analysis there are some assumptions that are made for the explanatory variables in order for the model to return reliable coefficients (Dougherty, 2011). The regressions are tested using a variety of tests to see if the estimations are reliable.

A1 The model is linear in parameters and correctly specified; this means that each variable on the right side of the equations presented in section 3.9.2 includes a unique β coefficient and there is no correlation between the βs. (Dougherty, 2011)

A2 There does not exist an exact linear relationship among the regressors in the sample; for the model to explain any variations in q the explanatory variables (A-G) must have a variance that is ≠ zero. (Dougherty, 2011)

A3 The disturbance term (u) has zero expectation; the expected value of u is zero, the disturbance term can vary and be both positive and negative but should not have a systematic tendency in any direction. (Dougherty, 2011)

A4 The disturbance term (u) is homoscedastic; we assume that the disturbance term is homoscedastic, if we have heteroscedasticity in the disturbance term the coefficients returned in the regression will be inefficient. (Dougherty, 2011)

A5 The disturbance term (u) has a normal distribution; the disturbance term is assumed to be normally distributed. (Dougherty, 2011)

3.9.2 Regression Equations

The two models for our regression analysis are as follows:

$$\ln(q) = \alpha + \beta_1 RMI + \beta_2 A + \beta_3 B + \beta_4 C + \beta_5 D + \beta_6 E + \beta_7 F + \beta_8 G + u$$

Formula 3.3 – Regression equation, RMI

$$\ln(q) = \alpha + \beta_1 RMT + \beta_2 A + \beta_3 B + \beta_4 C + \beta_5 D + \beta_6 E + \beta_7 F + \beta_8 G + u$$

Formula 3.4 – Regression equation, RMT

We have performed our test with two different data series representing the use and disclosure of risk management. See aforementioned section 3.5.1 for an explanation of *RMI* and *RMT*.

3.9.3 Dependent Variable

The natural log of *Tobin's q* is set as the dependent variable in the regression analysis, this enables us to interpret the coefficients in terms of percentage change.

3.9.4 Independent Variables

RMI and *RMT*, which represent the use of risk management, are set as the independent variables in combination with the control variables explained in section 3.9.5.

3.9.5 Control Variables

To make sure we are measuring the effect of risk management on company value we are measuring, we need to exclude the impact of other variables on our results. To do this we have included several control variables in the regression analysis. Below follows a description of the control variables and why they are included.

A. *Size:* Peltzman (1977) argues that size leads to higher efficiency and Allayannis and Weston (2001) argues that larger companies' are more likely to use risk management due to large start-up costs of hedging. To account for this we have a control variable that is set as the natural log of total assets.
B. *Access to financial markets:* Companies that uses risk management may forgo investment opportunities because of difficulties to obtain financing for these projects, if they only undertake positive *NPV* project their *q* will remain high. This is accounted for by a dividend dummy which is set to 1 if the company paid a dividend in 2011, and zero otherwise. If the company paid a dividend they are less likely to be financially constraint and therefore we expect the dividend dummy to be negatively related to *Tobin's q*. (Allayannis & Weston, 2001)
C. *Leverage:* A company's capital structure may have an impact on its' value. (Allayannis & Weston, 2001) We adjust for this by including a control variable that is defined as long-term debt divided by common equity.
D. *Profitability:* More profitable companies are likely to trade at higher premium then less profitable companies. If companies that use risk management are more profitable this will result in their *q* being higher. To control for this we

use return on assets defined as revenues to total assets. (Allayannis & Weston, 2011)

E. *Investment growth:* Myers (1977) argue that company value also depends on the company's investment opportunities. Froot et al. (1993) argue that a company that uses risk management will also have greater investment opportunities'. Following these two argumentations we control for the effect of investment opportunities in our results by using a control variable that is a ratio of CAPEX to revenues.

F. *Industrial diversification:* Lang and Stulz (1994) present empirical evidence that industrial diversification is negatively related to company value. To compensate for this effect we will use a dummy variable that is set to 1 if the company is active in more than one segment of the industry and zero otherwise.

G. *Geographical diversification:* Morck and Yeung (1991) find that multinationality is positively related to company value. To account for this effect we use a dummy that is set to 1 if the company has revenues from international sales, and zero otherwise.

3.10 Criticism

3.10.1 Reliability and Validity

The reliability in this study can be attributed to two dimensions. First of all, the reliability of the data that has been collected from different sources, particularly Thomson Reuters DataStream and the companies' annual reports. These sources are widely used and well scanned and why they can be considered reliable. The second dimension is the reliability of methods that have been used to collect data. Since the methods are highly dependent on computer programs, the risk for human mistakes is minimal and the reliability of the result can be considered high.

Regarding the validity in this study it can be divided in two different aspects, the measurement of company value and the measurement of risk management. *Tobin's q* as a proxy for company value is widely used and a proven method, and can because of this be considered to have a high validity. On the other hand, the measurement of

risk management as a function of risk management disclosure can be questioned. Since this study is the first of its kind using this method, there are no other studies that we can benchmark with. The question is if the disclosure has a correlation to the actual risk management activities conducted by the companies or if the only thing that is measured is the disclosure. The validity can due to this be questionable and needs further investigation.

3.10.2 Replicability

All the data is found in Thomson Reuters DataStream and in the companies' annual reports. You could simulate the scan conducted by the computer program by manually checking the annual reports and end up with the same result as the program generates. Since all data is available and well described the study has a high degree of replicability.

4 EMPIRICAL FINDINGS

This chapter starts by presenting some descriptive statistics for our sample. This is followed by a presentation of the results from the data tests and findings from the regression analysis. The chapter is concluded with a description of how to interpret the results.

4.1 Descriptive Statistics

Here we present the descriptive statistics over our data sample. Tables with full data series can be found in Appendix C. In December 2011 there were a total of 79 securities from 59 different companies listed on Nasdaq OMX Stockholm, Large Cap. 20 of the companies listed, had two classes of securities actively traded. There are four banks that will, as aforementioned, be excluded. There are three companies that do not have their primary listing in Stockholm (Lundin Mining, Autoliv and Stora Enso) these are excluded as well along with Castellum due to lack of data in Thomson Reuters DataStream. This results in 52 companies being included in the study. The currency unit used is Swedish crowns (SEK).

As seen in table 4.1 there are large variations in the data material regarding the accounting numbers for the companies in the sample. Total assets (TA) vary from 1.6 billion to 352 billion. Volvo, which has the largest amount of debt, has around 84 billion whilst H&M and Axis do not have any debt at all.

	TA	CE	LTD	Revenues	CAPEX
Mean	68 034 078	30 075 414	12 401 249	50 800 123	2 515 985
Median	37 296 000	14 978 500	7 630 800	26 075 000	982 900
Max	352 083 137	159 492 646	84 287 000	310 367 000	17 394 000
Min	1 617 800	-1 601 000	0	408 000	0
Std. Dev.	84 425 333	39 157 205	16 496 759	67 312 676	3 442 606
Obs.	52	52	52	52	52
	CL	**CA**	**Mkt. Cap.**	**Int. Sales**	**Div. Paid**
Mean	19 892 910	24 063 669	62 641 038	40 714 302	2 752 973
Median	8 618 000	10 522 067	25 787 172	16 609 852	817 000
Max	153 210 000	198 816 000	409 614 552	296 259 000	24 921 624
Min	8 000	11 000	6 032 187	0	0
Std. Dev.	31 596 223	41 076 931	88 322 301	60 865 314	4 636 862
Obs.	52	52	52	52	52

Table 4.1 – Descriptive statistics accounting data

Variables A-G in table 4.2 are the control variables described in section 3.9.5. Variables B, F and G are all dummy variables. As seen for variable B a mean of 0.9808 means that 98.08% of all the companies in the study paid a dividend in the year of 2011 (all companies except Lundin Petroleum). Both variables F and G, industrial and geographical diversification are dummy variables and the table shows that 71.15% of the companies are active in more than one segment of their industry. 88.46% of the companies are internationally diversified, i.e. they have revenues from operations in other countries than Sweden.

	A	B	C	D	E	F	G
Mean	17.4661	0.9808	0.3535	0.8738	0.1384	0.7115	0.8846
Median	17.4344	1.0000	0.3675	0.8072	0.0309	1.0000	1.0000
Max	19.6794	1.0000	1.4635	4.2212	2.1268	1.0000	1.0000
Min	14.2966	0.0000	-5.3310	0.0211	0.0000	0.0000	0.0000
Std. Dev.	1.0904	0.1387	0.8743	0.7088	0.3432	0.4575	0.3226
Obs.	52	52	52	52	52	52	52

Table 4.2 – Descriptive statistics control variables

Table 4.3 shows the statistics over the calculations and input used for computing *Tobin's q*. As seen in the table, there are large variations among the companies here as well.

	MVE	AVCL	AVCA	AVLTD	DEBT	TA
Mean	62 641 038	19 892 910	24 063 669	12 401 24	8 230 490	68 034 078
Median	25 787 172	8 618 000	10 522 067	7 630 800	2 610 433	37 296 000
Max	409 614 55	153 210 00	198 816 00	84 287 00	237 360 95	352 083 13
Min	6 032 187	8 000	11 000	0	-78 531 000	1 617 800
Std.	88 322 301	31 596 223	41 076 931	16 496 75	36 880 006	84 425 333
Obs.	52	52	52	52	52	52

Table 4.3 – Descriptive statistics data for calculation of Tobin's q

4.2 The Relative Use of Risk management

As seen in table 4.4, regarding individual hits (RMI) on the selected words in our sample, we get a result that range, from 45, which is obtained by Melker Schörling, to 89, which is obtained by Ericsson. When it comes to the amount of total hits (RMT), the company with the lowest amounts of hits, is once again Melker Schörling (379), and the company with the most hits is Investor (2558).

	q	ln(q)	RMI	RMT
Mean	1.2817	0.0006	69	1153
Median	0.9337	-0.0686	69	1035
Max	5.5810	1.7194	89	2558
Min	0.2259	-1.4875	45	379
Std. Dev.	1.1295	0.6676	10	491
Obs.	52	52	52	52

Table 4.4 – Descriptive statistic Tobin's q, dependent variable, RMI and RMT

When comparing these results graphically you can see that a relation exists, the companies with high amounts of individual hits also have a high amount of total hits, and the opposite.

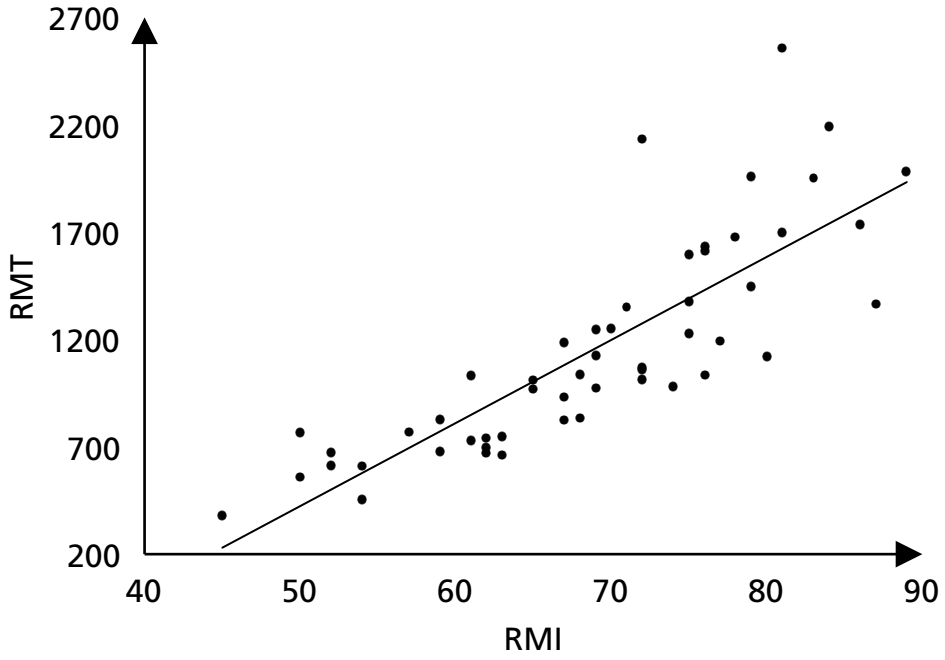

Figure 4.1 – Relation between RMI and RMT

4.3 Test of Data

To see if the results of the regression analysis are reliable, we have tested the regressions for a series of violations of OLS assumptions previously described in section 3.9.1. The following section will describe the results of these tests.

4.3.1 Heteroscedasticity

If the errors in the regression do not have a constant variance they are heteroscedastic. This means that there is a systematic increase/decrease in the variance of the errors although the mean might be fairly constant. If the errors are heteroscedastic and this is ignored the model will still return unbiased and consistent coefficients. Heteroscedasticity may results in that the standard errors of the coefficients are underestimated and the p-values are too low. (Brooks, 2011)

The regressions are tested for heteroscedasticity using the *Breusch-Pagan-Godfrey* test. The null hypothesis is that the variance of the residuals is constant, i.e. we have homoscedasticity. The test is performed at 5% significance level. With p-values of 0.2495 and 0.2650 respectively, we can accept the null hypothesis of homoscedasticity in the data and thus, this do not affect our results.

Variable	Coefficient	p-value	Variable	Coefficient	p-value
α	-0.2417	0.8410	**α**	0.3748	0.7730
RMI	-0.0023	0.7407	**RMT**	0.0001	0.4468
A	-0.0171	0.8096	**A**	-0.0640	0.3859
B	0.4049	0.3862	**B**	0.4281	0.3411
C	0.0227	0.7539	**C**	0.0397	0.5710
D	0.2251	0.0461	**D**	0.1619	0.1204
E	0.1708	0.5496	**E**	0.1013	0.7165
F	-0.0915	0.5754	**F**	-0.0987	0.5389
G	0.5091	0.0648	**G**	0.4436	0.0930
R-squared	0.1998	-	***R-squared***	0.1958	-
F-statistic	1.3417	-	***F-statistic***	1.3088	-
p-value F-stat.	-	0.2495	***p-value. F-stat.***	-	0.2650

Table 4.5 – Heteroscedasticity test

4.3.2 Non-normality

Assumption A5 says that the residuals in the OLS estimation must be normally distributed. If the residuals are not normally distributed the inferences made about

the coefficient might be wrong (Brooks, 2011). The normality assumption is tested using a *Jarque-Bera* test for normality, the null hypothesis is that the residuals are normally distributed. With p-values of 0.6609 and 0.7919 respectively, we can accept the null hypothesis of normally distributed residuals.

	Residual - RMI	Residual - RMT
Mean	0.0000	0.0000
Median	0.0070	0.0158
Maximum	1.1872	1.2029
Minimum	-1.5301	-1.5144
Std. Dev.	0.5630	0.5542
Skewness	-0.3085	-0.2315
Kurtosis	2.9591	2.9695
Jarque-Bera	0.8284	0.4667
p-value	0.6609	0.7919
Observations	52	52

Table 4.6 – Normality test residuals

4.3.3 Multicollinearity

Multicollinearity occurs when the explanatory variables are very highly correlated with each other. This can lead to high R-square values but the individual coefficients will have poor precision and the regression becomes sensitive to small changes in specifications. The rule of thumb is that a correlation between the independents that is higher than 0.8 will affect the results. (Brooks, 2011) The correlation matrix below shows that we have no multicollinearity in our explanatory variables and thus, this will not affect the results of the regression analysis.

Obs. 52	A	B	C	D	E	F	G
A	1.0000						
B	0.0954	1.0000					
C	0.1574	0.0237	1.0000				
D	-0.3103	0.0869	-0.0296	1.0000			
E	-0.0628	-0.1636	0.0841	-0.3245	1.0000		
F	0.3512	0.2199	-0.1093	0.0226	-0.4445	1.0000	
G	0.1709	-0.0505	-0.0974	-0.0005	-0.6470	0.3014	1.0000

Table 4.7 – Correlation matrix control variables

4.4 Results From Regression Analysis

In this section we present the results from the regression analysis. *RMI* and *RMT* are the dependent variables, variables A-G are the control variables previously defined in section 3.9.5. The coefficients in the table show if there is any relationship between the tested variables. The regression analysis is performed at 5% significance level, a p-value below 0.05 means that the result is statistically significant. R-squared is the coefficient of determination, a value of 0.2890 means that the model can explain 28.90% of the variation in the dependent variable.

4.4.1 Results RMI

The coefficient for *RMI* of -0.0075 indicates a weak negative relationship between company value and risk management, holding everything else constant. The results are not statistically significant at a 5% level. The only coefficient, which is statistically significant, is the coefficient for *leverage* (C), holding everything else constant. The complete model however, with a p-value of 0.0478 is statistically significant. This means that *RMI* on its own cannot explain the dependent variable *ln(q)*, but all the explanatory variables combined in the model can explain the variations in the dependent variable *ln(q)* to a degree of 28.90% (R-squared).

Variable	Coefficient (β)	p-value
α	2.6384	0.1315
RMI	-0.0075	0.4547
A	-0.0666	0.5129
B	-0.9441	0.1614
C	-0.2291	0.0314
D	0.1997	0.2101
E	-0.0714	0.8612
F	-0.3273	0.1659
G	0.1344	0.7286
R-squared	0.2890	-
F-Statistic	2.1842	0.0478

Table 4.8 – Regression output, RMI

4.4.2 Results RMT

The coefficient for *RMT* is -0.0003, which indicates that there is almost no relationship between company value and risk management. Again the coefficient is not statistically significant. The only variable with a p-value lower than 0.05 is *leverage* (C), same as in the other analysis. Same as for *RMI*, significant F-statistics means that the whole model is significant and that all the explanatory variables combined can explain the variation in the dependent variable *ln(q)*, in this model to a degree of 31.08%.

Variable	Coefficient (β)	p-value
α	1.5746	0.4042
RMT	-0.0003	0.1697
A	-0.0216	0.8391
B	-0.8933	0.1724
C	-0.2318	0.0262
D	0.2182	0.1476
E	-0.0071	0.9860
F	-0.2901	0.2153
G	0.1444	0.7012
R-squared	0.3108	-
F-Statistic	2.4239	0.0294

Table 4.9 – Regression Output, RMT

4.4.3 Explanation of Result Interpretation

Since the data is cross-sectional the interpretation of the coefficients needs some explanation. The different coefficients vary in terms of their unit of measurement. The natural log of the calculated value of *Tobin's q* is the dependent variable. This means that, when interpreting the coefficients, a one-unit increase in the independent variables account for a β percentage change in *Tobin's q.*

With a one-unit increase in *RMI* (i.e. if a company receives, a *RMI* of 678 instead of 677) *Tobin's q* will decrease with 0.0075%, holding all other variables constant. A one percent increases in leverage *(C)* will result in a decrease of *Tobin's q* with 0.2291% for *RMI.* The interpretation of individual coefficients should however be

done with caution since they are not statistically significant and the result may be due to randomness.

5 ANALYSIS

This chapter put the empirical results together with theory. First we present a discussion around the measurement of risk management. This is followed by an analysis of the coefficients and the complete regression models. The chapter ends with a critical examination of the results and evaluates the validity of the selected proxy of risk management usage.

5.1 Measurement Method Analysis

The empirical results show that there are large variations in the data material with regards to the number of hits on the search words. For *RMI*, the mean and the median are the same (69), and the standard deviation is 10. The difference between the highest numbers of hits on individual words is 44. Ericsson has the most hits (89) and Melker Schörling the least (45). This is a large percentage difference (97.78%), however, the scale of measurement is too narrow to make any valid conclusions since there are too many companies that have the same *RMI*. The results can due to this be a bit misleading since the amount of hits are the only variable for determining the use of risk management.

If we instead look at *RMT*, the percentage difference between Investor with 2558 hits and Melker Schörling with 379 hits, is substantial (574.93%). The mean is 1153 with a standard deviation of 491. This data series contains more hits and has greater variance among the results. It is reasonable to consider that a company that mentions 'risk' ten times is more involved in risk management compared to a company that only mention the word once. Hence *RMT* possibly show better results than *RMI* in terms of risk management usage.

Since no one (to our knowledge) has previously used this kind of measure when investigating the relationship between risk management and company value, we cannot compare our results with another study using the same method. However, our results seem not to support the findings in the studies by Allayannis and Weston (2001) or Clark and Judge (2009). They suggest that risk management add additional value of 4.87% and 14% respectively. Our findings give the impression to

be more in line with the studies included in the compilation of commodity price and risk management, by Smithson and Simkins (2005). Their results either suggest no relationship or, a negative relationship between company value and the use of risk management. However, these studies were only conducted to see if there is any correlation between risk management and commodity price and hence not a very good comparison for our results.

5.2 Coefficient Analysis

With regard to our empirical results we cannot make any statement whether or not, risk management is value creating. With p-values of 0.4547 (RMI) and 0.1697 (RMT) the results are insignificant. What the tests indicate is that risk management does not increase company value. We received coefficients of -0.0073 (RMI) and -0.0003 (RMT), which implies that a one-unit increase in number of hits results in a 0.075% (RMI) and 0.0003% (RMT) decrease in the relative company value. Instead of risk management being value creating, our results indicate that risk management could possibly be value destroying. As aforementioned, the results are insignificant and with such low p-values the reason that the results appear as they do can be due to randomness. We cannot prove that the use of risk management is value destroying, since the results are insignificant. However, this does not mean that we have proved that is not value destroying.

The size of the sample might be a reason for not finding any significant results. Previous studies have included more companies, Allayannis and Weston (2001) sample consists of 720 companies, and Graham and Rogers (2002) sample include 442 companies. In addition to a larger number of companies included in the study, they use data that covers a longer time period than one year. Even if we had received a result that indicated a positive relationship, the correlation would have had to be very strong to result in significant coefficients.

In line with Allayannis and Weston (2001) we make sure that what is measured is the effect of risk management and not the effect of other parameters. To do this we include control variables, following the methodology of their study, that will help us to explain the dependent variable *ln(q)*.

Both Peltzman (1977) and Allayannis and Weston (2001) argue that it would be reasonable to think that the size of a company will have positive effects on the company's value, but that this effect is not connected to the use of risk management. The results from our regression analysis do not show any significant results that size have a positive impact of a company's relative value. Instead our results indicate, both for *RMI* and *RMT*, that size might have a slightly negative relation to a company's relative value. This is in line with the findings of Lang and Stulz (1994) and Allayannis and Weston (2001), who find significant negative relationship between company value and size.

The argument stated by Allayannis and Weston (2001) for a positive relation between company value and the use of risk management, was built upon the fact that smaller companies do not have the same possibility to engage in hedging due to large start-up costs. Peltzman (1977) argues that size leads to higher efficiency. Since all companies in this study have a market capitalization of over 1 billion EUR, we find it hard to believe that they cannot afford risk management if they need it. According to this argumentation, we would expect our result to show no relation between size and company value.

The second variable that we control for is the companies' relative access to financial markets. This is done by a dummy variable. As Allayannis and Weston (2001) argue, companies using risk management may forgo positive *NPV* projects due to difficulties of financing these. Since we examine this variable by using a dividend dummy, and all companies except one paid a dividend, we will not analyze this variable further.

The third control variable is leverage, this since the capital structure of a company has the ability to influence company value. Both the regressions generated significant results, although the results were not what we expected. Our results show that increased leverage leads to decreased company value. What can be noticed is that two companies, Axis and H&M, do not have any debt at all. This might have lead to disproportionate effects of leverages potential to increase company value.

The fourth control variable is profitability. Due to Allayannis and Weston (2001) more profitable companies are more likely to trade at a higher premium. If companies that use risk management are more profitable this will result in their *q* being higher. Our results are not significant, why we cannot make any statement, but the indication is that more profitable companies tend to have higher *q*.

The fifth control variable is investment growth. Since the results regarding this variable have p-values as high as 0,8612 (RMI) and 0.9860 (RMT) it is not possible to make a statement regarding this variable.

Industrial diversification is measured with a dummy and is expected to affect company value negatively. The results indicate a negative relation but with p-values of 0.1659 for *RMI* and 0.2153 for *RMT* the results are insignificant and the negative coefficients might be due to randomness. The p-values for geographical diversification are higher than 0.7 and hence we will not comment on that variable further.

With the exception of leverage, none of the independent variables can explain *Tobin's q*, holding everything else constant. The outcome from the overall test, including the control variables, is however significant. The p-values for the F-statistic of both regressions (RMI, 0.0478) and (RMT, 0.0294) are below the 5% significance level. However, even if the model is significant, the degree of explanation is only 0.2890 (RMI) and 0.3108 (RMT). This means that around 70% of the explanation of *Tobin's q* is due to other factors than those included in our regression models.

Something worth mentioning is that our study is conducted on an inhomogeneous sample. Many other studies, including Jin and Jorion (2004), investigate the relationship between risk management and company value on companies that operate within the same industry. This makes it easier to derive increased value from the risk management engagement. Our sample, in line with Allayannis and Weston (2001) and Graham and Rogers (2002), include companies within different sectors. The

only thing the companies in our sample have in common is that they are listed on Nasdaq OMX Stockholm large cap. Companies in this kind of studies will conduct risk management due to different purposes why the value creation will be harder to trace.

With regard to our inhomogeneous sample, a way to make the results a better reflection of the overall sample could be to exclude outliers. If the test should be conducted again it is worth considering excluding some companies that have the most extreme values. However, this should be done with great caution as this could lead to misleading results due to the exclusion of observations. As mentioned above, H&M and Axis do not have any debt. Especially since H&M is one of the largest companies this will lower the relationship between leverage and *q*. If excluding such outliers it could possibly give other, more significant results, not stating that these results would lead to correct interpretation. One could claim that it is rather a question of how representative the initial choice of data is than which companies to exclude from the set.

5.3 Why to Expect Lower Value Creation

As mentioned above, one probable reason for not finding any significant result in our study is due to the sample being too small. Even though the results came out insignificant there are reasons to believe that risk management should not have the same effect on the companies included in our sample as the theory suggest.

Among others, Smithson et al. (1995) argue that risk management can be value-creating due to convexity in the tax curve. This does not apply to Swedish companies since companies listed in Sweden always face a linear tax burden. This means that no value can be created due to this argument.

Further, Myers (1977) and Froot et al. (1993) argue that risk management can be value creating with regards to its potential to reduce costs of agency problems. Since all companies in our study are listed corporations there are reasons to believe that these companies are well monitored. As Stulz (2003) implies, high monitoring reduce the risk of overinvestment problem and hence the cost of it. Since large companies

often are considered safer to invest in compared to small companies, they will attract larger investors. These investors will help monitor the management and by that, reduce the costs connected to agency problems.

5.3.1 Disclosure as a Measurement

Since our study use the disclosure of risk management as a proxy for the actual use of risk management, it is rational to question whether this method actually reflects what is meant to be measured. Legislations and standards, *IFRS 7*, require companies to disclose their work with financial instruments. However, these standards only require companies to disclose up to a minimum level, which leads to the risk that the level of voluntary disclosure among the companies' in our sample varies. The consequence would be that our results do not demonstrate the correlation between risk management and company value, but instead the relationship between the disclosure of risk management and company value. If this were the case, our study would be more in line with Muller and Verschoor (2008) who studies if risk management disclosure has any impact on company value. These results are similar to what our results indicate, that no strong relation between company value and the use of risk management. That our results match can however be a coincidence.

When we started this study we were well aware about the difficulties of how to measure the use of risk management, this since it has been a recurrent problem in earlier studies. Among others, Allayannis and Weston (2001) circumvent this problem by only categorize companies as users and non-users. What might increase the reliability of the method is the fact that Hoyt and Liebenberg (2011) use a similar method when investigating the relationship between *Enterprise Risk Management* and company value.

6 CONCLUSION

This section presents the theoretical and empirical conclusions that have been discussed in the analysis. The chapter ends with suggestions to further research within the same empirical and theoretical field.

This study examines the risk management activities of 52 Swedish companies, all listed on Nasdaq OMX Stockholm, Large cap. This is conducted to see if there is any relation between risk management engagement and company value. The level of risk management disclosure in their annual reports determines the amount of risk management the companies use. The companies' relative values are measured by *Tobin's q*.

The outcome of the study is that no significant results can explain the relationship between risk management and company value. The results seem to suggest that instead of risk management having a positive impact on company value, it seems to have a negative effect. This result is not in line with the results presented by Allayannis and Weston (2001) and Graham and Rogers (2002). When we include control variables in the models, the outcome of the regression analysis are significant and can explain close to 30% of the variation in *q*.

One probable reason why the results came out to be insignificant can be due to the size of the sample. It can also be due to the fact that the sample is inhomogeneous when it comes to which industries' the companies are operating in. With a larger sample and a larger number of observations, the p-values will probably decrease and hence, make it possible to make significant statements about the result. When investigating companies operating under similar circumstances, it is easier to trace variations in value to engagement in risk management.

Since all companies in the sample can be considered large and the fact that they are listed in Sweden give reasons to believe that risk management should not have the same impact as the theory suggests. This is derived from the fact that Swedish companies face fixed percentage taxation and that large listed companies are well

monitored by stakeholders. These arguments will reduce benefits from the convex tax curve as well as the potential of risk management to reduce costs connected to agency problems.

Due to the limited amount of time, we have been forced to restrict the scope of this study. This give rise to suggestions of further research within the topic. Since our results came out insignificant, we suggest that research including a larger sample would be of interest. A larger sample while using the same method has the potential to make valid statements on whether risk management is value adding or not to a greater extent.

Further, it would be interesting to conduct the same method when investigating the relationship between company value and risk management on a more homogenous sample. This will make it easier to trace the risk management activities to the relative values of the companies.

Since the measurement of risk management can, due to our experiences and previous research, be considered very hard, we suggest a study that includes a combination of quantitative empirical data and a qualitative investigation. This would help reduce the probability of a result that deviates from the companies' actual use of risk management and hence increase the validity of the findings.

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APPENDIX

The appendix contains full lists and tables of, companies, search words and data used.

Appendix A - Companies Included in the Study

ABB	Alfa Laval
Alliance Oil	ASSA Abloy
AstraZeneca	Atlas Copco
Atrium Ljungberg	Axfood
Axis	Billerud
Boliden	Castellum
Electrolux	Elekta
Ericsson	Fabege
Getinge	Hakon Invest
Hennes & Mauritz	Hexagon
Holmen	Hufvudstaden
Husqvarna	Industrivärden
Investor	Kinnevik
Latour Investment	Lundebergsföretagen
Lundin Petroleum	Meda
Melker Shörling	Millicom International
Modern Times Group – MTG	NCC
Nibe Industrier	Oriflame Cosmetics
Peab	Ratos
SAAB	Sandvik
Scania	SCA
Securitas	Skanska
SKF	SSAB
Swedish Match	Tele2
TeliaSonera	Tieto Corporation
Trelleborg	Wallenstam
Volvo	

Appendix A Table 1 – Companies included in the study

Appendix B - Search Words

ACCESS+CAPITAL+MARKET
ACCURA+INFORMATION
APPROV+STRATEGIES+BOARD
ASSESS+RISK+MANAGE+EXTERNAL
AUDIT+COMMITTEE+RESPONSIBILIT
BENCHMARK+EVALUAT+RESULT
BOARD+RESPONSIBILITY
BUDGET+INTERNAL+AUDIT
BUSINESS+CYCLE
BUSINESS+OBJECTIVE
CENTRAL+TECHNOLOG+RISK
COMMERCIAL+RISK
COMMODITY
COMMODITY+PRICE
COMMODITY+PRICE+RISK
COMMUNICA+RISK+MANAGE
COMMUNICAT+REGULATION
COMMUNICATE+EXTERNAL
COMPETITION
COMPLIANCE
COMPLIANCE+INDUSTRY
COMPLIANCE+REGULATION
COMPLIANCE+RISK
CORRELATION+COMBIN+RISK
CORRELATION+RISK
COST+OF+CAPITAL
CREDIT+EXPOSURE
CREDIT+RISK
CREDIT+RISK+POLICY
CURRENCY
CURRENCY+EXPOSURE
CURRENCY+FLUCTUATION
CURRENCY+RISK
DATA+MANAGEMENT
DATA+RISK
DERIVATIVES
DERIVATIVES+RISK
DISASTER+RECOVERY+PLAN
DOCUMENT+CONTROL
ECONOMIC+RISK
EQUITIES+RISK
EQUITY+RISK
EXCHANGE
EXCHANGE+RATE
EXCHANGE+RATE+EXPOSURE
EXPOSURE
FINANCIAL+EXPOSURE
FINANCIAL+RISK
FLUCTUATION
FOREIGN+EXCHANGE+RATE
FUNDING+RISK
FX+EXPOSURE
HEDGE
HEDGING
HEDGING+RISK
INDEPENDENT+VERIFI
INFLATION
INTEREST
INTEREST+RATE
INTEREST+RATE+EXPOSURE
INTEREST+RATE+RISK
INTERNAL+AUDIT
KEY+RISK+INDICATOR
LIQUIDITY
LIQUIDITY+RISK
LITIGATION
LONG-TERM+DEBT
LONG+TERM+DEBT
MANAGE+RISK
MANUFACTUR+LOCATION+CONCE-
NTRAT
MARKET+RISK
MINIMIZATION+RISK
MINIMIZE+RISK

MONITORING+RISK
OPERATIONAL+EXPOSURE
PAYMENT+RISK
PORTFOLIO+RISK
PRICE+RISK
PROCESS+CONTROL
PROCESS+MANAGE+RISK
PRODUCTION+RISK
QUANTITATIVE+IMPACT+KEY+PERF-
ORMANCE+INDICATOR
REDUCING+EXPOSURE
REFINANCING+RISK
REPORT+BOARD+RISK+MANAGE
REPUTATION+RISK
REVIEW+EFFECTIV+CONTROL
RISK
RISK+ANALYSIS
RISK+ASSESSMENT
RISK+AWARENESS
RISK+EXPOSURE
RISK+FACTOR
RISK+IDENTIFICATION
RISK+MANAGEMENT
RISK+POLICY
RISK+REDUC
RISK+REDUCTION
SAFETY
SALE+CONTROL
SALES+CONTROL
STRATEGIC+RISK
STRATEGIES
STRATEGY
TECHNOLOG+RISK
TRANSACTION+EXPOSURE
TRANSLATION+EXPOSURE
VALID+INFORMATION
WRITTEN+GUIDELINE+MANAGE+
RISK

Appendix B Table 1 – Complete list of search words used in the study

Appendix C - Overview of Data

Regression Variables

	A	B	C	D	E	F	G
ABB (OME)	19.4228	1	0.2047	0.8986	0.0268	1	1
ALFA LAVAL	17.3183	1	0.3377	0.8627	0.0193	1	1
ALLIANCE OIL SDB	17.1815	1	0.7743	0.6844	0.3071	0	1
ASSA ABLOY	17.8153	1	0.3154	0.7654	0.0214	1	1
ASTRAZENECA (OME)	19.6793	1	0.3156	0.6316	0.0249	1	1
ATLAS COPCO	18.1203	1	0.5912	1.0964	0.0212	1	1
ATRIUM LJUNGBERG	16.9574	1	0.8217	0.0871	0.5472	0	0
AXFOOD	15.9248	1	0.0139	4.2211	0.0187	1	0
AXIS	14.2965	1	0.0000	2.2113	0.0125	0	1
BILLERUD	16.0491	1	0.1681	0.9763	0.0510	0	1
BOLIDEN	17.4416	1	0.2362	1.0733	0.0990	1	1
ELECTROLUX	18.1114	1	0.4693	1.3840	0.0311	1	1
ELEKTA	15.9852	1	0.2040	0.9026	0.0112	0	1
ERICSSON	19.4039	1	0.1625	0.8488	0.0220	1	1
FABEGE	17.2401	1	1.1371	0.0587	1.1014	0	0
GETINGE	17.5263	1	1.0351	0.5344	0.0427	1	1
HAKON INVEST	16.1002	1	0.0039	0.2543	0.0096	1	1
HENNES & MAURITZ	17.8922	1	0.0000	1.8658	0.0463	0	1
HEXAGON	17.6647	1	0.5588	0.4168	0.0178	1	1
HOLMEN	17.4270	1	0.1648	0.5039	0.0977	1	1
HUFVUDSTADEN	16.9376	1	0.3303	0.0634	0.6579	0	0
HUSQVARNA	17.1505	1	0.5628	1.0811	0.0231	1	1
INDUSTRIVARDEN	17.8605	1	0.3563	0.0447	0.0000	1	1
INVESTOR	19.1764	1	0.2863	0.0915	0.0294	1	1
KINNEVIK	18.0649	1	0.0827	0.1254	0.0901	1	1
LATOUR INVESTMENT	16.4235	1	0.0371	0.5283	0.0252	1	1
LUNDBERGFORETAGEN	18.2608	1	0.3191	0.2652	0.1575	1	1
LUNDIN PETROLEUM	16.7305	0	0.2068	0.4383	0.5357	0	1
MEDA	17.4570	1	0.9958	0.3369	0.0096	0	1
MELKER SCHORLING	16.7791	1	0.0799	0.0210	0.0000	1	1
MILLICOM INT.	17.6835	1	0.8059	0.6027	0.1544	0	1
MODERN TIMES GP.MTG	16.2329	1	0.3691	1.2011	0.0089	1	1
NCC	17.3038	1	0.4646	1.6049	0.0141	1	1
NIBE INDUSTRIER	16.2712	1	0.9355	0.6983	0.0318	1	1
ORIFLAME COSMETICS	15.7689	1	1.4634	1.8847	0.0312	1	1
PEAB	17.2556	1	0.9310	1.3958	0.0121	1	1
RATOS	17.4868	1	0.8542	0.7621	0.0319	1	0

	A	B	C	D	E	F	G
SAAB	17.2722	1	0.0940	0.7409	0.0138	1	1
SANDVIK	18.3764	1	0.7622	0.9834	0.0530	1	1
SCA	18.7448	1	0.4535	0.5881	0.0726	1	1
SCANIA	18.4981	1	0.5508	0.8519	0.0425	1	1
SECURITAS	17.3752	1	0.9301	1.8221	0.0157	0	1
SKANSKA	18.2111	1	0.0686	1.4640	0.0185	1	1
SKF	17.8772	1	0.5828	1.1401	0.0277	0	1
SSAB	17.9544	1	0.5505	0.7115	0.0696	1	1
SWEDISH MATCH	16.4350	1	0.0000	0.8497	0.0210	1	1
TELE2	17.5910	1	0.5700	0.9341	0.1060	1	1
TELIASONERA	19.3200	1	0.5714	0.4245	0.1666	1	1
TIETO CORPORATION	16.2088	1	0.2088	1.4856	0.0306	0	1
TRELLEBORG	17.1391	1	0.4087	1.0484	0.0368	1	1
WALLENSTAM	17.1816	1	0.3658	0.0560	2.1267	0	0
VOLVO	19.6456	1	0.9965	0.9117	0.0505	1	1

Appendix C Table 1 – Overview of control variables. The table shows the complete values for all the control variables included in the regression analysis.

Accounting Data

	TA	CE	LTD	Revenues	CAPEX
ABB (OME)	272 423 052	108 494 724	22 218 828	244 811 511	6 577 526
ALFA LAVAL	33 210 000	14 982 000	5 060 000	28 652 000	555 000
ALLIANCE OIL SDB	28 963 211	13 488 655	10 445 356	19 824 186	6 089 069
ASSA ABLOY	54 587 000	23 527 000	7 422 000	41 786 000	898 000
ASTRAZENECA (OME)	352 083 137	159 492 646	50 346 599	222 407 620	5 555 059
ATLAS COPCO	74 057 000	28 776 000	17 013 000	81 203 000	1 728 000
ATRIUM LJUNGBERG	23 149 400	9 540 500	7 839 600	2 018 100	1 104 400
AXFOOD	8 243 000	3 237 000	45 000	34 795 000	652 000
AXIS	1 617 800	768 600	0	3 577 600	44 800
BILLERUD	9 334 000	4 871 000	819 000	9 113 000	465 000
BOLIDEN	37 569 000	21 020 000	4 967 000	40 323 000	3 992 000
ELECTROLUX	73 404 000	20 535 000	9 639 000	101 598 000	3 163 000
ELEKTA	8 756 000	3 832 000	782 000	7 904 000	89 000
ERICSSON	267 329 000	143 105 000	23 256 000	226 921 000	4 994 000
FABEGE	30 711 000	11 890 000	13 521 000	1 804 000	1 987 000
GETINGE	40 889 000	14 608 000	15 121 000	21 854 000	935 000
HAKON INVEST	9 823 000	8 456 000	33 000	2 498 000	24 000
HENNES & MAURITZ	58 954 000	44 104 000	0	109 999 000	5 103 000
HEXAGON	46 956 421	22 505 164	12 576 336	19 572 770	349 642
HOLMEN	37 023 000	19 773 000	3 259 000	18 656 000	1 824 000
HUFVUDSTADEN	22 695 000	12 486 900	4 125 000	1 440 100	947 500
HUSQVARNA	28 079 000	12 332 000	6 941 000	30 357 000	702 000
INDUSTRIVARDEN	57 116 000	39 140 000	13 947 000	2 555 000	0
INVESTOR	212 920 000	156 070 000	44 693 000	19 484 000	573 000
KINNEVIK	70 068 000	59 637 000	4 936 000	8 789 000	792 000
LATOUR INVESTMENT	13 573 000	10 489 000	390 000	7 171 000	181 000
LUNDBERGFORETAGEN	85 226 000	30 969 000	9 885 000	22 604 000	3 561 000
LUNDIN PETROLEUM	18 449 330	6 904 064	1 427 882	8 088 047	4 333 236
MEDA	38 152 000	14 975 000	14 913 000	12 856 000	124 000
MELKER SCHORLING	19 368 000	16 636 000	1 330 000	408 000	0
MILLICOM INT.	47 850 469	15 487 960	12 482 049	28 840 719	4 454 989
MODERN TIMES GP.	11 217 000	4 128 000	1 524 000	13 473 000	120 000
NCC	32 733 000	8 286 000	3 850 000	52 535 000	741 000
NIBE INDUSTRIER	11 655 300	4 487 200	4 198 000	8 139 800	259 100
ORIFLAME COSMETICS	7 053 199	1 993 732	2 917 785	13 293 272	415 831
PEAB	31 191 000	7 947 000	7 399 000	43 539 000	529 000
RATOS	39 305 000	13 658 000	11 667 000	29 955 000	956 000
SAAB	31 713 000	12 950 000	1 218 000	23 498 000	326 000
SANDVIK	95 669 000	32 490 000	24 767 000	94 084 000	4 994 000
SCA	138 289 000	60 752 000	27 553 000	81 337 000	5 911 000
SCANIA	108 058 000	34 511 000	19 011 000	92 058 000	3 921 000
SECURITAS	35 155 300	9 202 900	8 560 300	64 057 100	1 009 800
SKANSKA	81 099 000	19 413 000	1 333 000	118 734 000	2 206 000

	TA	CE	LTD	Revenues	CAPEX
SKF	58 075 000	21 436 000	12 495 000	66 216 000	1 839 000
SSAB	62 737 000	30 768 000	16 940 000	44 640 000	3 111 000
SWEDISH MATCH	13 729 000	-1 601 000	8 535 000	11 666 000	245 000
TELE2	43 623 000	21 449 000	12 227 000	40 750 000	4 323 000
TELIASONERA	245 808 000	116 680 000	66 682 000	104 354 000	17 394 000
TIETO CORPORATION	10 950 417	5 024 466	1 049 211	16 268 555	499 243
TRELLEBORG	27 760 000	13 338 000	5 452 000	29 106 000	1 074 000
WALLENSTAM	28 967 000	10 294 000	3 766 000	1 625 000	3 456 000
VOLVO	340 406 000	84 581 000	84 287 000	310 367 000	15 703 000
	CL	**CA**	**Mkt. Cap.**	**Int. Sales**	**Div. Paid**
ABB (OME)	115 845 986	165 537 491	296 877 347	150 316 755	10 107 872
ALFA LAVAL	10 997 000	15 619 000	54 697 103	27 710 000	1 258 000
ALLIANCE OIL SDB	3 451 184	6 221 778	14 708 562	19 824 186	2 553
ASSA ABLOY	18 563 000	16 072 000	63 490 975	39 134 000	1 472 000
ASTRAZENECA (OME)	108 075 719	161 276 526	409 614 552	209 297 946	24 921 624
ATLAS COPCO	25 324 000	47 119 000	179 318 876	79 347 000	4 851 000
ATRIUM LJUNGBERG	2 939 300	838 300	9 533 999	0	312 400
AXFOOD	4 324 000	3 937 000	13 305 803	0	630 000
AXIS	747 400	1 431 000	9 620 383	2 098 300	312 600
BILLERUD	1 922 000	3 827 000	6 032 187	8 348 000	361 000
BOLIDEN	6 918 000	11 276 000	27 487 872	32 700 000	1 369 000
ELECTROLUX	37 563 000	43 066 000	31 227 775	97 388 000	1 850 000
ELEKTA	3 928 000	5 761 000	25 815 354	7 862 000	280 000
ERICSSON	97 029 000	198 816 000	226 019 568	223 039 000	7 455 000
FABEGE	4 098 000	438 000	8 743 932	0	489 000
GETINGE	7 528 000	12 769 000	41 563 597	21 412 000	775 000
HAKON INVEST	930 000	1 828 000	15 407 686	162 000	472 000
HENNES & MAURITZ	14 757 000	39 918 000	354 185 408	93 656 000	15 723 000
HEXAGON	9 068 365	10 052 134	36 271 183	18 400 704	498 847
HOLMEN	6 663 000	6 800 000	16 606 041	14 211 000	588 000
HUFVUDSTADEN	716 100	432 000	14 448 929	0	474 400
HUSQVARNA	6 409 000	13 895 000	18 154 622	29 088 000	859 000
INDUSTRIVARDEN	3 502 000	161 000	31 712 867	0	1 545 000
INVESTOR	7 774 000	18 647 000	97 648 954	10 881 000	3 802 000
KINNEVIK	3 830 000	3 465 000	37 170 277	7 027 000	1 247 000
LATOUR INVESTMENT	2 394 000	3 193 000	17 018 650	4 206 000	491 000
LUNDBERGFORETAGEN	8 626 000	8 444 000	25 172 000	14 212 000	465 000
LUNDIN PETROLEUM	2 778 610	2 055 626	52 625 928	8 088 047	0
MEDA	5 033 000	5 009 000	21 640 603	8 897 000	604 000
MELKER SCHORLING	8 000	11 000	16 866 560	0	146 000
MILLICOM INT.	18 475 123	11 772 307	68 900 690	28 840 719	3 144 803
MODERN TIMES GP.	4 763 000	5 668 000	21 833 384	9 180 000	498 000
NCC	16 839 000	26 414 000	13 120 734	23 574 000	1 084 000
NIBE INDUSTRIER	1 995 100	4 064 400	11 196 513	6 196 700	164 400
ORIFLAME COSMETICS	2 425 377	5 048 600	12 355 676	13 242 840	759 926

	CL	CA	Mkt. Cap.	Int. Sales	Div. Paid
PEAB	15 194 000	20 499 000	10 117 222	7 616 000	746 000
RATOS	11 259 000	12 210 000	25 758 989	0	1 678 000
SAAB	14 321 000	18 911 000	14 455 533	14 819 000	367 000
SANDVIK	31 236 000	54 395 000	100 181 952	89 851 000	3 807 000
SCA	28 893 000	31 892 000	71 638 934	73 893 000	2 898 000
SCANIA	41 523 000	49 960 000	81 600 000	43 438 000	4 000 000
SECURITAS	15 229 400	15 329 600	21 684 498	59 924 000	1 095 200
SKANSKA	57 151 000	64 277 000	46 920 116	88 219 000	4 945 000
SKF	13 245 000	33 348 000	66 299 116	64 064 000	2 277 000
SSAB	9 971 000	21 040 000	19 646 644	35 234 000	648 000
SWEDISH MATCH	4 714 000	5 564 000	49 879 254	5 353 000	1 152 000
TELE2	10 975 000	9 507 000	59 471 680	28 352 000	11 991 000
TELIASONERA	36 168 000	36 643 000	202 518 065	68 295 000	12 349 000
TIETO CORPORATION	4 408 644	5 262 963	6 996 201	6 042 530	444 958
TRELLEBORG	8 610 000	10 992 000	16 196 539	27 444 000	474 000
WALLENSTAM	12 083 000	461 000	10 909 300	0	200 000
VOLVO	153 210 000	136 046	152 665 325	296 259 000	5 069 000

Appendix C Table 2 – Overview of Accounting Data. The table shows the data collected from Thomson Reuters DataStream. All numbers are expressed in SEK thousands.

Data for Tobin's q Calculations

	AVCL	AVCA	AVLTD
ABB (OME)	115 845 986	165 537 491	22 218 828
ALFA LAVAL	10 997 000	15 619 000	5 060 000
ALLIANCE OIL SDB	3 451 184	6 221 778	10 445 356
ASSA ABLOY	18 563 000	16 072 000	7 422 000
ASTRAZENECA (OME)	108 075 719	161 276 526	50 346 599
ATLAS COPCO	25 324 000	47 119 000	17 013 000
ATRIUM LJUNGBERG	2 939 300	838 300	7 839 600
AXFOOD	4 324 000	3 937 000	45 000
AXIS	747 400	1 431 000	0
BILLERUD	1 922 000	3 827 000	819 000
BOLIDEN	6 918 000	11 276 000	4 967 000
ELECTROLUX	37 563 000	43 066 000	9 639 000
ELEKTA	3 928 000	5 761 000	782 000
ERICSSON	97 029 000	198 816 000	23 256 000
FABEGE	4 098 000	438 000	13 521 000
GETINGE	7 528 000	12 769 000	15 121 000
HAKON INVEST	930 000	1 828 000	33 000
HENNES & MAURITZ	14 757 000	39 918 000	0
HEXAGON	9 068 365	10 052 134	12 576 336
HOLMEN	6 663 000	6 800 000	3 259 000
HUFVUDSTADEN	716 100	432 000	4 125 000
HUSQVARNA	6 409 000	13 895 000	6 941 000
INDUSTRIVARDEN	3 502 000	161 000	13 947 000
INVESTOR	7 774 000	18 647 000	44 693 000
KINNEVIK	3 830 000	3 465 000	4 936 000
LATOUR INVESTMENT	2 394 000	3 193 000	390 000
LUNDBERGFORETAGEN	8 626 000	8 444 000	9 885 000
LUNDIN PETROLEUM	2 778 610	2 055 626	1 427 882
MEDA	5 033 000	5 009 000	14 913 000
MELKER SCHORLING	8 000	11 000	1 330 000
MILLICOM INT.	18 475 123	11 772 307	12 482 049
MODERN TIMES GP.	4 763 000	5 668 000	1 524 000
NCC	16 839 000	26 414 000	3 850 000
NIBE INDUSTRIER	1 995 100	4 064 400	4 198 000
ORIFLAME COSMETICS	2 425 377	5 048 600	2 917 785
PEAB	15 194 000	20 499 000	7 399 000
RATOS	11 259 000	12 210 000	11 667 000
SAAB	14 321 000	18 911 000	1 218 000
SANDVIK	31 236 000	54 395 000	24 767 000
SCA	28 893 000	31 892 000	27 553 000
SCANIA	41 523 000	49 960 000	19 011 000
SECURITAS	15 229 400	15 329 600	8 560 300
SKANSKA	57 151 000	64 277 000	1 333 000

	AVCL	AVCA	AVLTD
SKF	13 245 000	33 348 000	12 495 000
SSAB	9 971 000	21 040 000	16 940 000
SWEDISH MATCH	4 714 000	5 564 000	8 535 000
TELE2	10 975 000	9 507 000	12 227 000
TELIASONERA	36 168 000	36 643 000	66 682 000
TIETO CORPORATION (OME)	4 408 644	5 262 963	1 049 211
TRELLEBORG	8 610 000	10 992 000	5 452 000
WALLENSTAM	12 083 000	461 000	3 766 000
VOLVO	153 210 000	136 046	84 287 000
	MVE	**DEBT**	**TA**
ABB (OME)	296 877 347	-27 472 677	272 423 052
ALFA LAVAL	54 697 103	438 000	33 210 000
ALLIANCE OIL SDB	14 708 562	7 674 762	28 963 211
ASSA ABLOY	63 490 975	9 913 000	54 587 000
ASTRAZENECA (OME)	409 614 552	-2 854 208	352 083 137
ATLAS COPCO	179 318 876	-4 782 000	74 057 000
ATRIUM LJUNGBERG	9 533 999	9 940 600	23 149 400
AXFOOD	13 305 803	432 000	8 243 000
AXIS	9 620 383	-683 600	1 617 800
BILLERUD	6 032 187	-1 086 000	9 334 000
BOLIDEN	27 487 872	609 000	37 569 000
ELECTROLUX	31 227 775	4 136 000	73 404 000
ELEKTA	25 815 354	-1 051 000	8 756 000
ERICSSON	226 019 568	-78 531 000	267 329 000
FABEGE	8 743 932	17 181 000	30 711 000
GETINGE	41 563 597	9 880 000	40 889 000
HAKON INVEST	15 407 686	-865 000	9 823 000
HENNES & MAURITZ	354 185 408	-25 161 000	58 954 000
HEXAGON	36 271 183	11 592 567	46 956 421
HOLMEN	16 606 041	3 122 000	37 023 000
HUFVUDSTADEN	14 448 929	4 409 100	22 695 000
HUSQVARNA	18 154 622	-545 000	28 079 000
INDUSTRIVARDEN	31 712 867	17 288 000	57 116 000
INVESTOR	97 648 954	33 820 000	212 920 000
KINNEVIK	37 170 277	5 301 000	70 068 000
LATOUR INVESTMENT	17 018 650	-409 000	13 573 000
LUNDBERGFORETAGEN	25 172 000	10 067 000	85 226 000
LUNDIN PETROLEUM	52 625 928	2 150 866	18 449 330
MEDA	21 640 603	14 937 000	38 152 000
MELKER SCHORLING	16 866 560	1 327 000	19 368 000
MILLICOM INT.	68 900 690	19 184 865	47 850 469
MODERN TIMES GP.	21 833 384	619 000	11 217 000
NCC	13 120 734	-5 725 000	32 733 000
NIBE INDUSTRIER	11 196 513	2 128 700	11 655 300
	MVE	**DEBT**	**TA**

ORIFLAME COSMETICS	12 355 676	294 562	7 053 199
PEAB	10 117 222	2 094 000	31 191 000
RATOS	25 758 989	10 716 000	39 305 000
SAAB	14 455 533	-3 372 000	31 713 000
SANDVIK	100 181 952	1 608 000	95 669 000
SCA	71 638 934	24 554 000	138 289 000
SCANIA	81 600 000	10 574 000	108 058 000
SECURITAS	21 684 498	8 460 100	35 155 300
SKANSKA	46 920 116	-5 793 000	81 099 000
SKF	66 299 116	-7 608 000	58 075 000
SSAB	19 646 644	5 871 000	62 737 000
SWEDISH MATCH	49 879 254	7 685 000	13 729 000
TELE2	59 471 680	13 695 000	43 623 000
TELIASONERA	202 518 065	66 207 000	245 808 000
TIETO CORPORATION	6 996 201	194 892	10 950 417
TRELLEBORG	16 196 539	3 070 000	27 760 000
WALLENSTAM	10 909 300	15 388 000	28 967 000
VOLVO	152 665 325	237 360 954	340 406 000

Appendix C Table 3 – Overview of data for Tobin's q calculations. All numbers are expressed in SEK thousands.

Tobin's q, Dependent Variable, RMI and RMT

	q	ln(q)	RMI	RMT
ABB (OME)	0.9889	-0.0111	75	1376
ALFA LAVAL	1.6601	0.5069	75	1228
ALLIANCE OIL SDB	0.7728	-0.2577	62	698
ASSA ABLOY	1.3447	0.2961	80	1120
ASTRAZENECA (OME)	1.1552	0.1443	84	2190
ATLAS COPCO	2.3567	0.8573	83	1952
ATRIUM LJUNGBERG	0.8412	-0.1728	52	614
AXFOOD	1.6666	0.5107	72	1070
AXIS	5.5240	1.7091	62	671
BILLERUD	0.5299	-0.6350	65	1011
BOLIDEN	0.7478	-0.2905	69	1126
ELECTROLUX	0.4817	-0.7302	86	1734
ELEKTA	2.8282	1.0396	68	834
ERICSSON	0.5517	-0.5947	89	1981
FABEGE	0.8441	-0.1694	59	829
GETINGE	1.2581	0.2296	59	680
HAKON INVEST	1.4804	0.3923	74	979
HENNES & MAURITZ	5.5810	1.7193	63	662
HEXAGON	1.0193	0.0191	68	1037
HOLMEN	0.5328	-0.6294	57	769
HUFVUDSTADEN	0.8309	-0.1852	50	559
HUSQVARNA	0.6271	-0.4665	87	1364
INDUSTRIVARDEN	0.8579	-0.1532	54	456
INVESTOR	0.6174	-0.4821	81	2558
KINNEVIK	0.6061	-0.5006	54	610
LATOUR INVESTMENT	1.2237	0.2019	63	748
LUNDBERGFORETAGEN	0.4134	-0.8831	65	967
LUNDIN PETROLEUM	2.9690	1.0882	76	1033
MEDA	0.9587	-0.0421	67	824
MELKER SCHORLING	0.9393	-0.0625	45	379
MILLICOM INT.	1.8408	0.6102	50	765
MODERN TIMES GP.	2.0016	0.6939	67	1185
NCC	0.2259	-1.4874	69	1244
NIBE INDUSTRIER	1.1432	0.1338	52	673
ORIFLAME COSMETICS	1.7935	0.5841	69	974
PEAB	0.3914	-0.9377	61	1030
RATOS	0.9279	-0.0747	70	1252
SAAB	0.3494	-1.0512	76	1632
SANDVIK	1.0639	0.0620	67	931
SCA	0.6955	-0.3629	78	1678
SCANIA	0.8530	-0.1589	76	1613
SECURITAS	0.8574	-0.1537	72	1061
SKANSKA	0.5071	-0.6790	72	2133

	q	ln(q)	RMI	RMT
SKF	1.0106	0.0105	79	1444
SSAB	0.4067	-0.8995	71	1350
SWEDISH MATCH	4.1928	1.4333	72	1014
TELE2	1.6772	0.5171	61	728
TELIASONERA	1.0932	0.0891	79	1959
TIETO CORPORATION	0.6566	-0.4205	77	1193
TRELLEBORG	0.6940	-0.3652	81	1699
WALLENSTAM	0.9078	-0.0966	75	1595
VOLVO	1.1457	0.1360	62	740

Appendix C Table 4 – Overview of Tobin's q, ln(q), RMI and RMT