SCHOOL OF ECONOMICS AND MANAGEMENT

Department of Business Administration

Degree Project Master of Science in Accounting and Finance

Spring 2020

The effect of risk management on firm value:

The case of Swedish manufacturing firms

Before, During and After Financial Crisis 2007-2009

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ABSTRACT

Title	The effect of risk management on firm value: The case of Swedish manufacturing firms Before, During and After Financial Crisis 2007-2009
Seminar Date	3rd June, 2020
Course	BUSN79 Degree Project in Corporate Finance - Master Level, 15 ECTS-credits
Authors	Martin Moding & Gustav Wahlgren
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Key words	Risk Management, Cash holdings, Derivatives, Hedging, Tobin's Q
Purpose	The purpose of this study is to determine whether cash, derivatives or a combination can increase firm value during a financial crisis for Swedish listed manufacturing firms.
Methodology	The study has been conducted with deductive approach and a quantitative method for analyzing secondary data collected from Databases and annual reports. Furthermore, have statistical tests been performed to ensure an unbiased sample, and regressions to test whether or not Cash holdings or Derivatives have a significant impact on Firm value measured as Tobin's Q.
Theoretical Perspective	Free cashflow hypothesis, Precautionary Motive, Transaction Motive, Pecking Order, Trade-off theory, Underinvestment problem, Information asymmetry, Long purse hypothesis, Agency Problem, Cost of Financial distress, Tax incentives, Financing cost hypothesis, Managerial risk aversion
Empirical Foundation	The sample consists of all 74 Swedish publicly traded manufacturing firms from 2004-2012, with an observation of 666.
Conclusion	The study concludes that even though cash holdings and derivative usage changed during the financial crisis, neither cash holdings, nor derivative have a significant impact on firm value. Even though this seems to be unspectacular, this has an impact on theories and previous studies, showing both similar results as this study, but also studies proving a value increase.

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1. INTRODUCTION

In this chapter, the background of risk management of manufacturing firms in Sweden during the financial crisis 2007-2009 is introduced and presented. This is followed by problem discussion of risk management in order to motivate the purpose of the thesis and formulate on research questions. Thereafter, findings and contribution followed by scope and limitations and target audience are presented, followed by a short description of the thesis's structure.

1.1 BACKGROUND

A firm's choice of risk management has always been an essential component in a firm's decision-making process. Creating and developing a risk management policy is one of the most challenging components in decision-making in the financial field (Brealey & Myers, 2016; Culp C.L., 2001). After that the financial crisis in 2007-2009 revealed severe problems in risk management models, firms largely failed to manage their risk management models because of unknown unknowns, as if the firms were meant to know all the unknowns (Jorion, 2009). In addition, Stulz, (2008) argues that the large losses that were a result of the financial crisis, was not equal to a failure of Risk Management, he further argues that the reason for the large losses was that firms were unprepared to predict what they did not know existed, hence could not be predicted. In addition, Stulz (2008), means that firms should focus their Risk Management more on maintaining the firm's financial health which increases the degree of survival by rather focusing on performance scenario analysis and stress tests instead of trying to predict when the next downturn or crash will come, since these are unknowns, that are hard to predict.

Risk management has several advantages though, such as reducing the effect of unforeseen events, reducing agency costs, and exploitation of financial advantages such as reducing the volatility of cash flow, hence firms can hold less cash while retaining investment opportunities without getting underinvestment problem (Culp C. L., 2001). Furthermore, Culp (2001) points out that there are several solutions to manage risks such as hedging against risk exposure through the use of derivatives, while the other alternative is to hold excess cash to reduce risk. Prior studies have shown that risk management strategies with derivatives and excess cash, are important measures to counteract financial distress and improve firm survival in economic

downturns (Mello & Parsons, 2000). Furthermore, risk management is also important for firms with large investment opportunities, especially when the likelihood of financial distress is high (Marin & Niehaus, 2011).

During the financial crisis of 2007-2009 the individual choice of a firm's risk management strategy had a direct impact on firm value and firm survival (Alam & Gupta, 2018). The study shows that non-financial firms in India engaged in hedging compared to non-hedgers is found to be value-adding for the hedgers. As opposed to several other countries that were hard hit by the economic downturn, Sweden managed substantially better than other countries, in which the crisis hit both individuals and firms hard (Bergman, 2011) (Stone & Quoreshi, 2019). The growth rate was 5.5% in Sweden for 2010, compared to the US which had 2.9% and average of the EU was 1.8%. The growth rate was the highest among all other developed nations in Europe (Irwin., N, 2011). Several contributing factors explain why Sweden managed the crisis better; Sweden has had budget surpluses and a government debt ratio around 45% of GDP during the crisis compared to other countries with similar prerequisites, like the US which had close to 100% (Irwin., N, 2011), or Germany with 78%, UK with 79% and France with 98% (OECD, 2020). Another factor is the expenditure ceiling (Bergman, 2011). Even though Sweden managed better than its counterparties, it is still highly dependent on its exporting industry, and the value of exports in 2008 corresponds to 49,2% of the GDP. The manufacturing and commodity industries have a significant part of Sweden's exports, and they sum up together more than 70 % of the total export (Manskikkaviita, 2009). During the financial crisis, Sweden's export fell by over 16% in 2009 (Bergman, 2011). Although Sweden as a country managed the financial crisis well, the Swedish manufacturing firms were worse off, and it took longer to recover from the financial crisis compared to other manufacturing firms in European countries. According to Eurostat (2016), Swedish manufacturing firms rank as the sixth least recovered country in Europe.

Why Sweden is interesting and important to study, is because firms in Sweden operate in a small open economy, with a high degree of foreign sales. This results in higher exchange risk compared to larger countries such as the United States with a larger national market. The United States and similar large countries are well studied, Risk Management vice, these studies however might not correspond to a smaller economy with high degree of export. In addition,

the manufacturing industry in Sweden exports to a large extent their products and are likely to engage in Risk Management, such as derivatives because of the foreign exchange risk (Alkebäck & Hagelin, 1999). Early studies have shown that Swedish firms have frequently used derivative and in 1999, manufacturing firms was the industry sectors' with highest usage of derivatives, with 79% usage rate according to Alkebäck and Hagelin (1999). The same study compares New Zealand as their equal country with the same conditions and dependence on foreign trade, it also shows that manufacturing firms use derivatives most of all other sectors. A study by Nydahl (1999) proved that there is value-adding in derivative use by Swedish firms. But these are not measured during the financial crisis but before that. Which shows a gap that we want to fill with a new study

At the time of writing we are on the verge with a new crisis, with the pandemic Covid-19 (Georgieva, K., 2020), that we still cannot see the results of. The virus has hit hard in countries all over the world included the stock markets decreases and it also shows a clear decline in firms' sales. Sweden's Manufacturing Project Management Institute (PMI) dropped to 36.7 in April 2020 from the peak of 52,7 in February 2020 (Trading Economics, 2020). Being on the verge of a new financial crisis brings up the relevance and need to study the previous crisis from the financial crisis 2007-2009, to see if there can be any lessons to be learned, and in that case shed light to how firms should respond to the new financial crisis. There is no optimal risk management strategy, but it depends on different conditions in each individual firm and each business climate (Jankensgård, Alviniussen, & Oxelheim, 2020). Consequently, studying these alternatives is especially interesting, since it may show performance differences and may be applicable for Swedish manufacturing firms to survive in these difficult economic times, caused by the Covid Pandemic.

1.2 PROBLEM DISCUSSION

A vastly changed business environment in risk management that reflects the effect of derivative use and cash holding on the firms' value has received considerable attention from several articles on how derivative use can increase firm value, protect against downturn by cash holding. Approximately 79% on average of listed Swedish manufacturing firms were found to be users of derivatives by Alkebäck and Hagelin (1999) but the study is from 1999. And the

level of cash holding was found at 17% on average but among all Swedish firms, not manufacturing firms (Alves, 2018). There is extensive research on how risk management should be done. However, these studies conclude different results, resulting in that firms might not perform the correct risk management strategy for the individual company. Results show that Swedish manufacturing firms were hit hard during the financial crisis, and still have not recovered, performing worse than the average of manufacturing firms in Europe (Eurostat; Siemens, 2015). This shows the importance of Risk Management, in order not to make the same potential mistake as the previous financial crisis.

According to Modigliani & Miller (1958), neither cash holdings nor risk management is relevant since all firms have access to frictionless markets. In this ideal market, firms have financial flexibility, without firm-specific conditions, they can all adjust their capital structure optimally. Though, this theory does not hold, rather the level of excess cash and derivatives are a function of different financing frictions, different firms have different corporate governance, various macro conditions, managerial risk aversion as several examples on frictions (Denis, 2011; Froot, Scharfstein, & Stein, 1993). Denis (2011) furthermore states that, in a financial crisis, when the cost of financing is high, there is a higher value of excess cash, than in general market conditions. Furthermore, the more marginal value of excess cash holdings increases the more financially constrained a firm will be (Pinkowity et al, 2006). Additional motives in favor of cash holdings in economic downturns are precautionary motives and transaction cost motives of not having excess cash, which was presented by Keynes in 1936.

In contrast to the positive effects of excess cash holdings, there are also negative effects. According to the free cash flow hypothesis, managers with too much excess cash can lead to investing in value-destroying projects and empire building (Jensen 1986), which gains support by Dittmar and Mahrt-Smith (2007) and Harford et al. (2008). Furthermore, in many cases, increased cash holdings, are a consequence of a decrease in R&D and underinvestment, mostly effecting financially constrained firms, since they aim to decrease volatility (Han & Qui, 2007). Furthermore, Gamba and Triantis (2008) conclude that managers prefer excess cash to hedge risk and volatility. In addition, shareholders' view on excess cash might be different during financial downturns. Dunchin, Ozbas et al (2010) concludes that in the short-term excess cash might save the company from a financial crisis and increase financial flexibility, which would

be preferable to shareholders. Studies from Pettit (2007), Griliches (1986) and Piergiovanni and Santorelli (2010) concludes similar results.

In theory, in order to increase firm value, firms can also use derivatives to decrease cash flow volatility, which can result in the possibility to increase leverage which would decrease underinvestment problem. However, this is only true if the benefits of hedging outweigh the costs of hedging. Studies by Graham and Rodgers (2002) shows that derivatives, especially during economic downturns can be especially valuable. However, substantial research on this topic has shown that derivative might decrease volatility (Culp, 2001) but it cannot be shown that this decrease impacts firm value positively (Culp, 2001; Tuffano, 1996; Jin and Jorion, 2006). Since there was even a study by Lin et al. (2012) who found a negative relationship between derivatives and firm value, it is uncertain if either derivative or cash holdings, or a combination have a positive impact on firm value. Since research has concluded contradicting results, it is of importance to thoroughly investigate these questions, since they might have a lot of implications on manufacturing firms in Sweden.

1.3 PURPOSE & RESEARCH QUESTION

The purpose of this thesis is to enrich the consisting literature and to decrease the research gap in Sweden, and among the Swedish manufacturing industry by studying if derivatives and cash holdings during financial distress and time of crisis can benefit the Swedish listed manufacturing companies. The purpose is to use data from the previous financial crisis, in order to generate a profitable strategy for the firms, value vice, which becomes even more important during the financial instability caused by the Covid pandemic.

There are two major research questions for this thesis to answer. The first question aims to analyze any periodic differences in Swedish manufacturing firms' cash holdings and derivative usage, and what effect that had on their firm values. The second question aims to generate a better understanding in how cash holdings, derivative usage or a combination of the two, could be used to improve the hedging strategy for Swedish manufacturing firms during a new financial crisis and hence the individual firm value. The research questions are based on

previous similar studies by Alam & Gupta, (2018) who studied how hedging changed in good and bad times and how hedging could impact the firm's value. Furthermore, it is based on studies by Pinkowitz et al., (2006) and Dittmar et al. (2007) who have shown that the value of cash holdings varies drastically between firms based on several factors. In addition, Stultz., (2008) study provided nuance on Risk Management and its effect, which question 2 will be based on. However, the consisting literature gap, mainly concerning less or no studies on the Swedish market, and the manufacturing industries motivates the need for this study. The questions are:

1. *How did derivative usage and cash holdings change before, during and after the financial crisis among Swedish listed manufacturing firms, and how did this affect the market value of the firms?*

2. *Which out of, cash holdings, Derivative usage or a combination can be used appropriately during a financial crisis for Swedish listed manufacturing firms?*

1.4 FINDINGS AND CONTRIBUTION

Research of Risk Management and usage in Sweden has not been very extensively studied before. The research that has been conducted, was more of the character of Sweden as a whole, not studying the manufacturing sector alone Hence, the most important contribution of this study was to provide and contribute to the research regarding how one of the most important industries in Sweden, namely Manufacturing industry behaved during the last financial crisis, and which lessons that could be learned to the new financial crisis for the manufacturing firms.

The study will be conducted quantitatively, studying Swedish manufacturing firms and their derivative usage and cash holdings, and how these, individually, and combined affect firm value during economic downturns. The study aims to provide a profitable strategy to manufacturing firms in Sweden, for the individual companies during economic downturns to protect firm value and ensure firm survival. To provide evidence and to analyze the data, a panel data analysis was conducted on the observations gathered. The panel data model used for the regression was fixed effect, which is motivated in chapter 4 and tested for in chapter 5. Furthermore, the study

complements prior studies which often does not include nor Sweden, nor manufacturing firms in Sweden. However, since our results did not prove any significant effect of neither cash holdings nor derivative usage, we cannot contribute to a definite profitable strategy for the firms to follow. The study should also contribute with inspiration regarding the importance to study this topic, especially when there is a risk of a new financial crisis, as a result of the Covid Pandemic.

1.5 SCOPE AND LIMITATIONS

All empirical studies have their flaws, this is no exception. The data set for this study consists exclusively of Swedish manufacturing firms traded publicly during the financial crisis of 2007-2009, three years before (2004-2006) and three years after, (2010-2012). There might be a risk of geographical bias, since previous research has concluded, that different countries and industries performed differently during the financial crisis. Our aim to minimize this potential bias was to perform research on an industry with high use of hedging, but on the same time, aim to use homogenous data, with an aim, not to be biased by geographic and industrial biases. Resulting in that, the findings may not be applicable for other countries, or other industries apart from the researched one. However, manufacturing firms are a substantial part of the Swedish market, and even more significant part of the export industry of Sweden. Since the study used only publicly traded companies, the study may not be applicable to privately traded companies, whom may have a systematical different hedging strategy in relation to the firm value.

1.6 TARGET AUDIENCE

The main target audiences of this thesis are the decision-makers of manufacturing firms on the Swedish market, and investors that are interesting to invest in manufacturing firms on the Swedish market. The wider target audience, however, is decision-makers in markets, and industries, with similarities to our study. A further group with an interest in this study, may be people with a general interest in how hedging could impact value of firms, especially interested in financial downturns.

1.7 THESIS STRUCTURE

The structure of this thesis will be as follows. In chapter 2, there will be a theorical framework, chapter 3 presents previous empirical studies. The research hypothesis will be developed and based on chapter 2 and chapter 3. Chapter 4 will present the methodology of this study, and the limitations of the research method. In chapter 5, the results from the study will be presented, while they in chapter 6 will be analyzed. In chapter 7 there will be a presentation of the conclusions which can be drawn, and a general discussion about the implications of this study will also be presented alongside potential further research.

2. THEORICAL FRAMEWORK

In this chapter, we present the relevant theories that are covered in this thesis. The chapter starts with a short presentation of the M&M's perfect capital market theory. Then there are two subchapters, one for cash holding theories and one for hedging theories, with presentation of advantages and disadvantages in cash holding and hedging, respectively. Then a review of the Financial Crisis 2007-2009 and Swedish manufacturing companies.

In the financial field, the motivation of entering risk management is to serve value maximation for the shareholders. But a fundamental economic theory of Modigliani and Miller (1958) (M&M) with its irrelevance-theorem, depart from the value maximization approaches, where financing sources for investments are irrelevant. Furthermore, the authors argue that the first proposition, under perfect capital market, risk management is not value-adding to value maximization. Because of the value creation only occurs when investing in operating assets that increase cash flow, therefore a company's capital structure and financial policy, where risk management also is included, is considered irrelevant (Modigliani & Miller, 1958). M&M mean that shareholders can manage risk themselves by holding diversified portfolios, therefore M&M have constructed four assumptions where enterprise value is independent by undertaking the following risk management actions:

1. *Perfect capital markets*: Under this assumption, there are no taxes, no transaction costs, no short selling restrictions, and no costs of bankruptcy.

2. *Symmetric information*: All information relevant to security prices are equally available to investors and managers. And all parties also perceive the information identically.

3. *Fixed investment strategies:* The investment opportunity set is fixed and independent of financing decisions.

4. *Equal access:* Companies and individuals can issue securities on identical terms, no credit or equity risk premium (Culp C. , 2002).

In addition, risk management cannot increase value because of in reality, it is indeed difficult to achieve (Culp C. L., 2001). However, these four assumptions do not hold because there are imperfections in the real world by unequal access of participants to the capital market, unequal available to information (asymmetry information), costs of external financing and other factors that associated with the M&M theorem (Denis 2011) (Froot, Scharfstein, & Stein, 1993).

The second proposition by M&M states that the firm's leverage has no effect on its weighted average cost of capital (WACC). An increase in leverage means a higher likelihood of default to a firm. Therefore, shareholders tend to demand a higher cost of equity (return) to be compensated for the additional risk, resulting in an unchanged WACC. As in the case of risk management, this does not affect firm value (Modigliani & Miller, 1958). And enterprise value is argued to be a concave function because of the market imperfections (Bartram, 2000). Moreover, the argument about that risk management is not value-adding becomes questionable, and therefore the M&M assumptions are relaxed, and the demand of risk management have risen because of the market imperfections (Ramlall, 2010).

2.1 RISK MANAGEMENT AND CASH HOLDING THEORIES

2.1.1 Theories in Favor of Cash holdings

The main favor to build up excess cash holdings, which benefits management according to Jensen (1986) called free cash flow hypothesis is, firstly that, large cash holdings reduce risk of bankruptcy and take-overs hence, ensuring their status as management of the firm. Secondly, with larger cash holdings, the need for external financing is lower, resulting in less control and interference from debtholders in management decisions.

Another favor of cash holding is Keynes's finance motives. The first motive, since it is costly to convert assets to cash and costly to raise external funding, Keynes (1936) motivates the larger cash holdings with transaction motive. Liquidity is necessary for every-day transactions and firm operations, and if it is costly to raise funds or sell assets, firms prefer to keep higher levels of cash as protection. Second motive, firms also tend to avoid investing in positive NPV

projects, if the firms do not have enough liquid asset, especially if they experience cash flow shortfalls. Consequently, the firms rather hold cash, than investing in positive NPV projects which is a precautionary motive (Opler et al. 1999). Since there is information asymmetry and issuing stock might be at too high a cost, resulting in that management rather decreases investments to keep high levels of cash holdings. This is especially relevant for firms with high investment opportunities (Marin & Niehaus, 2011). The precautionary motive is hence a strategy to protect the firm from financial distress, which can explain why some firms have large cash holdings.

This can be linked to an underinvestment problem that arises when a firm face high growth investment opportunities but hold low levels of cash. One of the first studies about this hypothesis come from Keynes (1936), the author argues that higher value of investment opportunities is demanded by holding cash as a motivation in order to catch opportunity with profits. Another study examined the determinants of cash holdings and found that companies with high growth opportunities hold relatively more cash (Opler, Pinkowitz, Stulz, & Williamson, 1999). This is confirmed empirically by several studies considering the underinvestment hypothesis supported by other studies (Gay & Nam 1998; Ozkan & Ozkan 2003). Furthermore, they explained that companies with high growth opportunities avoid getting into a situation where they must reject positive NPV projects because of cash shortfalls.

Keynes' finance motive is shared the same idea as Long-Purse Hypothesis by Telser's (1966), this is another motive for cash holding that suppose that firms with excess cash, that characterized a highly rivalry industry, can push financially constrained competitors out of business. This is done by reducing their cash flows through more competitive price, the cash-rich companies want to reduce prices for own products to the levels where the financially constrained companies cannot continue to operate (Bolton & Scharfstein, 1990).

A further advantage of cash holding is introduced in pecking order by Myers & Majluf (1984), when firms choose their financing structure, asymmetric information is a factor to be considered. When determining financing, firms follow a certain order because of the asymmetrical information (Myers & Majluf, 1984). The order is as follows, firstly firms use

internal funding (cash & liquid assets), since management then must not issue capital to uninformed debtholders or shareholders. Secondly, if internal funding is insufficient, firms tend to use debt as funding, which is less affected by information asymmetry and hence not as expensive to issue. Thirdly, as a last resort, companies according to the pecking-order theory issues equity, which is the most expensive way of financing (Myers & Majluf, 1984). Hence, this theory supports large cash holdings.

2.1.2 Theories not in Favor of Cash holdings

Another side of the Free Cash Flow Hypothesis that does not support cash holding, links to agency cost of debt to agency cost of management incentives. Jensen (1986) states that, the larger the cash holdings of a firm is, the larger the incentive for managers to invest in projects with a negative net present value for the firm's shareholders. Consequently, management can use the excess cash for their own interest in empire-building. The hypothesis concludes that it is beneficial to increase leverage, which disciplines management, since that decreases the cash flow of the firm. Jensen (1986) concludes the optimal leverage as when the marginal cost of debt is equal to the marginal benefit of debt.

As Jensen (1986) mentioned the problem of cash holding, management with own interest can lead to empire building, which creates information asymmetry. All market participants have different access to information; therefore, information asymmetry often arises when there is a gap between managers and shareholders where managers are assumed to have an information advantage regarding the company's future, including risks and value, unlike external investors on the market. Ogden (2003) argues that in an environment with high information asymmetry because of cash holding, can be reduced by signaling such as dividend to communicate the condition of a company's strength or weakness. In addition, the author means that otherwise it bring difficult for firms to signal their true strength to the market (Ogden, Frank, & O'Connor, 2003).

Information asymmetry may result in agency costs and can explain why firms cannot hold excess cash (Kim, Mauer, & Sherman, 1998). Large cash holding and free cash flow with poor

investment opportunities may give the managers incentives to invest in unprofitable investments that disadvantages the shareholders and lower enterprise value. Jensen and Meckling (1976) introduced agency problems that can be occurred to as a conflict between firms' managers and shareholders for cash purpose. Every manager's job is to maximize shareholder value rather to pursue its own objectives (Kim, Mauer, & Sherman, 1998). For instance, when managers hold excess cash but face lack of investment opportunities then agency problems arise because of shareholders want that cash to work to create value such as one-time dividend or buy-back shares. Another suggestion from recent research highlights that agency problem arise because of poor corporate governance, are valued below their book value of excess cash (Dittmar, Mahrt-Smith, & Servaes, 2003).

Another theory that does not support cash holding, Miller (1977) presents the Trade-off theory, in which it is shown how firms use both debt and equity as the financing structure of the firms. Miller (1977) further explains that firm value is maximized through an optimal usage of costs and benefits associated with equity and debt financing. The benefits associated with firm value maximization is the tax shields on debt, however these are offset by the cost of financial distress which is associated with further debt issued. Optimal capital structure is therefore, when the marginal cost of debt is perfectly offset by marginal benefit of debt (Miller, 1977). Regarding this study, it is important to evaluate when the marginal cost of having too high levels of cash is offset by the marginal benefit of having excess cash. As seen in the transaction motive for cash holdings, different level of cash holdings is optimal for different types of firms and are especially important to evaluate in financial distress (Opler et al. 1999).

2.1.3 Summary of cash holding theories

Different theories mentioned above considering cash holding, highlight various impacts on firm value both positively and negatively. The value of cash holding depends on multiple factors that can be a level of strength or weakness of corporate governance, financially constrained or unconstrained, cost of external financing, cost of financial distress, degree of investment opportunities and more. For shareholders' perspectives, the companies can never have too much cash because it is costly and want the cash to be put into work to provide value creation in return. But shareholders view on excess cash might be different during financial downturns

because the sufficiently cash holding provide more financial flexibility for the company and might save the company from distress, which is a precautional motive and would be preferable to the shareholders.

2.2 RISK MANAGEMENT AND HEDGING THEORIES

2.2.1 Theories in Favor of Derivatives

One of the favors of derivatives is financial distress that occurs when a firm is uncapable of meeting its debt obligations such as servicing debt with interest payments and amortizations. This may lead to bankruptcy for the firm. Costs of financial distress are considered as direct and indirect costs that means a loss in firm value (Ogden, Frank, & O'Connor, 2003). The financial distress may often be triggered by volatility in cash flow, which can lead to limited access to liquid assets (Miller, 1977). The work from Smith and Stulz (1985), Mayers and Smith (1982), and Nance, Smith and Smithson (2013), all argue that there is a benefit to hedge in order to reduce financial distress costs or lower likelihood of financial distress that leads to increase firm value. Furthermore, hedging to reduce the volatility in cash flow and covenants becoming binding which let the firm to take on additional leverage, which can increase value of the tax shield, which in turn, increase the firm value (Smith & Stulz 1985; Bessembinder 1991). The same argument is also built on Stulz's work (1996).

A study introduced three determinants for firms to enter derivatives, one of them is for tax reducing purpose (Smith & Stulz, 1985). Furthermore, the authors assert theoretically that if a corporate income tax rates or corporate tax liability are an increasing function of the company's pre-tax value (i.e. its progressiveness), then the post-tax value of the company is a concave function of its pre-tax value. In addition, if cost of hedging is not too large then the expected post-tax company value increases by reducing the expected corporate tax liability because of the lower variability of pre-tax company value through hedging. As a further follow-up, Stulz (1996) is adamant about RM benefits allow for value enhancing by reducing taxes.

Another favor for derivatives lies on financing cost in connection with external financing. As, in the pecking-order theory presented by Myers and Majluf (1984), firms prefer internal financing over external financing when investing. Since information asymmetry is excessive in imperfect capital markets because of, for instance, managers have private information about the existing and coming projects with the expected earnings. Therefore, external financing is costly Another advantage of hedging lies on financing cost in connection with external financing. As, in the sub chapter of pecking-order theory presented by Myers and Majluf (1984), companies prefer internal financing over external financing when investing. Since information asymmetry is excessive in imperfect capital markets because of, for instance, managers have private information about the existing and coming projects with the expected earnings. Therefore, external financing is costly (Froot, Scharfstein, & Stein, 1993). To ensure to have internally funds to remain the ability to undertake investments, that is why hedging relevant in this case (Fazzari, Hubbard, & Petersen, 1988). Furthermore, Froot et al. (1993) points that hedging helps firms to ensure their internal funds by reducing variability of internal cash flows, in turn, less need of external financing.

Additional favor of derivatives is managerial risk aversion by Smith and Stulz (1985) who conclude that managers personal wealth can be affected by the firms' hedging activities. Furthermore, their study show that risk averse managers used hedging to reduce firms' specific risk that was non-diversifiable. For shareholder wealth maximization and to decrease the use of hedging, management incentive system should be constructed as a convex function of the firm value (Ramlall, 2010). The theory presented by Smith & Stulz, 1985 also concluded that, managers who own stock holdings rather than options perform risk management more than managers who owns more stock options. This theory was also supported by research conducted by Tufano (1996).

2.2.2 Theories not in favor of Derivatives

Prior studies suggest that there are many benefits of using derivatives to reduce cash flow volatility, which in turn can increase firm value, which is the firm's primary target for derivatives. But in reality, hedging cannot increase value because of it is indeed difficult to achieve (Culp C. L., 2001). Furthermore, the author highlight that every manager has various

risk preferences which depend on how much the managers own in firms. Therefore, it is difficult to achieve optimally in firm value. Jin and Jorion (2006) mention problems with hedging is that stockholders who are looking for that risk exposure that they want to invest in a firm due to having a bullish view or diversifying for their own purpose. But problems arise if a firm has hedged against the risk exposure, which then creates a potential negative clientele effect (Jin & Jorion, 2006).

2.2.3 Summary of hedging theories

Most of the mentioned theories above highlight that each company's main purpose with hedging is to reduce the volatility of cash flow, in turn, companies can add more leverage, avoid underinvestment problems, lower cost of distress, and then enterprise value theoretically can increase. But value can only increase if the benefits of hedging outweigh the costs of hedging, especially when the more leverage in companies with the high cost of external financing (credit rationing), the more valuable is hedging. But Culp (2001) points out that hedging cannot increase value because of it is difficult to achieve in reality. Furthermore, every manager has various risk aversion which depends on how much CEO ownership is in firms, therefore it is difficult to achieve optimally in reality.

It also highlights some disadvantages of hedging such as negative clientele-effect, investors who are looking for exposure that they want to invest in a company due to have a bullish view or diversify for their own purpose. But problems arise if a company has hedged against the risk exposure, which then creates a potential clientele effect (Jin & Jorion, 2006). But on the other hand, information asymmetries decrease through hedging against risk exposure, because potential investors can get a clearer picture of the actual likelihood of the underlying project or company, thereby encouraging investment in companies.

2.3 THE FINANCIAL CRISIS IN 2007-2009 AND THE SWEDISH MANUFACTURING INDUSTRY

Why the study in the Swedish market is an interesting case and important to study is because companies in Sweden operate in a small open economy with high foreign sales. As a result, there is a higher currency risk compared to larger countries such as the US with a larger

domestic market. The US and similar large countries are well studied in risk management, but these studies may not correspond to a smaller economy with a high export level. In addition, the manufacturing industry in Sweden largely exports its products and is likely to conduct risk management, such as derivatives due to the currency risk (Alkebäck & Hagelin, 1999).

2.3.1 The financial crisis in Sweden

The global financial crisis started with subprime mortgage crisis resulting in decreasing house prices in the US market (Duca, J.,V., 2013). Resulting in that the banks had to write down house obligations, which created a loss of liquidity in the banks and the bankruptcy of the Lehman Brothers (Lehman, 2008). The trust in the banks by the general public decreased, which was the main concern on the Swedish market, resulting in that Sweden was only indirectly affected by the US financial crises, the effects in the aftermath though, affected also the financial system of Sweden (Finanspolitiska Rådet, 2009). However, Sweden managed to perform substantially better than other countries (Bergman, 2011; Stone & Quoreshi, 2019). The dependence on international trade among Swedish firms however, also added to the difficulties and further credit losses in the Swedish banks, and bankruptcies of Swedish companies, because of the international decline in products (Finanspolitiska Rådet, 2009). To ensure liquidity to the Swedish banks and not to further increase the crisis, the central bank of Sweden granted loans to banks in need, which seemed like an effective measure (Riksbanken, 2018). Another problem was that the large banks in Sweden had a lot of borrowings internationally, especially in the Baltics, where the financial crisis hit substantially harder than in Sweden, also affecting the Swedish banks negatively (Finanspolitiska Rådet, 2009).

2.3.2 The effect of financial crisis on Swedish manufacturing firms

Although Sweden managed to perform better than its counterparts, but Sweden is a small economy with highly dependent on its exporting industry, and the value of exports in 2008 equal to 49,2% of GDP (Manskikkaviita, 2009). During the financial crisis, Sweden's export fell by over sixteen percent in 2009 (Bergman, 2011). The manufacturing industry has been a significant part of exports that sums up more than 70 % of the total export of Sweden (Manskikkaviita, 2009). The negative effect on Swedish manufacturing firms during the

financial crisis of 2007-2009 had a significant impact on both production and unemployment (Carlgren, 2016). During the years 2007 to 2015, the production in Swedish manufacturing firms had decreased by 19.3%, far worse than EU-average at 7% (Eurostat). Even on a longer time period, there has been a general decline in manufacturing production, from 2000 to 2013, there has been a production decline of 0.3% (Siemens, 2015). Manufacturing firms represent a large part, namely 20% of GDP in Sweden (SCB 2016). Therefore, it is notable, that there is such a large decline, in an export dependent country, in which manufacturing firms represent such a large stake of total GDP.

2.3.3 Derivative usage in Swedish manufacturing firms

From a business perspective, it shows what risks there are in firms regarding manufacturing industry that depend on exports to be able to cope. As it shows that the Swedish manufacturing firms not only sells in Sweden, but largely exports to the world. Therefore, several risks arise such as currency and commodity risk that the firms must deal with and not let it get too high volatility in cash flow (Alkebäck & Hagelin, 1999). Another example is commodity risk, especially in the manufacturing industry because they have raw materials as input to produce output-products like car, tools, and more. Large exposure to foreign trade, there is a risk that changes in currency or price changes in commodities have a major impact on cash flow, which manufacturing firms must be able to manage these risks.

Therefore, it is more natural for manufacturing firms to be active in risk management such as derivative compared to other countries such as the US with larger domestic markets (Alkebäck, Hagelin, & Pramborg, 2006). The derivative usage in Sweden is ever increasing. During the 1980s, there were almost no derivative contracts purchased, but by 1990s, this had increased drastically (Näslund, 1995). European firms use less derivatives than the US, however more than non-US countries in general (Bartram, Brown and Fehle, 2009). Simultaneously, most of the manufacturing firm categories, uses more derivatives than the average firm in the sample (Bartram, et al. 2009). The derivative usage among all Swedish firms are 52.4%, slightly less than the world average at 54.3% and slightly less than the European average at 55.1% but slightly higher than the non-US countries, at 52.1% (Bartram, Brown and Fehle, 2003). These results are in line with what Alkebäck and Hagelin (1999) also found while studying the

Swedish market. They added that there is a positive relationship between firm size and derivative usage, where large firms use derivatives 86% versus small firms who only use in 18% of the cases (Alkebäck and Hagelin, 1999). Their results also concluded that derivative usage was the highest for manufacturing firms, at a rate of 79%, and that the derivative usage was higher in Sweden than in the US. The same study compares New Zealand as their equal country with the same conditions and dependence on foreign trade. It also shows that manufacturing firms use derivatives most of all other sectors. A study by Nydahl (1999) showed that there are value additions in the use of derivatives by Swedish companies. A later study by Alkebäck and Hagelin (2006) showed that derivative usage increased slightly, to 59% and for large firms to 89%. Furthermore, small firms also almost doubled their derivative usage, from 18% to 34% (Alkebäck and Hagelin, 2006).

2.3.4 Cash holding in Swedish manufacturing firms

There are very few studies on manufacturing firms in Sweden regarding cash holding, therefore looking in countries other than Sweden. According to Alves (2018), it shows that Swedish non-financial firms had 17% cash and cash equivalents by net assets on average from 1995 to 2014, which Swedish firms have more cash than firms in all other European countries, except Ireland at 19%. But US firms have the same level of cash as Swedish firms (Alves, 2018). A study by Opler et al, (1999) shows that small firms with high business risk and high growth opportunities hold more cash than firms with easy access to the capital market. Ferreira and Vilela (2004) also suggest that cash holding levels tend to decrease, the more capital markets become developed in a country. Since manufacturing firms tends to be large, and has less business risk and less growth opportunities, they tend to hold less cash, than other industries (Bates, Kahle, & Stulz, 2009). The same study also argues that high-tech firms have more cash than manufacturing firms in U.S. because high-tech firms are at higher risk and worse access to the capital market compared to manufacturing firms. Therefore, the manufacturing firms do not need to hold as much cash when there is access to the capital market and automatically lower risk.

3. PREVIOUS EMPIRICAL STUDIES

In this chapter we present empirical studies of relevant theories that were dealt with in Chapter 2. The chapter begins with a thorough review of previous empirical studies of cash holding and derivative usage, respectively. Finally, the hypotheses are presented and motivated in previous research and theories.

3.1 PREVIOUS EMPIRICAL STUDIES OF CASH HOLDING

Previous empirical studies about finance motives by Bates, Kahle and Stulz (2009) and Irvine and Pontiff (2008), concluded that, the higher cash volatility, the more cash the firms had at hand, which is a precautionary motive. Furthermore, Opler, Pinkowitz, Stulz and Williamson (1999) conclude, that firms with limited market access and volatile cash flows use larger cash holdings as protection. These motives are also according to Opler et al. 1999, the greatest in financial downturns and financial crisis, which also Han and Qiu (2007) confirm. Regarding transaction motive in the finance motives, the higher the marginal costs of being illiquid, the higher the cash holdings, until an optimum where the marginal cost of holding cash equals the marginal benefit of holding the cash (Opler et al., 1999). This is also confirmed by a study by Kim, Mauer and Sherman (1998) which shows that firms that experience higher earnings volatility and hence higher external financing costs, has higher cash holdings as a protection.

Another empirical studies in pecking-order by Denis and Sibilkov (2010) found that this theory is especially supported in financial distress and financially constrained firms, that have higher cash holdings allow these firms to invest in positive NPV project, that would otherwise not have been performed. Furthermore, Denis and Sibikov (2010) finds that financially constrained firms avoid external financing, by holding larger cash holdings. The benefits of large cash holdings for financially constrained firms have also been studied by Nance et al. (1993); Opler et al (1999); Kim et al (1998). Another empirical study by La Rocca and Cambrea (2019), have examined the relationship between cash holding and performance in Italy over 36 years. The study shows that cash holding in economic downturn is more attractive for firms because of less cost of financial distress by greater financial flexibility.

However, an empirical study about underinvestment problem shows that financially constrained firms tend to hold more cash in order to maintain the activity of investments because of the limited access to the capital markets. Especially in the Financial Crisis in 2007-2009, 1050 CFOs in USA, Asia and Europe was surveyed, the study discovers that during the crisis, financially constrained companies planned to cut their investments and R&D while financially unconstrained companies simultaneously performed less cuts (Campello, Graham, & Harvey, 2010). In later years, papers such as Marin and Niehaus (2011) and Bolton et al (2011) conclude a positive sensitivity of cash holding on financially constrained firms.

Several empirical studies are founded that information asymmetry result in a price premium for external financing, why managers have incentives to act in existing stockholder's interest to reduce cost of external financing by lower information asymmetry thorough better transparent as one example (Donaldson, 1961) (Myers & Majluf, 1984). In later years, papers such as Marin and Niehaus (2011) and Bolton et al (2011) conclude a positive sensitivity of cash holding on financially constrained companies.

Several empirical studies regarding cash holding found that information asymmetry result in a price premium for external financing, why managers have incentives to act in existing stockholder's interest to reduce cost of external financing by lower information asymmetry thorough better transparent as one example (Donaldson, 1961) (Myers & Majluf, 1984). Myers and Majluf (1984) also found that cash holding is valuable if companies have higher costs to raise external financing. Another empirical study in Japan found about high growth companies, in an environment of high information asymmetry and insufficient investment, have incentives and more valuable to hold enough cash (Pinkowitz & Williamson, 2001). An empirical study builds on long purse hypothesis and finds a support but, with an addition that it mainly applies in times of economic recession (Campello M. , 2003).

Pinkowitz, Stulz, and Williamsson (2006) empirically found in agency problems that an extra dollar only is worth $0.33 in firms with poor governance, while in companies with enough governance is higher, at $0.91. The result is supported by Dittmar et al. (2007), where a poor

corporate governance has a market value of cash holding at $0.42-$0.88 of each $1 of book value, while a good governance is two times higher than poor governance.

3.2 PREVIOUS EMPIRICAL STUDIES OF DERIVATIVE USAGE

Previous study of derivative usage shows mixed findings regarding cost of financial distress and derivative usage. According to previous studies by Nance, Clifford, and Smithson (1993), Geczy et al (1997), Howton and Perfect (1998), Allayannis and Weston (2001), Graham and Rogers (2002), Júnior and Laham (2008), Bartram et al, (2009), Allayannis et al. (2012), and Ahmed et al (2013) find that firms tend to enter derivatives to avoid large expected costs of financial distress and their results show a positive relationship between firm value, performance and derivative usage. On the contrary, Tufano (1996), Jin and Jorion (2006), and Ayturk et al (2016) did not find any observable relationship between firm value and derivatives.

Regarding tax incentives if looking at previous studies, there was limited evidence to support this hypothesis while using derivatives. However, Graham and Rogers (2002) show a positive evidence in value enhancing in connection to leverage. As leverage (debt/equity ratio) increases by 3 percent producing an additional tax shield of 1.1 percent of market value to the asset. The research of Berkman and Bradbury (1996) also found tax loss carry-forwards as positive evidence. Other studies failed to confirm the relation between hedging and tax incentive (Nance, Smith, & Smithson, 1993) (Mian, 1996) (Tufano, 1996). But they document a positive relationship between tax credits and tax convexity but not robust as hypothesized.

The previous study of Fazzari et al. (1988) shows results, that manufacturing companies with high sensitivity of cash flow in need for investments, is significant. The same result is supported by Kaplan and Zingales (1997). Newer study, the result shows that growth companies that rely heavily on external financing to finance the investment opportunities is the hedging valuable, it says that investment and cash flow are strongly linked (Lewellen & Lewellen, 2016). But in contrast, another previous study of 64 airlines from Asia and Europe over 11 years and find that there is no significant relationship between derivative and firm value (Berghöfer & Lucey, 2014). The authors conclude that one possible explanation is that the reduced volatility in jet

fuel prices in the period may have made airlines less exposed to fuel prices and thus derivative is less efficient. Another article which also shows non-significant results with 320 non-financial companies in France but only one year (2001). The authors concluded that it has information asymmetry to do, it seems that French investors cannot judge whether firms really use derivatives for hedging purposes (Khediri & Folus, 2010). Consequently, it shows that corporate governance is an important implication, namely, to better explain derivative strategies so that their shareholders and investors fully appreciate the potential value-adding. This discrepancy may play a role in corporate governance or leadership suggested by Allayannis et al. (2004). Similarly, Fauver and Naranjo (2010) find that firms with higher agency costs (higher information asymmetry), because of a weaker corporate governance show a negative relationship between the use of derivatives and Tobin's Q.

Some empirical studies show that derivatives are too complex to achieve optimal levels. An empirical study by Lin et al. (2012) examine 105 insurance firms from 2000 to 2007 and find a negative relation between hedging and firm value and firm performance. The author concludes that the stock market and stockholders may find derivative costly, complicated to implement, therefore a negative relationship is explained. Another similar study in French with 211 French firms and is measured for 4 years, the result shows that there is no significant value adding to firm value by derivative (Belghitar, Clark, & Mefteh, 2013). The authors of the study find a potential explanation to this, as above about complex but also difficult to get the actual exposures to estimate accurately.

3.3 SUMMARY OF PREVIOUS STUDIES OF CASH HOLDING AND DERIVATIVE USAGE

In Table 3.1, shows a summary of the most relevant previous studies and their results connected to these topics which are cash holding and hedging. The table also indicates in which period, regions studies based on, which methodology and how the studies look at relation to cash holding and derivative usage, respectively.

AUTHORS	TIME PERIOD	REGION	METHODOLOGY	RELATION
RISK MANAGEMENT AND CASH HOLDING ARTICLES				
Batesm, Kahle and Stulz (2009)	1980-2006	USA	Multivariate Regression	+
Irvine and Pontiff (2008)	1964-2003	USA	Multivariate Regression	+
Opler, Pinkowitz, Stulz and Williamson (1999)	1971-1994	USA	Multivariate Regression	+
Han and Qiu (2007)	1997-2002	USA	Multivariate Regression	+
Kim, Mauer and Sherman (1998)	1975-1994	USA	Multivariate Regression	+
Denis and Sibilkov (2010)	1985-2006	USA	Simultaneous Equation	+
Campello, Graham and Harvey (2010)	2007-2009	USA, Asia and Europe	Questionnaire Survey	+/-
Pinkowitz and Williamson (2001)	1974-1995	USA, Japan and Germany	Multivariate Regression	+/-
Campello (2003)	1984-1996	Global	Multivariate Regression	+
Pinkowitz, Stulz and Williamsson (2006)	1988-1998	Global	Multivariate Regression	+/-
La Rocca and Cambtra (2019)	1980-2015	Italy	Multivariate Regression	+
Dittmar and Mahrt-Smith (2007)	1990-2003	USA	Multivariate Regression	+/-
RISK MANAGEMENT AND DERIVATIVE USAGE ARTICLES				
Nance, Smith and Smithson (1993)	1986	USA	Questionnaire Survey	+
Graham and Rogers (2002)	1994-1995	USA	Multivariate Regression	+/-
Howton and Perfect (1998)	1994	USA	Multivariate Regression	+

Tufano (1996)	1990-1993	North America	Multivariate Regression	-
Berkman and Bradbury (1996)	1994	New Zealand	Multivariate Regression	+
Mian (1996)	1992	USA	Multivariate Regression	+/-
Fazzari, Hubbard and Petersen (1988)	1969-1984	USA	Multivariate Regression	+
Kaplan and Zingales (1997)	1970-1984	USA	Multivariate Regression	+
Lewellen and Lewellen (2016)	1971-2009	USA	Multivariate Regression	+
Berghöfer and Lucey (2014)	2002-2012	Asia & Europe	Multivariate Regression	-
Khediri and Folus (2010)	2001	France	Multivariate Regression	-
Allayannis and Mozumdar (2004)	1977-1996	USA	Multivariate Regression	-
Fauver and Naranjo (2010)	1991-2000	USA	Multivariate Regression	-
Lin, Wen and Yu (2012)	2000-2007	USA	Multivariate Regression	-
Belghitar, Clark, and Mefteh (2013)	2002-2005	France	Multivariate Regression	-
Geczy, Minton, and Schrand (1997)	1990	USA	Multivariate Regression	+
Allayannis and Weston (2001)	1990-1995	USA	Multivariate Regression	+
Junior, and Laham (2008)	1996-2005	Brazil	Multivariate Regression	+
Bartram, Brown, and Fehle (2009)	2000-2001	Global	Multivariate Regression	+
Allayannis, Lel, and Miller (2012)	1990-1999	Global	Multivariate Regression	+
Ahmed, Azevedo, and Guney (2013)	2005-2012	UK	Multivariate Regression	+

Jin and Jorion (2006)	1998-2001	USA	Multivariate Regression	+/-
Ayturk and Gurbuz (2016)	2007-2013	Turkey	Multivariate Regression	+/-

3.4 HYPOTHESES FORMULATION

The aim from the starting point of this study, is to study the relationships between derivative usage and firm value, between cash holding and firm value, and between the both risk management strategies and firm value. With the help of the multivariate regressions, the authors can make a conclusion based on the results by a hypotheses test to answer the research questions whether derivative, cash holdings or the combination can statistically be considered as a link for firms with potential protection against the economic downturns. The conditional hypothesis is called null hypothesis (H_0) used in parallel with alternative hypothesis (H_A). The authors use the null hypothesis as based on the assumption that the stated statement is valid. But if the stated statement is invalid then the null hypothesis is rejected, and the statistical evidence proves that the alternative assumption is correct. The hypothesis test is performed at a minimum of 10% significance level. Basically, this means that when the authors found a p-value less than 10%, it leads to reject the null hypothesis and accept the null hypothesis if a p-value of more than and equal to 0.1.

The first hypothesis is based on theories by Keynes (1936); Opler et al., (1999); and Marin & Niehus (2011) shows that during an economic downturn, large cash holdings can be used as protection from financial distress, which would explain a potential increase in cash holdings. However, a study by Myers & Majluf (1984) shows that because of the information asymmetry when issuing new funds, cash and internal funding is the cheapest way of financing. This would explain a potential decrease in cash holdings, because when firms are in a financial distress, external financing becomes even more expensive compared to internal financing resulting in that firms use up their cash reserves first.

Hypothesis 1: H_0: Cash holdings did not change during the period

H_A: Cash holdings changed during the period

The second hypothesis is based in theories and studies by Smith and Stulz (1985); Mayers and Smith (1982); and Graham and Rogers (2002), show that during an economic downturn, firms tend to benefit from derivatives, since it would lower the financial distress costs and lower volatility in cash flows. This would mean that the firms should increase derivatives during the financial crisis.

Hypothesis 2: H_0: Derivative usage did not change during the period

H_A: Derivative usage changed during the period

The third hypothesis will be tested and see if supporting theory for a market value increase because of derivative usage as Graham and Rodgers (2002) and Howton and Perfect (1998), where the value increase is especially large during financial distress. However, contradicting research by Jin and Jorion (2006) and Culp (2001) show that derivatives does not increase firm value.

Hypothesis 3: H_0: The market value was unaffected by change in derivative usage

H_A: The market value was affected by change in derivative usage

The value of cash holdings are an arguable topic that becomes the fourth hypothesis, where studies by Pinkowitz et al., (2006) and Dittmar et al., (2007) show that the market value of cash is well below the book value of cash, however this is especially the case for unconstrained firms. During a financial distress, studies by Keynes (1936); Opler et al., (1999); and Marin & Niehus (2011) concludes rather that cash holdings are beneficial for the firms.

Hypothesis 4: H_0: The market value was unaffected by change in cash usage

H_A: The market value was affected by change in cash usage

The fifth hypothesis is tested on the relationship between cash holding and firm value during the financial crisis. A study by La Rocca & Cambrea, (2019) shows that cash holding during a economic downturn leads to better performance than other firms with lower cash holding due to greater financial flexibility and thus attractive to firms in financial distress.

Hypothesis 5:

H_0: Cash holdings alone is not appropriate during a financial crisis for Swedish manufacturing firms

H_A: Cash holdings alone is appropriate during a financial crisis for Swedish manufacturing firms

The sixth hypothesis becomes a test of the relationship between derivative usage and firm value during the financial crisis. According to a number of previous studies such as Nance, Clifford and Smithson (1993), Allayannis and Weston (2001), Graham and Rodger (2002), and Allayannis et al. (2012) show that there is a positive relationship between derivative usage and firm value.

Hypothesis 6:

H_0: Derivative usage alone is not appropriate during a financial crisis for Swedish manufacturing firms

H_A: Derivative usage alone is appropriate during a financial crisis for Swedish manufacturing firms

The seventh hypothesis, it is often hard to conclude that one Risk Management strategy alone is the most appropriate strategy for the firms during a financial crisis. Therefore, it is tested whether or not a combination between cash holdings and derivative usage can be the most appropriate strategy for Swedish manufacturing firms during a financial crisis.

Hypothesis 7:

H_0: A combination of derivative usage and cash holdings is not appropriate during a financial crisis for Swedish manufacturing firms

H_A: A combination of derivative usage and cash holdings is appropriate during a financial crisis for Swedish manufacturing firms

4. METHODOLOGY

This chapter describes the framework of methodological approach applied in this study and defines the sampling method of the study. Thereafter a thorough description of both dependent and independent variables which are used in this study and how they are measured. After that, the authors present the statistical tests for heteroskedasticity, multicollinearity, normality and including the econometric method. Finally, the last part of this chapter, hypotheses will be developed and presented.

4.1 METHODOLOGICAL APPROACH

This study's methodological approach is based on economic theories and previous studies and research on this subject. The approach is deductive in order to investigate whether the use of derivatives or excess cash holdings during financial crisis can impact firm value. In addition, the study is based on a quantitative approach, in which its objective is analyzing data containing a large sample of Swedish manufacturing companies. The study will be analyzed through multivariate regressions and seven hypothesizes, which makes a quantitative approach favorable (Lundahl and Skärvad, 2016).

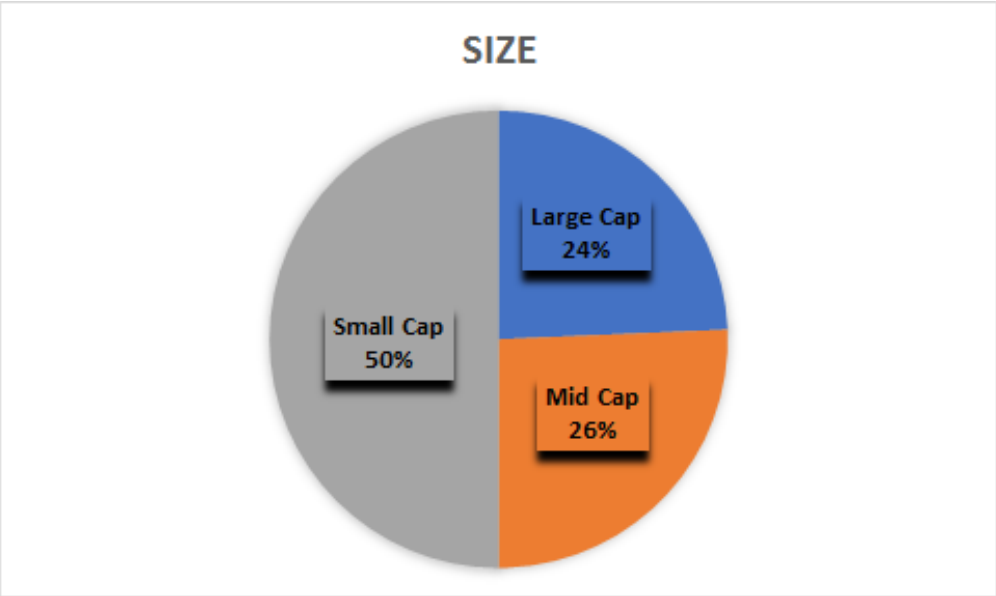
4.2 SAMPLE AND SAMPLING METHOD

The sample consists of all 74 Swedish manufacturing firms listed on the Stockholm Stock Exchange, with observations between 2004-2012, which provides a sample size of 666 observations. See how the sample is distributed in different sizes in number in Figure 4.1 below and more details about which firms are included in the samples can be found in Appendix 1. The definition for manufacturing firms were set by the Global Industry Classification Standard (GIC-code), the classification codes, 1510 Materials, 2010 Capital Goods, 2020 Commercial & Professional Services, 2030 Transportation, were used in the data collection to the sample in this study that belongs to manufacturing. The authors chose that type of industry taxonomy because GIC is a registered trademark of MSCI Inc (A leading provider of research-based indexes and analytics) and Standard & Poor's (A leading credit rating agency) and used by majorities around the world.

Furthermore, this study uses recognized sources such as COMPUSTAT, Business Retriever, and annual reports to collect data for the data collection. The samples will later be worked in Excel and calculated in STATA. To reduce the risk of selection bias, the sample includes all relevant firms from the Stockholm Stock Exchange. However, including all relevant firms from this stock exchange gives a better picture of the market than choosing a random sample from the index.

Even though research conducted by Allayannis and Weston, (2001); Géczy et al, (1997) excluded small firms from their sample, our study aims to provide generalizable results, hence we include all sizes. This results in that since there might be a difference between firms' size and derivatives and excess cash, it is of importance to include all market capitalizations. The study period is set to the previous financial crisis of 2007-2009, and for comparison a pre-financial crisis period is set at 2004-2006 and a post-financial crisis period is set to 2010-2012, in order to visualize the potential difference, the previous financial crisis has impacted. With regards to that this was the latest financial crisis, the study period is as up to date as possible yet ensuring results from a financial crisis.

Figure 4.1 The samples are distributed in different sizes in number



4.3 ECONOMETRIC TECHNIQUE

It is important that to identify an appropriate model to get proper regression output. This is done by basing the model in theoretical framework and the model has to meet statistical frameworks (Brooks, 2019). The regression model used is shown below, where the dependent variable is Tobin's Q that measures firm value. The independent variables are cash holdings and derivative usage as a dummy variable. Furthermore, there are control variables, namely Managerial Risk Aversion (MRA), Firm Size (LN Total assets), Access to financial markets (dividend dummy), Investment opportunities, Leverage, Risk of financial distress (Altman Z-score), Tax, Return on Assets (Profitability), Dollar, Euro and Oil price. In addition, lastly the unobservable factors that cannot be included in any variable, is captured in the unobservable error term (Brooks, 2019).

$$\boldsymbol{Tobin's\ Q} = \boldsymbol{a_0} + \boldsymbol{\beta_1 Cash\ Holding_{i,t}} + \boldsymbol{\beta_2 Derivate\ Usage_{i,t}} + \sum_{\boldsymbol{i=1}}^{\boldsymbol{k}} \boldsymbol{\emptyset\ Control_{i,t}} + \boldsymbol{\varepsilon_{i,t}}$$

4.4 DEFINITION OF VARIABLES

This subchapter will provide a thorough description of the variables included in this study, which are used in previous studies of a similar nature, Allayannis and Weston (2001), Opler et al (1999), Alam (2018), and Graham and Rogers (2002). An important aspect of this study is about how firm value in Swedish manufacturing companies have been affected by selecting one of the risk management strategies. And if manufacturing companies began to manage risk exposures after the Financial Crisis 2007-2009 and then how their performance has been.

The purpose of this paper is not to achieve a high R^2 at the expense of reduced empirical quality but for a highly relevant statistical goal for the study, as it provides the fit of the model to the data (Brooks, 2019). For that reason, the authors decided to include independent variables from previous research to explain a dependent in the regression analysis.

4.4.1 Dependent variable

In this study, Tobin Q is used as a proxy to measure a firm value and tell about how much the market values the already installed capital in the company. And how much profits of capital are expected to generate in the future. Tobin's Q was introduced by Tobin (1969). Tobin's Q is measured as the market value of a firm divided by the replacement cost of firm's assets. But this study, the authors use another and simplified equation by Allayannis and Weston (2001), and Jin and Jorion (2006). However, both equations provide the same results.

$$Tobin's\ Q = \frac{Market\ value\ of\ equity + Total\ Debt}{Book\ value\ of\ assets}$$

4.4.2 Main Descriptive Variables

As in accordance with this study, Cash Holding and Derivative usage will be our main descriptive variables for assessing whether risk management has a significant effect on firm value of the Swedish manufacturing companies before, during and after the financial crisis. The variables are in the center of hope in order to be able to give strength to the regression model and provide answers to what risk management would be useful for the Swedish manufacturing companies.

a) Cash Holding (CH): Based on theoretical arguments, the companies should not hold cash because it is less attractive from a shareholder's perspective. But empirical evidence contradicts depending on the time period and the economic climate. Moreover, the previous studies mean that cash holding is more attractive for companies in economic downturn because of greater financial flexibility, and less cost of financial distress (La Rocca & Cambrea, 2019). In summary, it is difficult to define the relationship between cash holding and firm value But as hypothesized, this study is about the financial crisis and the authors expect a positive relationship between cash holdings and firm value with regard to the financial crisis. Opler et al. (1999) use the availability of cash and marketable securities in relation to net assets (total book value of assets less cash and marketable securities) as an equation of cash holding.

$$Cash\ Holding = \frac{Cash\ and\ marketable\ securities}{Total\ Book\ Value\ of\ Assets - Cash\ and\ marketable\ securities}$$

b) Derivative usage: According to research by Geczy et al., (1997); Nance, Clifford and Smithson., (1993); Júnior and Laham (2008); Allayannis and Weston (2001); Bartram et al, (2009); Graham and Rodger (2002); Allayannis et al. (2012) and Ahmed et al (2013), there is a positive relationship between firm value, performance and the use of derivatives. However, contradicting research by Jin and Jorion (2006) and Ayturk et al. (2016) finds no significant evidence or relationship. The derivative usage is measured by a dummy variable, it is often used when it is not possible to measure or quantify the data of interest in an ratio (Weiers, 2011). The firms that hedge takes the value of one and zero otherwise. The data is gathered from the annual reports. The authors expect the relationship to be positive between derivative usage and Tobin Q.

$$Derivative\ usage = Derivative\ dummy, 1; 0$$

4.4.3 Control Variables

Interpretation of regression results is obtained by the coefficient of determination (R2) indicates the relationship between the variation in the dependent variables explained by the independent variables. However, several regressions take into account that the dependent variable is affected by more than one factor (Gujarati & Porter, 2010). Many parts explain the impact on firm value more than cash holding or hedging that a firm decides to choose, and therefore firm value cannot be explained solely through cash holding or hedging. The regression analysis includes several control variables to better explain the movement of the dependent variable. However, because the authors are not aware of all possible factors that affect the dependent variable, the regression will explain simplified situations and the R2 will reflect "cross-sectional values" of data. Which means that the authors will be able to compare a firm's risk management decision within the time periods in the regression (Brooks, 2019).

a) Managerial Risk Aversion (MRA): This control variable is included because of a CEO tend to be more active in company’s decision to engage in risk management the more

the CEO's wealth has a direct tie to the company, in turn, affect corporate performance and firm value (Gay & Nam, 1998) (Smith & Stulz, 1985). Regarding to the previous studies and the financial crisis, the authors of this paper predict a positive relationship between managerial risk aversion and Tobin's Q since higher risk aversion should lead CEOs to hold more cash or engage hedging that is positive aspect in an economic downturn. The MRA variable define CEO stock ownership as part of the company, and thereby describe their risk aversion as follows:

$$MRA = \frac{Shares\ owned\ by\ CEO\ x\ Share\ Price}{Market\ Value\ of\ Equity}$$

b) Firm Size: According to Bartram et al. (2011), the study found a relationship between the firm's total risk and systematic risk with regards to firm size. The high initial cost of hedging and derivative usage is according to Allyanis and Weston (2001) a reason why there is a positive relationship between firm size and derivative usage. It is argued upon whether there is a positive or negative relationship between firm size and Tobin's Q. Research by Shepherd (1972) and Punnose (2008) report a positive relationship, while Haines (1970); Evans (1987) and Allayannis and Weston (2001) reports a negative correlation between firm size and Tobin Q. According to Allayannis and Weston (2001) firm size can be measured either by, the log of total sales, log of CAPEX or log of total assets, however all generate the same results (Allyannis and Weston, 2001). The authors expect the relationship between firm size and firm value to be negative.

$$Firm\ Size = \log(Total\ Assets)$$

c) Access to Financial market: Dividend can be used as a signaling tool, where an increase in dividend increases the stock price, while a dividend decrease decreases the stock price (Lang and Litzenberger, 1989). Dividend can also be used as a proxy for access to financial markets (Allayannis and Weston, 2001); Jin and Jorion, 2006). Allayannis and Weston (2001) argue that there ought to be a negative relationship between tobin q and paying dividend, while Jin and Jorion (2006) and Júnior and Laham (2008) argue that paying dividend instead has positive relationship with tobin q and argue easier access to financial markets if firms pay dividend. Studies by Júnior and Laham (2008), Ahmed

et al. (2013) and Allayannis and Weston (2001) used dividend dummy for proxy of access to financial market. In this study it is therefore measured as 1 if the firm pays dividend and 0 otherwise.

$$Access\ to\ financial\ market = Dividend, 1; 0$$

d) Investment opportunities: Myers (1977) finds a positive relationship between investment opportunities and firm value, resulting in that hedged firms might have higher investment opportunities. The results are in line with Júnior and Laham (2008) and Allayannis and Weston (2001), they calculated investment opportunities as total capital expenditure divided by Total sales. The authors expect to find a positive relationship between investment opportunities and firm value.

$$Investment\ opportunities = \frac{CAPEX}{Total\ Sales}$$

e) Leverage (Debt/Equity): According to Modigliani and Miller theorem, firm value is unaffected by its capital structure (Modigliani and Miller, 1958). However, in the real world, there are both bankruptcy costs and tax benefits of having debt. A study by Graham and Rodgers (2002) found a positive relationship between performance, firm value and increased debt, which is in line with results from Berger and Patti (2006). The relationship is stronger the higher quality, and less risk of bankruptcy of the firm (Cheng and Tzeng, 2011).

$$Leverage = \frac{Debt}{Equity}$$

f) Risk of financial distress (Altman's Z-score): The degree of likelihood of facing financial distress has a significant effect on firm value in an economic downturn. The higher the risk of companies going bankrupt, the worse the firms' valuation will be affected. Therefore, the control variable is relevant to this study and include to the regression model. The measurement of risk of financial distress, Altman (1968) developed a model by five business aspects, measurements for liquidity, profitability, solvency, leverage, and activity ratio. Kim et al (1998) used Altman's Z-score to their

study when calculating the risk of financial distress as one of determinants of cash holding. The authors of this paper expect to have a positive relationship with the dependent variable, since companies that have high Z-score will manage better than other companies with lower Z-score.

$$Altman's\ Zscore = 1.2\ x \frac{WC}{Tot.Assets} + 1.4\ x\ \frac{Ret.Earnings}{Tot.Assets}$$

$$+ 3.3\ x \frac{EBIT}{Tot.Assets}\ + 0.6\ x\ \frac{Market\ Value\ of\ Equity}{Book\ Value\ of\ Total\ Liabilities} + 1.0\ x \frac{Sales}{Tot.Assets}$$

g) Tax (TAX): Graham and Rogers (2002) and Smith and Stulz (1985) argue that there is a positive relationship between taxes and Tobin's Q via derivative. With convex tax schedule, the companies can create value by lowering expected taxes through derivatives. This reduces the variability of taxable earnings which in turn improves firm valuation (Tobin's Q). This way of measuring tax variable is defined as net operating loss carryforwards divided by total assets. The measurement is used by Berkman and Bradbury (1996), Gay and Nam (1998), and Graham and Rogers (2002). The authors expect that there is a positive relationship between tax and Tobin's Q because of the greater net operating loss carryforwards, the more likely to use derivatives which in turn improves firm valuation.

$$TAX = \frac{Net\ Operating\ Loss\ Carryforwards}{Total\ Assets}$$

h) Profitability (ROA): Allayannis and Weston (2001) argued that there is a positive relationship between profitability and firm value because of a higher profitability is to be equal to the firm valuation is increased in the eyes of the shareholders, which is in line with findings by Varaiya, Kerin and Weeks (1987). Profitability is measured using return on total assets, ROA (Goodman & Bamford, 1989; Hanna 2011). The authors expect to find a positive relationship between profitability and firm value.

$$Profitability\ (ROA) = \frac{Net\ Income}{Total\ Assets}$$

The authors of this paper also want to include other variables that influence firm value that is not found in other similar studies that we have applied in this paper. In this paper, the focus is on Swedish manufacturing companies that are export dependent in accordance with Statistics Sweden's data that show that manufacturing companies represent a significant part of exports that sums up more than 70 % of the total export of Sweden (Manskikkaviita, 2009). The Swedish manufacturing companies that go internationally face several risks such as currency risk and commodity risk. These factors of risk influence firm value.

i) Selection of currencies for this study is based on Statistics Sweden (2018), about 60 per cent of the exports go to the EU countries and the US is the largest market for Sweden outside Europe. In this case, foreign exchanges will be the euro and the dollar as these primary currencies for the Swedish manufacturing companies. The measurement of currencies is calculated by variation in exchange rates by difference between current year exchange rate and last year exchange rate. The currencies are defined in terms of dollars as USD / SEK and euros as EUR / SEK. The authors expect that there is a positive relationship between currencies and firm value because when the Swedish krona is weaker, the Swedish manufacturing companies get benefits from lower price on goods from a foreign customer perspective.

$$\Delta DOLLAR = DOLLAR_N - DOLLAR_{N-1}$$

$$\Delta EURO = EURO_N - EURO_{N-1}$$

j) Another variable, commodity price, Hamilton (1983) conclude that oil is the most used input on real output. As in this case, manufacturing companies have oil as one of their inputs such as to get started with its machinery and transport. Hamilton's (1983) study shows that oil prices have a negative impact on companies that have oil as input, which in turn affects performance and firm value. Another empirical study shows that 33 of 38 industries are affected negatively of increasing oil price due to the fact that oil is used as input (Scholtens & Yurtsever, 2012). The measurement of oil is calculated by variation in oil price by difference between current year oil price and last year oil price. The authors chose to use Brent oil as input to get historical prices of oil. The authors

expect that there is a negative relationship between increased oil price and firm value because manufacturing companies use oil as input.

$$\Delta OIL = OIL_N - OIL_{N-1}$$

The following table, Table 4.1, shows the summary of both dependent, main descriptive and control variables used in this study with their definition, the authors' expectations on variables' impact on Tobin's Q, and sources from where data were collected related to each variables. The authors believe that the selected variables will provide results for answering the research questions.

Table 4.1 – Expected impact on Tobin's Q

VARIABLES	DEFINITION	EXPECTED IMPACT	SOURCE
TOBIN'S Q	(Market value of equity + Total Debt) / Book value of assets		COMPUSTAT
CASH HOLDING	Cash and marketable securities / (Total book value of assets – cash and marketable securities)	+	COMPUSTAT
DERIVATIVE USAGE	Derivative dummy, 1; 0	+	Annual Reports
MANAGERIAL RISK AVERSION	(Shares owned by CEO*Share price) / Market value of Equity	+	Annual Reports
FIRM SIZE	Ln (Total Assets)	-	COMPUSTAT
ACCESS TO FINANCIAL MARKETS	Dividend dummy, 1; 0	+/-	COMPUSTAT
INVESTMENT OPPORTUNITIES	CAPEX / Total sales	+	COMPUSTAT
LEVERAGE	Debt/Equity	+	COMPUSTAT
RISK OF FINANCIAL DISTRESS	Altman's Z-score	+	COMPUSTAT
TAX	Net Operating Loss Carryforwards / Total Assets	+	COMPUSTAT
PROFITABILITY	Net income / Total Assets	+	COMPUSTAT
EXCHANGE RATE – DOLLAR	$Dollar_N – Dollar_{N-1}$	+	Investing.com
EXCHANGE RATE – EURO	$Euro_N – Euro_{N-1}$	+	Investing.com
COMMODITY PRICE – OIL	$Oil_N – Oil_{N-1}$	-	Investing.com

4.5 ORDINARY LEAST SQUARES

Ordinary Least Squares (OLS) is a universally used econometric model and is used for regression analysis to test the linearity between the dependent and independent variables (Brooks, 2019). However, for the OLS model to be reliable, the study sample must fulfill important criteria. If these criteria are fulfilled, this would imply that OLS is the best linear unbiased estimator (BLUE) (Brooks, 2019). The first assumption is that the error term has a population mean of zero. If this were not the case and the expected value of the error term could be predicted, more variables should be added to the regression, since the aim is to only have random errors left in the error term. The first assumption automatically fulfills, when a constant term is added to the model. The second assumption is homoscedasticity, meaning that the error term and the residuals has a constant variance. This assumption can be tested with White test (Wooldridge, 2012). The third assumption states that the error term is not correlated with each other (non-autocorrelation). The problem if this assumption is not fulfilled is known as serial correlation. However, serial correlation is almost exclusively tested for time-series data, and rarely for panel data (Wooldridge, 2012). Since the study is based on panel data, serial correlation is not tested for. The fourth assumption states that all independent variables are not correlated with the error term. If any independent variable were to be correlated with the error term, this would imply that the error term was not an unpredictable random error, and hence the model would suffer from endogeneity, which would result in biased results (Brooks, 2019). The fifth assumption is regarding the normality of the error term, which the study tests with Jarque-Bera Normality test. However, with the law of large numbers, the fifth assumption is negligible (Wooldrige, 2012; Brooks, 2019).

4.6 STATISTICAL TESTS

Many of the statistical methods including correlation, regression, t-test, and analysis of variance are performed under the assumption of certain characteristics of the data. Generally, they assume that the data is normally distributed and the variances of the variables when comparing, are homogeneous (Razali and Wah 2011). But the consequences arise when breaking these assumptions that leads to invalid or unreliable interpretations of findings of the study. For this reason, these assumptions need to be taken seriously to get valid and reliable on the findings by

performing tests on the data such as check the normality and the homogenous of the data before the authors can perform any statistical analyses on the data.

4.6.1 Test for Heteroscedasticity

Heteroscedasticity happens when the standard errors of a variable are non-constant over a specific period (Wooldridge 2012). Which is a problem since OLS regression assumes that all residuals have a constant variance, so called homoscedasticity. The regression needs to be tested to provide reliable results with the assumption that the residuals have a constant variance. A common test for heteroscedasticity is White's test. The test implies the two following hypotheses, H_0: the data is homoscedastic and H_a: the data is heteroscedastic. When a p-value of F-test is greater than a confidence level of 95% then the H_0 can be accepted and there is no heteroscedasticity problem in the data.

4.6.2 Test for Multicollinearity

When there is an exact relationship between two independent variables, it is called perfect multicollinearity. Multicollinearity is a problem since it undermines the statistical significance of an independent variable, which in independent variables would be independent of each other, would not correlate with each other. (Brooks 2019). The idea is that value of one independent variable can change and not the others. Therefore, the test for multicollinearity is highly relevant since this study have many different proxy variables that aim to measure. This would provide a model that suffers from multicollinearity. A correlation matrix is considered suitable for noticing extreme multicollinearity.

a) *Correlation matrix:* It identifies the relationship between dependent and independent variables as well as between independent variables. It measures a value range from -1 to +1. If the correlation value shows 1 or -1, then there is a perfect correlation between the variables, which is not desirable for this study. But if it shows 0 then there is no correlation between the dependent and independent variables. Multicollinearity is not a problem if no correlation between independent variables exceeds or below at a certain

value, usually about +0.7 or -0.7, respectively (Martin and Bridgmon 2012). Otherwise, it is recommended to remove one of the variables from the combination.

4.6.3 Test for Normality

It is hard to get perfect normally distributed data, but it is often enough to conclude that the data is normally distributed if it shows relatively normal distribution (Martin and Bridgmon 2012). When testing normality, there are three ways to choose from. The first approach formal normality tests (Shapiro-Wilk Test), the second approach is numeric (Skewness and Kurtosis Test), and then the last approach is graphic (Histogram and Box Plots). The mentioned approaches will be presented and tested with the assistance of STATA software in this study.

a) *Shapiro-Wilk Test*: This test for normal distribution is based on the P-value in the test range from 0 to 1, and if the P-value is less than 0.05, it leads to reject the null hypothesis, which it means the data is not normally distributed. But if the P-value is more than 0.05 then the null hypothesis can be accepted, and data is normally distributed.

b) *Skewness and Kurtosis Test*: Skewness describes the distribution of variables about its mean, at either extreme of the tails in that distribution. The skewness value can be positive or negative, or even undefined. A positively skewed distribution has most values to the left and some extreme values to the right. And vice versa applies for negatively skewed distribution. Kurtosis describes the height and sharpness of the center, relative to that of a systematic normal bell curve. Usually, the values of skewness and kurtosis, so called z-value, fall between -1.96 to +1.96 then the data is assumed as normally distributed, even better if closer to zero. But normally, a small deviation from the zero is acceptable (Martin and Bridgmon 2012).

c) *Histograms and Box Plots:* The last approach to test normality through a graphical representation is a histogram. A normally distributed histogram looks like a bell shape

curve as shows a symmetric distribution. Normally, it is not expected that data has a symmetric distribution but rather relatively bell-shaped curve of normal distribution such as some more topped, narrower, or flatter share on distribution. Lastly, the Box Plot is normally distributed if the box plot is equally spaced.

4.7 HYPOTHESIS TESTING AND REGRESSION MODELS

4.7.1 Paired T-test

In order to test the first two hypotheses of the any change between the different time periods, before, during and after the financial crisis regarding cash holdings and derivative usage, a paired T-test was used. A paired T-test tests if there are significant differences between two correlated groups, for example, between different time periods (Wahlgren, 2012).

4.7.2 Panel data models

There are three models for panel data, First differencing, Fixed effect, and Random effect model. First differencing and fixed effect generate the same results when T=2, however, when T is >2, Fixed effect model generates less bias (Wooldridge, 2012). Consequently, first differencing is chosen not to be used for this study. Fixed effects usually give larger standard errors than Random effects. Hence, if the study is to use Fixed effects, they must differ in economically important ways. The best model is tested with the Hausman Test (Wooldridge, 2012), which was developed by Hausman in 1978 (Hausman, 1978). The Hausman test concludes that Fixed effect is the most appropriate model. Furthermore, since the sample is not homogenous and is of panel data characteristics, a Pooled OLS is not an appropriate model to yield the best results. This will be explained further in chapter 5.2.4.

4.8 METHODOLOGICAL DISCUSSION

4.8.1 Validity

This study aims to find potential deviation in firm valuation of Swedish manufacturing firms in terms of a choice of risk management such as cash holding or derivative usage. In order to answer the research questions, high quality data and work processes must be ensured to validate. Swanborn (1996) defines validity as tools used and results generated from empirical measurement should be absence from any kind of biases and errors. The empirical measurements should be correct mainly during the time of collection of data and analytical processes. The validity is assured when both in terms of dependent and independent variables, has been used in several other studies. The authors found these previous studies useful and applicable as a ground for the development of the methodological framework.

However, some risk of non-validity may exist in the sense of classification of industries as one instance. Classification of industries by codes rarely provide a complete description of a company's product or industry range, which can lead to misallocation. Such incorrect industry classification, the authors therefore use a known and registered trademark, GIC codes that is developed by Standard & Poor's (S&P) to avoid the incorrect industry classification.

Another important aspect is if this study can support generalization beyond the actual investigated context. One of the selected studies that has similar dependent and independent variables as in this study, Allayannis and Weston (2001). They study the US market, which is characterized by an extensive domestic market and lower exposure against exchange rates which less demand for hedging. Compared to Sweden, which is a small country that is heavily dependent on exports. This difference between different types of economies, the authors suggest that the results can only be applied to comparable countries. And also, using Swedish data can provide additional insights into the topic of risk management.

4.8.2 Reliability

The reliability is assured when the conclusions and results from the study can be replicated using the same, or similar methods, and hence would generate similar results, and not random results (Bryman and Bell, 2017). This is an important criterion that the authors have strived to follow to a high extent. The data has been imported from trustworthy databases, and furthermore checked with multiple sources, including the companies' own annual reports to verify the integrity of the databases used, namely COMPUSTAT and Business retriever. The data that was possible to export from COMPUSTAT as a datafile, a technique used to minimize human error. And therefore, the authors believe that the data does not contain errors and expect that other data sources will provide a similar result. However, CEO ownership and derivative usage was not included in COMPUSTAT and had to be manually imported, which increases the risk of human error. However, the authors took the precautionary actions of checking each other's data multiple times before importing the data from annual reports manually. At the same time, the law of large numbers results in that even if there were some minor errors in a few observations, the conclusion would still be replicable, since the large observations minimize the potential effect errors might have. With the above-mentioned precautions, the study has a potentially high authenticity, which should generate replicable results. Worth mentioning is that there may be other risks, the authors have not discovered. Such unknown additional risks may have a potential impact on the results. These are believed to be of low impact, as a result of the extensive precautionary actions. Furthermore, the method used in this study is based on assumptions and choices, made by previous leading research on this topic, which increase the reliability of this study.

5. RESULTS

In this chapter, the authors present the results from the study, descriptive statistics of the sample, and the regression models. First, the sample is explained with descriptive statistics in different time periods. After that, the results from statistical tests are presented, as well as the implications and model fit for the regressions models. Thereafter the hypothesis tests are presented followed lastly by the regression outputs.

5.1 DESCRIPTIVE STATISTICS

The sample consists of 666 observations for the 74 publicly listed manufacturing companies during the years of 2004-2012 (More detailed information about which companies are included in the samples, see appendix 1). The tables presented are for the dependent variable, Tobin's Q, the main explanatory variables Cash holdings, and Derivative usage, and for the control variables, described in chapter 4.4. Market value of equity was added to the descriptive statistics to compare the firm size of the sample in a meaningful way, since Ln(total assets) does not give any meaningful information about the actual size of the company, it is rather used as a control variable in the regression.

Table 5.1 Descriptive statistics for all years

	MEAN	MEDIAN	MAXIMUM	MINIMUM	STD.DEV
TOBIN'S Q	1,473	0,949	30,476	0,181	2,425
CASH HOLDINGS	0,139	0,066	2,091	0,000	0,236
DERIVATIVE USAGE	0,626	1,000	1,000	0,000	0,484
M.R.A.	0,039	0,001	0,569	0,000	0,109
LN (TOTAL ASSETS)	7,707	7,563	12,828	2,211	2,265
DIVIDEND DUMMY	0,731	1,000	1,000	0,000	0,443
INVESTING OPPORTUNIES	0,154	0,023	66,520	0,000	2,592
LEVERAGE	0,724	0,499	69,470	-17,224	2,841
ALTMAN'S Z-SCORE	32,795	3,808	7671,557	-7,313	380,878
TAX	0,030	0,021	0,178	0,000	0,032
ROA	0,038	0,052	1,527	-0,793	0,150
DOLLAR	7,001	6,850	7,944	6,467	0,512
EURO	9,398	9,040	10,933	8,579	0,700
OIL	66,652	64,200	91,480	37,660	17,673
MARKET VALUE OF EQUITY	9638,706	1177,200	155522,249	8,954	21256,047

Note: The table shows the mean, median, maximum, minimum, and standard deviations of all sample firms for all years. The numbers of market value of equity are in million SEKs and contain values from 666 observations.

The ratio of cash holdings to net assets (total assets excluding cash and marketable securities) there is a large difference between the sample, where the minimum value is an insignificant amount of cash, and the highest a ratio of 209.1%. The extreme value can occur as a firm has a lot of cash or large short-term investments in relation to net assets. Furthermore, the mean ratio is 13.9% and the median is 6.6%. Of the total observations, 62,6% of the firms over the time period hedge, using derivatives. The market value of the sample firm's equity has a mean of 9,64 Billion SEK with the largest firm having a market value of 156 Billion SEK and the smallest firm in the sample, 8.95 Million SEK. Meaning the sample consists of all different sizes of companies, ranging from quite small, to quite large. 73.1% of the firms pay dividends. The firm's investment opportunities are measured by a ratio between capital expenditure and total sales. The mean ratio of 15.4% means that the firms invest 15.4% of their total sales, on average, though ranging with extreme values of 0% to 6600%. The extreme value at 6600% occurred in a firm because the firm was newly started with large cash and low sales and high investment to generate sales in the future. The firms have a D/E ratio on average, on 72,4% and a median on 49,9%.

As the table shows that there are extreme values in leverage, both maximum and minimum, it turns out that a firm has suffered a significant loss after the financial crisis that caused shareholder's equity was almost empty while debt remained, which is why it shows the extreme value at a maximum of 6947% in leverage. Regarding the negative value at a minimum of -1722% in leverage, it turns out that a firm had negative shareholder's equity after its annual large losses, while debt has not decreased but increased instead.

Altman's z-score shows that it is not a perfect measure of risk of financial distress because it varies extremely between firms as it shows 32,795 in the score, which means extremely low risk of getting into financial distress while the median speaks more truth about the firms' financial health. Mainly the extreme values were due to one of the ratios in the Z-score, MV of Equity / Total Debt, there were firms with zero or small debts with a high MV of equity, therefore it shows high extreme values. Regarding the negative minimum at -7,313, it appears that some firms have negative retained earnings, which negatively affects one of the ratios in

Z-score, Retained Earnings / Total Assets. As the basic idea with Z-score, it means a high risk for firms to go bankrupt with a negative score.

The profitability of the firms, measured by return on assets, is 3.8% on average and with a median on 5.2%. This is low given that investments and assets are required to produce, i.e. a capital-intensive industry often tends to have higher value in the ratio than other industries with less capital-intensive operations.

Table 5.2 Descriptive statistics for different time periods

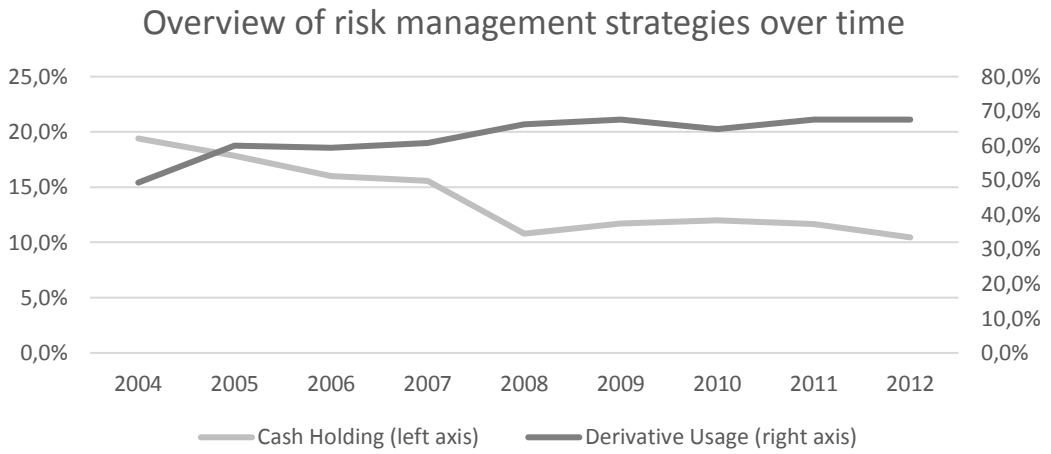
	-------2004-2006-----		-------2007-2009-----		------2010-2012----	
	Mean	**Std.Dev**	**Mean**	**Std.Dev**	**Mean**	**Std.Dev**
TOBIN'S Q	2,052	3,498	1,227	2,054	1,138	0,821
CASH HOLDINGS	0,177	0,289	0,127	0,216	0,114	0,187
DERIVATIVE USAGE	0,563	0,496	0,649	0,477	0,667	0,471
MRA	0,040	0,109	0,043	0,117	0,035	0,101
LN (TOTAL ASSETS)	7,461	2,318	7,796	2,223	7,864	2,233
DIV.DUMMY	0,721	0,449	0,766	0,424	0,707	0,455
INV.OP	0,074	0,484	0,352	4,456	0,036	0,062
LEVERAGE	0,574	0,611	1,012	4,650	0,588	1,448
ALTMAN'S Z-SCORE	84,903	656,087	6,762	23,167	6,721	12,048
TAX	0,032	0,033	0,029	0,031	0,029	0,032
ROA	0,043	0,132	0,013	0,223	0,021	0,146
DOLLAR	7,150	0,567	7,150	0,553	6,704	0,163
EURO	9,159	0,177	10,205	0,612	8,830	0,179
OIL	48,667	8,482	69,720	15,997	81,570	7,329
MARKET VALUE OF EQUITY	8780	17827	8428	18379	11707	26331

Note: The table shows the mean, and standard deviations of all sample firms for different time periods. The numbers of market value of equity are in million SEKs and contain values from 666 observations.

During the different time periods, the Tobin's Q is the highest for the period prior to the financial crisis, namely 2004-2006, while it decreases throughout the time period for the sample. As can be seen in table 5.2 and Figure 5.1, the derivative usage increases on average from, 56.3% in the first period to 64.9% during the crisis and 66.7% after the financial crisis. Furthermore, table 5.2 and Figure 5.1 shows that cash holdings decreased during the periods.

The mean decreases from 17.7% prior to the financial crisis, to 12.7% during the financial crisis and 11.4% after the financial crisis.

Figure 5.1



The market value of equity (firm size) decreases a bit during the financial crisis but increases a lot to after the financial crisis. Firms pay out dividend roughly in roughly the same manner throughout the period, with a slight increase during the financial crisis compared to before and after. Furthermore, leverage increases on average quite drastically, from 57% to 101% during the financial crisis, however returning to 59% after the financial crisis. The profitability of the firms drops during the financial crisis compared with before. After the financial crisis profitability increases a bit, but not to the same level as before.

5.2 DIAGNOSTIC TESTS PRE-ESTIMATION

5.2.1 Test for Heteroskedasticity

We test for Heteroskedasticity using Whites test where the null hypothesis is homoscedastic sample. In fact, there are issues with heteroskedasticity in the sample, since the White tests reports a p-value of 0.0000, meaning the null hypothesis is rejected that it would be homoscedastic sample. This means that one of the OLS assumptions is broken, which leads to

that the regression will be based on robust standard errors to circumvent the broken OLS assumption.

Table 5.3 Result from White's test for heteroskedasticity in STATA

SOURCE	Chi2-test	Degrees of Freedom	P-Values
HETEROSKEDASTICITY	448.58	101	0.0000
SKEWNESS	88.78	13	0.0000
KURTOSIS	3.39	1	0.0657
TOTAL	**540.74**	**115**	**0.0000**

5.2.2 Test for multicollinearity

In the result from the correlation table (Table 5.4) for multicollinearity, neither of the variables have any high correlations measured above 0.7, or below –0.7, which otherwise would be a sign of multicollinearity (Martin and Bridgmon 2012). There are two pairs of variables that are close to 0.7 however, Euro and USD: and Size and derivative usage. However, since they are both below 0.7 and hence measure economically different effects, neither are excluded from the regression model.

Table 5.4 Results from Correlation Matrix in STATA, Dependent and Independent Variables

CORR	T'Q	CH	DERIV	MRA	SIZE	DIV	INV.OP	LEV	ALTM.	TAX	ROA	USD	EUR	OIL
T'Q	**1.000**													
CH	0.515	**1.000**												
DER.US	-0.228	-0.338	**1.000**											
MRA	-0.038	0.057	-0.214	**1.000**										
LN(SIZE)	-0.368	-0.399	0.642	-0.278	**1.000**									
DIV.DUM	-0.191	-0.122	0.267	-0.011	0.420	**1.000**								
INV.OP	-0.004	0.029	-0.058	-0.017	-0.048	-0.077	**1.000**							
LEV	-0.052	-0.085	0.016	-0.028	0.053	-0.069	-0.012	**1.000**						
ALTMAN	0.031	0.033	-0.095	-0.019	-0.043	-0.025	-0.000	-0.020	**1.000**					
TAX	-0.156	-0.250	0.232	-0.132	0.271	0.191	-0.035	-0.036	-0.043	**1.000**				
ROA	-0.082	0.009	0.137	0.024	0.258	0.421	-0.041	-0.054	0.015	0.158	**1.000**			
USD	0.003	-0.018	0.021	0.015	-0.010	0.020	-0.037	0.021	0.041	-0.003	-0.032	**1.000**		
EUR	-0.066	-0.036	0.028	0.029	0.012	0.036	0.004	0.068	-0.021	-0.019	-0.064	0.666	**1.000**	
OIL	-0.149	-0.116	0.091	-0.015	0.073	0.060	-0.005	-0.016	-0.055	-0.061	-0.069	0.023	0.113	**1.000**

5.2.3 Test for Normality

Statistical normality tests include Shapiro Wilk's test (P> 0, 05 and W = 1), skewness and kurtosis test, and histograms and box plots showing that the values of the variables used in this study are relatively normally distributed. The Shapiro Wilk's test result of variables (See table 5.5 below): All variables except MRA and Dividend dummy are insignificant to conclude that distributions are normal. But W value of Shapiro Wilk's test shows most of the variables are more than 0.85, which is relatively normal.

Table 5.5 Result from Shapiro-Wilk W test for normal data

VARIABLE	**Obs**	**W**	**V**	**z**	**Prob>z**
TOBINS Q	666	0.34624	284.963	13.760	0.00000
CASHHOLD	666	0.43781	245.050	13.393	0.00000
DERIVATIVE	666	0.50401	216.195	13.088	0.00000
MRA	666	0.99921	0.344	-2.598	0.99531
LN(SIZE)	666	0.98356	7.167	4.795	0.00000
DIV.DUMMY	666	0.99651	1.520	1.019	0.15410
INV.OP	666	0.02360	424.727	14.732	0.00000
LEV	666	0.12848	379.882	14.460	0.00000
ALTMAN'S Z	666	0.04965	414.243	14.671	0.00000
TAX	666	0.85761	62.067	10.050	0.00000
ROA	666	0.57378	185.784	12.719	0.00000
USD	666	0.86085	60.655	9.994	0.00000
EURO	666	0.84839	66.086	10.203	0.00000
OIL	666	0.95334	20.337	7.334	0.00000

The results from Skewness and Kurtosis tests for normality in table 5.6 below, show that data are relatively skewed but near to zero since 12 of 14 variables are equal to zero. While in the values of kurtosis is even more near to zero which leads this distribution to assume to be normally distributed. The authors conclude that the data are normally distributed. Usually, it is difficult to get perfect normal distribution and a small deviation from prob>chi2 of zero is acceptable according to Martin and Bridgmon (2012).

Table 5.6 Result from Skewness and Kurtosis tests for Normality

				----------joint----------	
VARIABLE	**Obs**	**PR(SKEWNESS)**	**PR(KURTOSIS)**	**ADJ CHI2(2)**	**PROB>CHI2**
TOBINS Q	666	0.0000	0.0000	.	0.0000
CASHHOLD	666	0.0000	0.0000	.	0.0000
DERIVATIVE	666	0.0000	.	.	0.0000
MRA	666	0.0000	0.0000	.	0.0000
FIRM SIZE	666	0.8804	0.0000	16.66	0.0002
DIVDUM	666	0.0000	0.0000	.	0.0000
INV.OP	666	0.0000	0.0000	.	0.0000
LEV	666	0.0000	0.0000	.	0.0000
ALTMAN'S Z	666	0.0000	0.0000	.	0.0000
TAX	666	0.0000	0.0000	.	0.0000
ROA	666	0.0000	0.0000	.	0.0000
USD	666	0.0000	0.0000	.	0.0000
EURO	666	0.0000	0.6111	73.47	0.0000
OIL	666	0.9672	0.0000	.	0.0000

Further, the histogram and Box Plots in Figure 5.2 and 5.3 show that the data is relatively normally distributed for this study, with a few exceptions of outliers, mostly with positive values. The histogram shows relatively bell-shaped with some over a normal pick. The box-plot shows that the distance from the median is relatively symmericed except two plots above 10, and the whiskers of the plot are about the same length. The authors again conclude from this result that data os relatively normally distributed.

The conclusion of the tests for normality shows that the residuals are normally distributed. This is also in line with one of the OLS assumptions about normality. But the coefficient results from the regression may be incorrect because some tests do not show a perfectly normal distribution. However, according to Brooks (2008), when the sample size is over 200, and in this case the sample size is above that limit, then it is considered sufficiently large to conclude the sample with non-normality is not a problem.

Figure 5.2 Result from Histogram of normality Test for Residuals

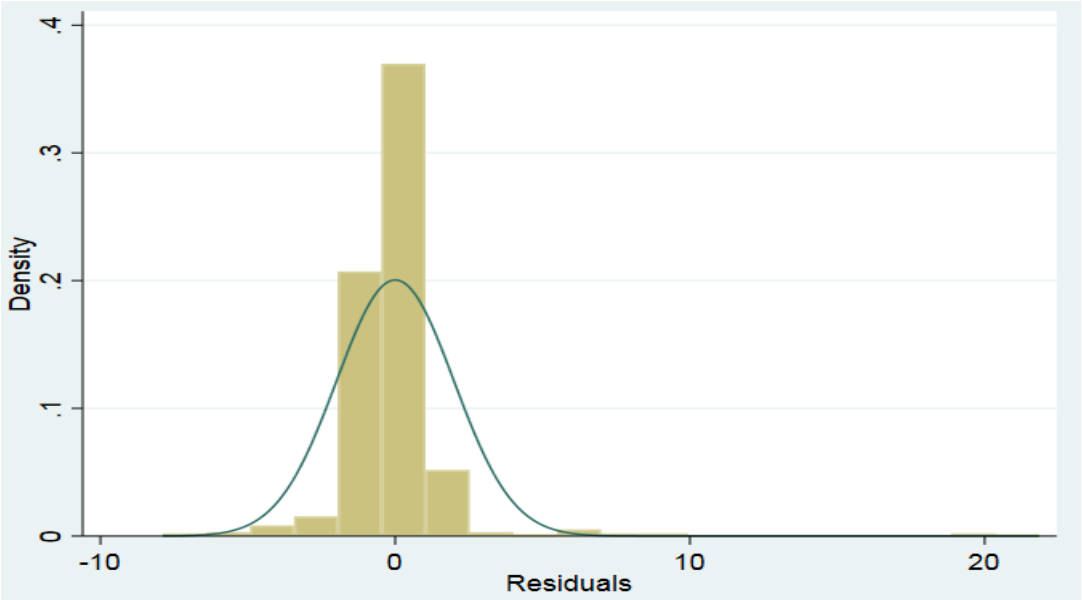
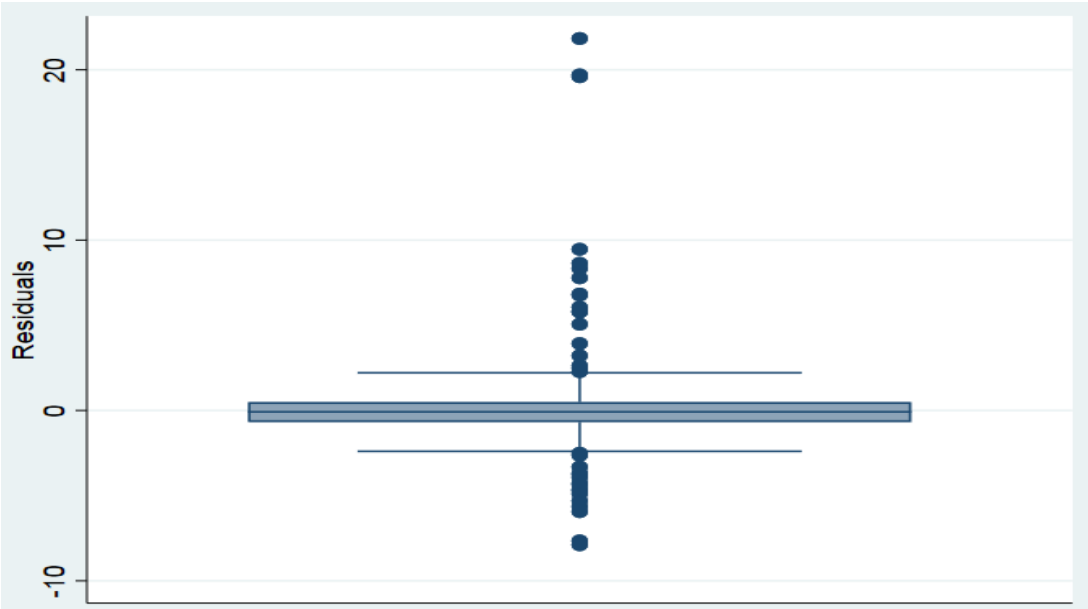


Figure 5.3 Result from Box Plots of normality Test for Residuals



5.2.4 Test for best fitting model

With panel data, there are 3 different models. In the method section one was excluded by the authors, due to T>2, namely First differencing, which gives less reliable estimates when T>2, than Fixed Effects. To test which of Fixed Effects and Random effects that generates the most

reliable output, a Hausman test is conducted. From the Table 5.7, the Hausman test for best fitting model concluded that there were a P-value of 0.0000, meaning that the null hypothesis is rejected, which means, that Random effect is not a suitable model. Therefore, the regression output will be based on the Fixed Effect model.

Table 5.7 Hausman best fit model test result

	----------Coefficients----------			
	(b)	**(B)**	**(b-B)**	
	Fixed	**Random**	**Difference**	**S.E.**
CASHHOLDING	1.539426	3.285091	-1.745665	.2810979
DERIVATIVE~Y	.2558082	.3178106	-.0620024	.1835574
MANAGERIAL~N	-6.136507	-3.439331	-2.697176	1.753442
FIRMSIZE	-1.319401	-.3389936	-.9804078	.2406119
ACCESSTOFI~D	-.282172	-.2747536	-.0074184	.1163843
INVESTMENT~S	-.0101593	-.0260009	.0158416	.0013662
LEVERAGE	.0120332	-.0011466	.0131798	.
RISKOFFINA~C	.0001029	.0000296	.0000733	.
TAX	1.074835	-1.201059	2.275893	4.591025
PROFITABIL~Y	1.176659	.3898209	.7868382	.2137238
DOLLAR	.1503683	.2697514	-.1193831	.
EURO	-.1695464	-.2501282	.0805818	.
OIL	-.0047206	-.0117194	.0069988	.0020565

b = consistent under Ho and Ha; obtained from xtreg. B = inconsistent under Ha, efficient under Ho; obtained from xtreg.

Test: Ho: difference in coefficients not systematic

chi2(12) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 86.30

Prob>chi2 = 0.0000

(V_b-V_B is not positive definite)

5.3 TESTS FOR DIFFERENCES IN MEANS

From the Methodology section, the authors have developed 7 different hypotheses in order to answer the research questions by doing tests on the hypothesis. The hypothesis test is performed at a 5% significance level. Basically, this means that when the authors found a p-value less than 5%, it leads to reject the null hypothesis and accept the alternative hypothesis. If a p-value is founded more than or equal to 0.05 then the authors can accept the null hypothesis.

Hypothesis 1: H_0: Cash holdings did not change during the period

H_A: Cash holdings changed during the period

Hypothesis 2: H_0: Derivative usage did not change during the period

H_A: Derivative usage changed during the period

Table 5.8 Cash Holding (Panel A) and Derivative Usage (Panel B) Paired T-test

PANEL A

PERIOD	obs	diff.mean	t	p	diff.std.err.
BEFORE/DURING	222	-0.0506707	3.1487	0.0019***	-0.0160927
BEFORE/AFTER	222	-0.0636937	4.3908	0.0000***	-0.0145062
DURING/AFTER	222	-0.013023	1.3405	0.1815	-0.0097152

PANEL B

PERIOD	OBS	DIFF. MEAN	T	P	DIFF.STD.ERR.
BEFORE/DURING	222	0.0855856	-3.3845	0.0008***	-0.0252878
BEFORE/AFTER	222	0.1036036	-4.0181	0.0001***	-0.025784
DURING/AFTER	222	0.018018	-1.0694	0.2861	-0.0168489

*** p<0.01, ** p<0.05, * p<0.1

The result of the paired T-test, see Panel A in Table 5.8, shows that cash holdings are significantly different between the period prior to the financial crisis and the financial crisis, at a 99% significance level. Furthermore, it also shows that the cash levels prior to the financial crisis is also at 99% significance level significantly different from the period after the financial crisis. However, there is no statistically significant difference between the period during the financial crisis and after the financial crisis. Consequently, the authors conclude that there is significant evidence that cash holding has changed during the period and therefore the null hypothesis is rejected, and the alternative hypothesis is accepted.

Panel B in Table 5.8 shows a result of paired T-test for derivative usage for the periods during; and after the financial crisis is statistically significant at a 99% level different from the period prior to the financial crisis. However, there is not statistically significantly difference between the period during the financial crisis and the period after the financial crisis. Consequently, the authors conclude that there is significant that derivative usage has changed during the period and therefore the null hypothesis is rejected and accept the alternative hypothesis.

5.4 REGRESSION RESULTS

5.4.1 With Robust standard errors

When using Robust standard errors and the Fixed effect model, from the Table 4.8, it can be seen in the regression output, that only Firm Size and Euro is significant at 99% respectively 90% significance level. Meaning neither of Cash holdings nor Derivative usage can be proven to have a statistically significant effect on Tobin's Q. However, the coefficients of Cash holdings and derivative usage is still positive. With a regular pooled OLS regression, both Cash holdings and derivative usage are shown to have a statistically proven effect, however, since it is panel data, a pooled OLS regression does not give reliable outputs. The Hausman test has proven that Fixed effects gave better estimates. However, the Random effects model shows that there are statistically proven effects on Cash holdings and Tobin's Q. The R^2 is at 13.1% with fixed effects, while it is at 32.8% with Pooled OLS regression. Since the Hausman test proved that Fixed Effect gives better estimates, this is the model that will be used in the study.

Table 5.10 The regression outputs with Robust Standard Errors

	(1)	(2)	(3)
VARIABLES	**POOLED**	**FIXED EFFECT**	**RANDOM EFFECT**
CASHHOLDING	4.412***	**1.539**	3.285**
	(1.418)	**(1.225)**	(1.444)
DERIVATIVE	0.358*	**0.256**	0.318
	(0.194)	**(0.225)**	(0.229)
MRA	-2.581***	**-6.137**	-3.439**
	(0.740)	**(3.836)**	(1.381)
LN (TOT. ASSET)	-0.258***	**-1.319*** **	-0.339***
	(0.0592)	**(0.433)**	(0.0915)
DIV.DUM	-0.235	**-0.282**	-0.275
	(0.245)	**(0.374)**	(0.299)
INV.OP	-0.0269***	**-0.0102**	-0.0260***
	(0.00945)	**(0.0130)**	(0.00722)
LEVERAGE	-0.00840	**0.0120**	-0.00115
	(0.0114)	**(0.00851)**	(0.00489)
ALTMAN'S Z	1.88e-06	**0.000103**	2.96e-05
	(7.25e-05)	**(9.67e-05)**	(9.00e-05)
TAX	-0.864	**1.075**	-1.201
	(1.434)	**(4.078)**	(2.745)
PROFITABILITY	-0.295	**1.177**	0.390
	(1.049)	**(1.216)**	(1.320)
DOLLAR	0.283	**0.150**	0.270
	(0.283)	**(0.187)**	(0.198)
EURO	-0.262*	**-0.170***	-0.250**
	(0.146)	**(0.100)**	(0.114)
OIL	-0.0112***	**-0.00472**	-0.0117**
	(0.00356)	**(0.00558)**	(0.00476)
CONSTANT	4.170***	**12.50*** **	5.038***
	(1.026)	**(3.274)**	(0.881)
OBSERVATIONS	666	**666**	666
R-SQUARED	0.328	**0.131**	
# OF COMPANY	74	**74**	74

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.4.2 With Robust standard errors before, during and after financial crisis

Neither of the periods show statistically significant results regarding the main explanatory variables, of cash holdings and derivative usage, using robust standard errors. The coefficients before the financial crisis is negative for cash holdings, while it is positive for derivative usage. During the financial crisis, the coefficient for cash holdings is positive, while it is negative for derivative usage. Post financial crisis both cash holdings and derivative usage has negative coefficients. Some control variables show statistically significant results, regarding Managerial risk aversion, it can be seen that post financial crisis there are statistically significant results on a 90% confidence level. Firm size has 95% confidence level for before the financial crisis, while 90% during the financial crisis. Investment opportunities has 90% confidence level before the financial crisis. Profitability has 90% confidence level after the financial crisis, while dollar, Euro and Oil has 99% confidence level after the financial crisis. Oil also has 95% confidence level before the financial crisis.

Table 5.11 The regression outputs of different periods with Robust Standard Errors

	(1)	(2)	(3)
VARIABLES	**FE PRE**	**FE DURING**	**FE POST**
CASHHOLD.	-1.662	5.905	-0.505
	(1.013)	(4.861)	(0.763)
DERIVATIVE	0.0488	-0.787	-0.0472
	(0.658)	(0.503)	(0.133)
MRA	4.960	-4.661	-1.765*
	(9.127)	(3.368)	(0.947)
LN(TOT. ASSET)	-4.318**	-3.733*	-0.244
	(1.966)	(2.005)	(0.205)
DIV.DUM	-0.582	0.231	-0.0722
	(0.409)	(0.229)	(0.0811)
INV.OP	0.361*	0.0549	-0.999
	(0.184)	(0.0358)	(1.161)
LEVERAGE	-0.160	-0.0198	-0.0115
	(0.199)	(0.0153)	(0.0107)
ALTMAN'S Z	-0.000101	-0.0166	0.00834
	(8.34e-05)	(0.0188)	(0.00633)
TAX	-4.558	4.469	-2.670

	(6.674)	(7.629)	(2.702)
ROA	2.647	-0.190	-1.085*
	(2.914)	(0.602)	(0.565)
DOLLAR	-0.248	-0.621	-2.017***
	(0.206)	(0.559)	(0.659)
EURO	0.645	0.420	2.421***
	(0.534)	(0.286)	(0.764)
OIL	0.0680**	0.00948	0.0165***
	(0.0267)	(0.00599)	(0.00555)
CONSTANT	27.13**	29.65**	-5.806
	(11.95)	(14.36)	(3.550)
OBSERVATIONS	222	222	222
R-SQUARED	0.280	0.370	0.289
# OF COMPANY	74	74	74

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

5.4.3 Test for Regression Results

The regression results from Table 5.10 and 4.11 are used to test Hypothesis 3 to 7. As the authors further will explain in chapter 5.4.1 that there are no significant results for cash holding or derivative usage on firm value. Furthermore, the results from table 5.10, do not show any proven benefit from either of the risk management strategies. Although cash holding's coefficient by 5.905, shows a positive effect on firm valuation compared to derivative usage of -0.787. The coefficient shows a negative effect, but it is not significant. On the whole, the authors conclude that null hypothesis of hypothesis 3 to 7 are accepted and cannot demonstrate any significant result.

6. ANALYSIS

In this chapter, the authors analyze the results from the regressions, and hypothesis tests based on the theorical and empirical framework presented in the earlier chapter. The chapter start with a discussion and an analysis of the cash holding variable, derivative usage variable and then finish with a possibly appropriate strategy during the financial crisis for Swedish manufacturing firms.

6.1 CASH HOLDINGS

6.1.1 Change in cash holdings

As can be seen in table 5.8 Panel A, cash holdings have significantly changed from before the financial crisis to during the financial crisis. This change persisted also to after the financial crisis. Furthermore, table 5.2 shows that the mean cash holdings decreased during all periods. Combining this with the t-test, it can be concluded that the cash holdings significantly dropped during and after the financial crisis, compared to prior to the financial crisis.

Our study shows that the firms tend to decrease cash holdings, in an economic downturn. According to the free cash flow hypothesis, one of the main reasons to have large cash holdings is protection against financial distress (Jensen, 1986). However, the theory also states that management should be constrained with less cash flows, since that would counteract empire building and investing in negative NPV project (Jensen, 1986). It can be shown that the cash flows and cash holdings decrease significantly during the financial crisis. One of the arguments could be that the financial crisis was used as a way to limit management, and their investments in negative NPV projects. Decreasing cash holdings is opposed to research and the precautionary motive of holding excess cash, which shows that, when volatility is high, firms tend to have higher cash holdings (Bates et al, 2009; Irvine et al, 2008; Opler et al, 1999; Han et al, 2007). The results from the study shows the opposite, even though there is a financial downturn and increased volatility, cash holdings decrease in the study instead of increase, which previous studies show. With regards to the transaction motive, that during high earnings volatility and high financing costs, firms tend to use cash holdings as protection (Kim et al.

1998), it was likely that the firms should have had higher cash holdings during the financial crisis, than before. This is also because of the higher marginal cost of being illiquid during the financial crisis (Opler et al, 1999), it would hence be expected that the study showed that cash holdings increased instead of decreased.

It is more likely that the pecking-order theory could explain why cash holdings decreased during the financial crisis. As the pecking order states, cash is the prime source of funds and first to be used since that is the cheapest way of financing, second source is debt and thirdly equity (Myers & Majluf, 1984). It could also be seen in table 5.2 that the leverage also increased during the financial crisis. This could simply be because there were not enough cash holdings for protecting the whole downturn of the financial crisis, and according to the trade-off theory cash and leverage are both significantly cheaper to use than equity financing, especially during a financial downturn where the information asymmetry might be largest (Myers & Majluf, 1984). However, research by Denis et al (2010); Nance et al, (1993); Opler et al, (1999); and Kim et al, (1998) show that constrained firms tend to avoid external financing, and hence hold larger cash holdings instead. However, the reason this is not the case it the study, might be that the firms were unprepared for such a downturn, and that they did not generate enough cash flows to increase cash holdings, and yet needed to have protection and still invest, and that's why leverage increased and cash holdings decreased during the financial crisis. There might be issues with underinvestment problem when firms hold less cash than needed for positive investment opportunities. This becomes even a greater problem if cash shortfalls were large enough to jeopardize everyday operations. Studies by Campello et al, (2010); Marin et al, (2011); and Bolton et al, (2011) show that firms that are constrained cut investment and R&D compared with firms that are unconstrained. This is problematic since studies by Opler et al, (1999); Gay & Nam, 1998; and Ozkan & Ozkan, (2003) show that companies with high growth opportunities avoid getting into the situation where they must reject positive NPV projects because of cash shortfalls. This is problematic for the studied firms, since the cash holdings decrease would either imply, that the firms do not have growth opportunities, or that they were unprepared of the financial crisis. Keynes (1936) also shows the importance of holding excess cash, since it makes it possible to catch profitable investment opportunities, rather than to have to cut back, since the firms lack enough cash holdings.

Since the results from the study are that cash decreased, this is a sign according to research by Donaldson, (1961); and Myers & Majluf, (1984) that the Swedish market might have less information asymmetry, since the value of cash increases if the cost of external financing is high due to information asymmetry. Pinkowitz & Williamson, (2001) show that in countries with high information asymmetry, companies tend to hold high levels of cash. Since cash holdings decreased and leverage increased, these are both signs that information asymmetry would be low in the Swedish market, hence information asymmetry could not support the cash change in the Swedish market. However, one hypothesis that might explain why cash holding decreased is the long-purse hypothesis, which states that by cutting prices, especially during a financial recession, fairly unconstrained firms can put financially constrained rivals out of business (Telser, 1966); (Campellom., 2003). Even though the manufacturing industry is highly competitive, the study does not show if this hypothesis is true regarding that rival companies were pushed out of business by lowering prices. However, lowering prices would have a direct impact on the cash holdings by the companies due to less profit.

6.1.2 Impact of Cash holdings on Firm Value

As can be seen in table 5.10 Cash holdings does not have a statistically significant effect on Firm value over all periods. Neither does it for any period alone (Table 5.11). Even though the regression did not prove any statistically significant impact of cash holdings on firm value, the coefficient implies that there might be a generally positive effect from cash holdings on firm value (Table 5.10). This potential effect is only positive during the financial crisis though (Table 5.11). Worth noting, is that this potential effect was not statistically proven at a 90% significance level, hence no certain effect could be concluded. That the coefficient is positive during the financial crisis, and there might be a potential relationship between cash holdings and Firm value, is in order with previous research mentioned in above subchapter by for example La Rocca & Cambrea, (2019) who found that cash holding had a positive effect on firm value during a financial downturn. This may be in line with the potential effect our study show. This is because cash holdings are especially valuable during financial downturns, because it creates larger financial flexibility (La Rocca & Cambrea, 2019). In addition, cash holdings generally have an arguable value, research by Pinkowitz et al (2006) and Dittmar et al. (2007) show that the value of excess cash is generally well below the book value, which is especially the case for unconstrained firms. This might explain, why the coefficient is negative for both

the period prior to, and after the financial crisis where the companies were unconstrained, neither of which are statistically significant, so nothing more than a potential effect can be concluded though. However, this potential effect is in line with Pinkowitz et al, (2006) and Dittmar et al. (2007) and the potential positive effect during the financial crisis is in line with La Rocca and Cambrea (2019).

6.2 DERIVATIVE USAGE

6.2.1 Change in Derivative usage of Swedish manufacturing firms

From the table 5.8 Panel B, the result for paired t-test shows a positive and significant change in derivatives usage simply by comparing before the financial crisis to after, which has increased by 15,3%. It should be noted that the descriptive statistic of different periods shows that mean of market value of equity of Swedish manufacturing firms decreased by 4% or Tobin's Q decreased by 40,2%. This is in line with the theory of Cost of Financial Distress from Smith and Stulz (1985), Mayers and Smith (1982), Graham and Rogers (2002), and Howton and Perfect (1998), they argue that there is a benefit to hedge to lower financial distress costs to avoid large expected costs of financial distress. It is also believed that the degree of probability of financial distress has a significant effect on the firm's value in an economic downturn. The higher the risk of firms going bankrupt, the worse the firms' valuation will be affected as the Z-score shows a sharp decrease from 84.9 down to 6.7, which could explain the positive change based on the economic downturn during the financial crisis.

The results seem to contradict the idea that leverage would increase firm value by entering derivatives because of the tax benefit of levering up D/E as it shows in the table 5.2 from 57.4% in 2004-2006 up to 101.2% in 2007-2009. According to Graham and Rogers (2002), Berkman and Bradbury (1996), Berger and Patti (2006), and Smith and Stulz (1985) argue that there is a positive relationship between taxes/leverage and Tobin's Q via derivative but the firms' value decreases instead of increasing as the idea is based on. One potential explanation is that firms had to borrow more to be able to avoid bankruptcy by utilizing loan facilities or using retained earnings, which the D/E ratio increases by lower stockholder's equity. The idea works in different ways in economic downturn compared to normal conditions.

Another potential explanation for the positive increase in the use of derivatives from before to after the financial crisis can be explained by increased cash flow volatility. As can be seen in Table 5.11 where ROA decreased by more than half during the financial crisis as before and standard deviation increased twice as much. This state is in line with the theory of Financing Costs Hypothesis where Swedish manufacturing firms need to remain the ability to undertake investments by having internally funds (Fazzari, Hubbard, & Petersen, 1988). Furthermore, Froot et al. (1993) argue that derivative helps firms to ensure their internal funds by reducing variability of internal cash flows, in turn, less need of external financing. The previous study of Fazzari et al. (1988) shows results that manufacturing firms with high sensitivity of cash flow that rely heavily on investments need external financing to finance. Which is similar to this case, where Swedish manufacturing firms' investment opportunities have increased in the financial crisis from mean of 7.4% up to mean of 35.2%. This may be due to declining sales, therefore the positive change of derivative during the financial crisis, is valuable for ensuring cash flow (Lewellen & Lewellen, 2016).

6.2.2 Impact of Derivative usage on Firm value

As can be seen in Table 5.10 and Hypothesis 3, results from the regression show that derivatives usage do not give a significant effect on the firm value over all periods, although the coefficient shows a small positive effect on firm value but nothing significant. And not one single period by the financial crisis that gives significant effect on firm value according to the Table 5.11 and the Hypothesis 6. However, it is more interesting to dig deeper into derivative usage affect the firm value under different periods, especially before the financial crisis, the result shows that there might be a generally positive effect from derivative usage on firm value. But the results do not show the same value effect in other periods. In these, derivative usage has a negative impact on firm value. But again, nothing shows significant impact.

This means that the results do not comply with theories mentioned, nor most studies that show that there is a positive and significant relationship between derivatives and firm value. Particularly important point in derivative usage during the economic downturn like the financial crisis, when firms facing higher likelihood of financial distress, it would be valuable to enter

derivative to avoid large expected costs of financial distress according to Graham and Rogers (2002), and Howton and Perfect (1998). But it is not so in this case which got the same result as Tufano (1996), the tests did not find any relationship between derivative and likelihood of financial distress.

One potential explanation to this insufficient result is in line with Culp (2001), the author points out that derivatives cannot increase firm value because if it is indeed difficult to achieve in reality even through it shows an increasing use of derivative through the periods. As an addition to the argument, the author further meant that every manager has various risk aversion, therefore it is difficult to achieve risk management optimally in reality. But the same author means also that hedging can help overcome various agency and information asymmetry problem through hedging against risk exposure, stockholders can get a clearer picture of the actual project, thereby encouraging to invest in the firms. But in this study of the use of derivatives of Swedish manufacturing firms, it is difficult to assess how high information asymmetry is, but during the financial crisis it may be higher than in other periods. Because it can be completely different risk exposures between periods, which makes it less clear picture of derivative usage. This potential explanation is consistent with the study by Belghitar et al. (2013) with no significant relationship between derivative usage and firm value. They suggest that this failure is that due to the complex relationship between different exposures can be difficult to estimate accurately. Our results are also in line with Jin and Jorion (2006) and Ayturk (2016) who find that derivatives are not value adding since they find no significant evidence or relationship in their studies.

6.3 APPROPRIATE STRATEGY DURING FINANCIAL CRISIS

According to Jankensgård, Alviniussen and Oxelheim (2020), there is no optimal risk management strategy, or any strategy that fits all in the real world. However, research has concluded that during a financial crisis, risk management might be more crucial than during normal market conditions. During a financial downturn, research by Keynes (1936); Opler et al. (1999); Gay & Nam, (1998); Ozkan & Ozkan (2003), show that cash holdings are crucial as precautions for cash flow shortfall, that otherwise might lead to underinvestment problem, or cutting profitable investment. Investments and R&D are crucial for manufacturing firms in

Sweden, and during the financial crisis, Swedish manufacturing firms were worse off than other European manufacturing firms (Eurostat).

Based on the results with non-significant in risk management strategies, it cannot be concluded which strategy is appropriate to adopt during the financial crisis. Although it showed a positive coefficient of cash holding during the financial crisis of 5.905 and derivative negative coefficient of -0.787, it could say that cash holding is the better solution than derivative but not appropriate as final. But according to theories of precautionary motive and free cash flow hypothesis, firms should protect oneself against the downturn, which in this case is the financial crisis that must be protected with the help of cash in order to be able to do better than others firms (Keynes, 1936; Jensen, 1986).

As Figure 5.1 have shown, Swedish manufacturing firms have lowered their cash holding in all periods, including before the financial crisis. And as the results show, firms should have kept cash instead of reducing it to be able to do better than others. During the financial crisis Sweden as a country managed the situation better than its counterparts, however, the manufacturing industry suffered quite substantially, far worse than the EU-average (Eurostat). To decrease cash flow volatility, research showed that derivatives and increased cash holdings could be a suitable combination. Hence, meaning that, in uncertain economic times, increasing both cash holdings and derivative usage might be a appropriate plan. This cannot, however, be confirmed in the study since neither derivative nor cash holdings showed any significant results on firm value.

7. CONCLUSION, DISCUSSION AND FURTHER RESEARCH

The concluding chapter presents firstly, the study's conclusion, secondly, a discussion about the current market condition that is relevant to the study, suggestions for topics that can be further studied in this research area

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7.1 CONCLUSION

The purpose of this study is to determine whether cash, derivatives or a combination can increase firm value during a financial crisis for Swedish listed manufacturing firms. Furthermore, show if any lessons could be learned from the previous financial crisis regarding the value of derivatives and cash holdings for Swedish manufacturing firms. This was conducted to generate an appropriate strategy for firms battling the new financial crisis as an effect of the Corona pandemic. This was performed by answering the following two research questions:

1. *How did derivative usage and cash holdings change before, during and after the financial crisis among Swedish manufacturing firms, and how did this affect the market value of the firms?*

2. *Which out of, cash holdings, Derivative usage or a combination can be used appropriately during a financial crisis for Swedish manufacturing firms?*

Regarding the first question, it can be concluded that cash holdings did change significantly from prior to during the financial crisis and from prior to after the financial crisis. The cash holdings decreased over the periods. It could however not be statistically proven that cash holdings influenced firm value. The positive coefficient could perhaps imply a potential positive effect during the financial crisis for firm value and cash holdings, this could however not be statistically proven. Regarding derivative usage in the first question, it can conclude that derivative usage changed significantly from before to during the financial crisis and from before to after the financial crisis as well as cash holdings. Compared to cash holdings, derivative

usage increases instead of decrease. However, it was not statistically proven that derivatives affected the firm's value which neither was the case for cash holding. The negative coefficient for derivatives during the financial crisis indicates that there might be a negative effect on firm value, but this cannot be statistically proven.

Since neither of cash holdings, or derivative usage or a combination between them could be statistically proven to influence firm value, it cannot be said which of them, or a combination that is appropriate for the firm values. However, from a Risk Management perspective, the financial crisis did in fact hit Swedish manufacturing firms substantial with their current risk management strategy. Since this was the case, they might have a need to update their current strategy for an upcoming crisis. Based in theories, previously mentioned, both derivative usage and cash holdings can have a decreasing effect on volatility, and be used as protection for economic downturns, they are increasing them, both comes as a cost though. Hence, the benefits and costs should always be considered closely.

7.2 DISCUSSION

As mentioned in Chapter 1, a new crisis is underway, with the pandemic Covid-19 at the time of writing. Which the authors still cannot be certain about the economic future can be said, since it is too early to see the full extent of consequences yet. However, the aftermath may have a substantial effect on firms in Sweden and worldwide such as a clear decline in firm sales, Sweden Manufacturing PMI dropped to 36.7 in April 2020 from the peak to 52.7 in February 2020. As shown in Table 5.11 where how cash holding and derivative usage stand for firm value during the financial crisis. With cash holding in Swedish manufacturing firms show a better result (coefficient) but not significant than derivative usage but worse in normal economic climate. Both behave differently depending on economic climates, as two studies by Bolton, Chen and Wang (2011), and Marin and Niehaus (2011) show that both risk management strategies can be seen as complementary to each other. Which one can aim for derivatives in more normal conditions while cash holding in the economic downturn. But the authors of this study discussed that it is difficult to build up cash during a financial downturn without cutting dividends and cutting investments.

It is therefore important to study if something from the previous financial crisis, can be used, and if any lessons could be learned, in order to ensure the company survival and try to sustain firm value, also in a new potentially difficult economic climate. By learning from past mistakes, especially among manufacturing firms who were hit substantially harder in Sweden, than other countries, there is a potential for a better outcome when a new crisis hit.

7.3 FURTHER RESEARCH

What could be added to further studies in this area, is adding more industries of Swedish firms, to visualize these results in a more general matter, and to investigate whether there are industry differences in Sweden. Sweden is, as previously mentioned less studied than other larger nation, but the research is of importance not only for the Swedish firms, but also their shareholders and the Swedish economy. Furthermore, Sweden is a small country, but it is in many ways alike the Nordic countries, thereby further research could also study if any connections between the Nordic countries could be drawn, meaning, studying if they are similar or not in the Risk Management context.

8. REFERENCES

Ahmed, H., Azevedo, A. and Guney, Y. (2013). The Effect of Hedging on Firm Value and Performance: Empirical Evidence from the Non-financial UK Firms, Working Paper: Hull University Business School, 1-17

Alam, N., & Gupta, A. (2018). Does hedging enhance firm value in good and bad times. International Journal of Accounting & Information Management, 26(1), 132-152.

Alkebäck, P., & Hagelin, N. (1999). Derivative Usage by Nonfinancial Firms in Sweden with an International Comparison. Journal of International Financial Management and Accounting, 105-120.

Alkebäck, P., Hagelin, N., & Pramborg, B. (2006). Derivative usage by non-financial firms in Sweden 1996 and 2003: what has changed? Managerial Finance, 32(2), 101-114.

Allayannis, George and Weston, James P (2001). The Use of Foreign Currency Derivatives and Firm Market Value, Review of Financial Studies, Vol. 14(1), 243-276.

Allayannis, G., Lel, U. and Miller, D.P (2012). The use of foreign currency derivatives, corporate governance, and firm value around the world, Journal of International Economics, Vol. 87(1), 65-79

Alves, P. (den 07 November 2018). Cash holdings around the world: Financial crisis, culture and shareholder rights. Accessed at CMVM, Lusofona University and ISCAL: https://mpra.ub.uni-muenchen.de/89861/

Ayturk, Y., Gurbuz, A.O and Yanik, S (2016), Corporate derivative use and firm value: Evidence from Turkey, Borsa Istanbul Review, Vol. 16(2), 108-120

Bartram, S. M. (2000). Corporate Risk Management as a Lever for Shareholder Value Creation. Financial Markets, Institutions & Instruments, 9(5), 279-324.

Bartram, S.M., Brown, G.W. and Fehle, F.R. (2009). International Evidence on Financial Derivatives Usage, Vol. 38(1), pp.185-206.

Bartram, S.M.; Brown, G.W. and Conrad, J. (2011). The Effects of Derivatives on Firm Risk and Value, Journal of Financial and Quantitative Analysis, Vol. 46 (4), 967-999

Bates, T., Kahle, K., & Stulz, R. (2009). Why do U.S. Firms Hold So Much More Cash than They Used To? Journal of Finance, 64, 1985-2021.

Belghitar, Y., Clark, E., & Mefteh, S. (2013). Foreign currency derivative use and shareholder value. International Review of Financial Analysis, 29, 283-293.

Berger, A. N., & Di Patti, E. B. (2006). Capital Structure and Firm Performance: A New Approach to Testing Agency Theory and an Application to The Banking Industry. Journal of Banking & Finance. Vol. 30(4): 1065-1102.

Berghöfer, B., & Lucey, B. (2014). Fuel hedging, operational hedging and risk exposure — Evidence from the global airline industry. International Review of Financial Analysis, 34, 124-139.

Bergman, M. (2011). Best in Class: Public Finances in Sweden during the Financial Crisis. Panoeconomicus, 431-453.

Bessembinder, H. (1991). Forward Contracts and Firm Value: Investment Incentive and Contracting Effects. The Journal of Financial and Quantitative Analysis, 26(4), 519-532.

Bolton, P., & Scharfstein, D. (1990). A theory of predation based on agency problems in financial contracting. American Economic Review, 80(1), 93-106.

Brealey, R. A., & Myers, S. C. (2016). Principles of Corporate Finance. New York: Mcgraw-Hill Higher Education.

Brooks, C. (2019). Introductory Econometrics for Finance. Cambridge University Press.

Brunzell, T; Hansson, M and Liljeblom, E (2011) The use of derivatives in Nordic firms. The European Journal of Finance, Vol. 17 (5-6). Finance in Finland.

Campello, M. (2003). Capital structure and product markets interactions: evidence from business cycles. Journal of Financial Economics, 68, 353-378.

Campello, M., Graham, R., & Harvey, R. (2010). The real effects of financial constraints: Evidence from a financial crisis. Journal of Financial Economics, 97, 470-487.

Culp, C. (2002). The ART of Risk Management. New York: John Wiley & Sons.

Culp, C. L. (2001). The Risk Management Process: Business Strategy and Tactics. John Wiley & Sons.

Dittmar, A., Mahrt-Smith, J., & Servaes, H. (2003). International firm governance and firm cash holdings. Journal of Financial and Quantitative Analysis, 38, 111-133.

Donaldson, G. (1961). Corporate debt capacity; a study of corporate debt policy and the determination of corporate debt capacity. Boston: Division of Research, Graduate School of Business Administration, Harvard University.

Evans D.S. (1987), The Relationship Between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries, Journal of Industrial Economics, Vol. 35 (4), 567-582.

Fazzari, S. R., Hubbard, G., & Petersen, B. (1988). Financing Constraints and Corporate Investment. Brookings Papers on Economic Activity, 2(1), 141-206.

Froot, K., Scharfstein, D., & Stein, J. (1993). Risk Management: Coordinating Corporate Investment and Financing Policies. The Journal of Finance, 48(5), 1629-1658.

Gay, G., & Nam, J. (1998). The Underinvestment Problem and Corporate Derivatives Use. Financial Management, 27(4), 53-69.

Geczy, C.; A.M. Bernardette; and C. Schrand. (1997). Why Firms Use Currency Derivatives, Journal of Finance, Vol. 52 (4), 1323–1354.

Goodman, E.J., & Bamford, J. (1989). *Small firms and industrial disctricts in Italy*. New York: Routledge.

Graham, J.R. and Rogers, D.A (2002). Do Firms Hedge in Response to Tax Incentives?, Journal of Finance, Vol. 57(2), 815-839

Gujarati, D., & Porter, D. (2010). Essentials of Econometrics. New York: McGraw-Hill.

Haines W.W. (1970), The Profitability of Large-Size Firm, Rivista Internationale de Science Economiche e Commerciale, 17: 321-351.

Hanna, W. (2011). The impact of management and board ownership on profitability in banks with different strategies. *Journal of Banking & Finance, 35, 3300-3318*

Hausman, J.A. (1978). Specification Tests in Econometrics, Econometrica, 46, 1251-1271.

Jankensgård, H., Alviniussen, A., & Oxelheim, L. (2020). Corporate Foreign Exchange Risk Management. John Wiley & Sons Ltd.

Jensen, M. C., & Meckling, W. .. (1976). Theory of the firm: Managerial Behavior, Agency. Journal of Financial Economics, 305-360.

Jin, Y., & Jorion, P. (2006). Firm Value and Hedging: Evidence from U.S. The Journal of Finance, 61(2), 893-919.

Jorion, P. (2009). Risk Management Lessons from the Credit Crisis. European Financial Management, 923-933.

Junior, R.J. and Laham, J., (2008). The Impact of Hedging on Firm Value: Evidence from Brazil, Journal of International Finance and Economics, 8, 76-91.

Khediri, B. K., & Folus, D. (2010). Does hedging increase firm value? Evidence from French firms. Applied Economics Letters, 17, 995-998.

Kim, C., Mauer, D., & Sherman, A. (1998). The Determinants of Corporate Liquidity: Theory and Evidence. Journal of Financial and Quantitative Analysis, 33(3), 335-359.

La Rocca, M., & Cambrea, R. D. (2019). The effect of cash holdings on firm performance in large Italian companies. Journal of International Financial Management & Accounting, 30, 30-59.

Lang, L.H.P and Litzenberger, R.H. (1989) Dividend Announcements; Cash Flow Signaling vs. Free Cash Flow Hypothesis?, Journal of Financial Economics , Vol. 24 (1), 181-191.

Lewellen, J., & Lewellen, K. (2016). Investment and Cash Flow: New Evidence. Journal of Financial & Quantitative Analysis, 51(4), 1135-1164.

Manskikkaviita, A. (2009). Foreign Trade – Exports and imports of goods January-December 2008. Hämtat från Statistiska centralbyrån: http://share.scb.se/ov9993/data/publikationer/statistik/ha/ha0201/2009m02d/ha0201_2009m02d_sm_ha22sm0901.pdf

Marin, M., & Niehaus, G. (2011). On the Sensitivity of Corporate Cash Holdings and Hedging to Cash Flows. Department of Finance, HEC Montréal, 1-36.

Mello, A. S., & Parsons, J. E. (2000). Hedging and Liquidity. The Review of Financial Studies, 127-153.

Mian, S. (1996). Evidence on Corporate Hedging Policy. The Journal of Financial and Quantitative Analysis, 31(3), 419-439.

Miller, M. H. (1977). Debt and Taxes. The Journal of Finance, 32(2), 261-275.

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. The American Economic Review, 48(3), 261-297.

Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. Journal of Financial Economics, 13, 187-221.

Myers, Stewart (1977). Determinants of corporate borrowing, Journal Financial. Economics, Vol. 5 (2), 147–175

Nance, D. R., Smith, C. W., & Smithson, C. (1993). On the Determinants of Corporate Hedging. The Journal of Finance, 48(1), 267-284.

Ogden, J. P., Frank, J. C., & O'Connor, P. F. (2003). Advanced Corporate Finance: Policies and Strategies. New Jersey: Prentice Hall: Upper Saddle River.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The Determinants and Implications of Corporate Cash Holdings. Journal of Financial Economics, 52(1), 3-46.

Ozkan, A., & Ozkan, N. (2003). Corporate cash holdings: An empirical investigation of UK companies. Journal of Banking & Finance, 28, 2103-2134.

Pinkowitz, L., & Williamson, R. (2001). Bank Power and Cash Holdings: Evidence from Japan. Review of Financial Studies, 14, 1059-1082.

Punnose E.M. (2008), A Profitability Analysis of Business Group Firms vs. Individual Firms in the Indian Electrical Machine Manufacturing Industry, ICFAI Journal of Management Research; Jan2008, Vol. 7 Issue 1, p52

Ramlall, I. (2010). Reasons Motivating Firms to Hedge: A Review of the Empirical Literature. IUP Journal of Financial Economics, 8(1&2), 67-81.

Scholtens, B., & Yurtsever, C. (2012). Oil price shocks and European industries. Energy Economics, 34(4), 1187-1195.

Shepherd W.G. (1972), The Elements of Market Structure, Review of Economics and Statistics, Vol. 54 (1), 25-37.

Smith, C. W., & Stulz, R. M. (1985). The Determinants of Firms' Hedging Policies. The Journal of Financial and Quantitative Analysis, 20(4), 391-405.

Stone, T.-A., & Quoreshi, S. (2019). Do Global Value Chains Make Firms More Vulnerable To Trade Shocks?: Evidence from Manufacturing Firms in Sweden. Journal of Risk and Financial Management.

Stulz, R. M. (2008). Risk Management Failures: What Are They and When Do They Happen? Journal of Applied Corporate Finance, 39-49.

Trading Economics. (den 04 05 2020). Sweden Manufacturing PMI. Hämtat från https://tradingeconomics.com/sweden/manufacturing-pmi

Tufano, P. (1996). Who Manages Risk? An Empirical Examination of Risk Management Practices in the Gold Mining Industry. The Journal of Finance, LI(4), 1097-1137.

Varaiya, N.; Roger, A.K and Weeks, D (1987) The Relationship between Growth, Profitability, and Firm Value, Strategic Management Journal Vol. 8, No. 5, pp. 487-497

Weiers, R. (2011). Introduction to Business Statistics. South-Western Publishing Company.

Electronic Sources

Alpman, Marie (2015) Sveriges industri har stagnerat efter krisen. Retrieved from

https://www.nyteknik.se/innovation/sveriges-industri-har-stagnerat-efter-krisen-6343747

BBC News (2020) Coronavirus: Worst economic crisis since 1930s depression, IMF says. Retrieved from

https://www.bbc.com/news/business-52236936

Bergström, Claes (2009) Finanskrisen och den svenska krishanteringen under hösten 2008 och vintern 2009. Retrieved from

http://www.finanspolitiskaradet.se/download/18.1166db0f120540fe0498000209106/090609+Bergstr%C3%B6m.pdf

Carlgren, Fredrik (2016) Lång väg ur krisen för industrin. Ekonomifakta. Retrieved from

https://www.ekonomifakta.se/Artiklar/2016/mars/lang-vag-ur-krisen-for-industrin/?fbclid=IwAR1hKnm6TzsJvQv5MMhc80s2QOyre_ert2hDkc-nbu2MA3ZHdBKzbVUK79A

Duca, J.V (2013) Subprime Mortgage Crisis. Retrieved from

https://www.federalreservehistory.org/essays/subprime_mortgage_crisis

Näslund, Bertil (1995) Derivatmarknadernas tillväxt och nuvarande omfattning. Retrieved from

https://www.nationalekonomi.se/filer/pdf/23-2-bn.pdf

OECD (2015) General government debt. Retrieved from

https://data.oecd.org/gga/general-government-debt.htm

Statistikmyndigheten (2016) Rekordår och kriser – så har BNP ökat och minskat. Retrieved from

https://www.scb.se/hitta-statistik/artiklar/2016/bruttonationalprodukten-bnp/

Svenska Dagbladet (2018) Finanskrisen slog ut miljontals jobb. Retrieved from

https://www.svd.se/finanskrisen-slog-ut-miljontals-jobb?fbclid=IwAR3MGBRbpFPsmotFIRwwce0hC1_7-FdAyY2IgbwhjAQYjSDZAEsRlKyCuY4

Sveriges Riksbank (2018) Finanskrisen 2008-2010. Retrieved from

https://www.riksbank.se/sv/finansiell-stabilitet/riksbankens-uppdrag-inom-finansiell-stabilitet/krishantering-vid-en-finansiell-kris/finanskrisen-2007-2010/

9. APPENDIX

APPENDIX 1 – LIST OF FIRMS INCLUDED IN THE SAMPLE

LARGE CAP – 18 FIRMS	MID CAP – 19 FIRMS	SMALL CAP – 37 FIRMS
ATLAS COPCO AB	PEAB AB	VBG AB
SANDVIK AB	INDUTRADE AB	BTS GROUP AB
ASSA ABLOY AB	INTRUM JUSTITA AB	SEMCON AB
SKF AB	SWECO AB	BE GROUP AB
ALFA LAVAL AB	AF POYRY AB	CISION AB
SCANIA AB	HOLMEN AB	AQ GROUP
VOLVO AB	BEIJER REF AB	REJLERS AB
SKANSKA AB	NCC AB	XANO INDUSTRI AB
BOLIDEN AB	ADDTECH AB	VIKING SUPPLY SHIPS AB
SECURITAS AB	SSAB CORP	ELANDERS AB
TRELLEBORG AB	LINDAB INTL AB	CTT SSYTEMS AB
LATOUR INVESTMENT AB	BEIJER ALMA AB	UNIFLEX AB
SAAB AB	SAS AB	SVEDBERGS I DALSTORP AB
SCA AB	FAGERHULT AB	MALMÖBERGS ELEKTRISKA AB
BERGMAN&BEVING AB	GUNNEBO AB	ROTTNEROS AB
BILLERUD KORSNÄS AB	NOLATO AB	SINTERCAST AB
NIBE INDUSTRIER AB	HALDEX AB	MIDWAY HOLDING AB
HÖGANÄS AB	ITAB SHOP CONCEPY AB	STUDSVIK AB
	OEM-INTERNATIONAL AB	HIFAB GROUP AB
		INVISIO COMMUNICATIONS
		SOTKAMO SILVER AB
		IMPACT COATINGS AB
		BONG AB
		LAMMHULTS DESIGN GROUP AB
		PROFILGRUPPEN AB
		LAPPLAND GOLDMINERS AB
		POOLIA AB
		BERGS TIMBER AB
		ICTA AB
		DUROC AB
		ACAP INVEST AB
		SAXLUND GROUP AB
		RÖRVIK TIMBER SA
		HEDSON TECHNOLOGIES INTL
		GEVEKO AB
		NETJOBS GROUP AB
		AQERI HOLDING AB

APPENDIX 2 – DESCRIPTIVE STATISTICS FOR DIFFERENT TIME PERIODS

2004-2006	MEDEL	MEDIAN	MAX	MIN	STD.DEV
TOBIN'S Q	2,052	1,128	30,476	0,291	3,498
CASH HOLD.	0,177	0,066	2,091	0,000	0,289
DERIV.DUMMY	0,563	1,000	1,000	0,000	0,496
MRA	0,040	0,000	0,569	0,000	0,109
LN(SIZE)	7,461	7,333	12,462	2,211	2,318
DIV.DUMMY	0,721	1,000	1,000	0,000	0,449
INV.OP	0,074	0,029	7,160	0,000	0,484
LEVERAGE	0,574	0,451	6,084	0,000	0,611
RISK	84,903	4,224	7671,557	-1,684	656,087
TAX	0,032	0,026	0,168	0,000	0,033
ROA	0,043	0,054	0,552	-0,828	0,132
DOLLAR	7,150	6,850	7,944	6,655	0,567
EURO	9,159	9,040	9,409	9,028	0,177
OIL	48,667	50,040	58,300	37,660	8,482
MARKET VALUE OF EQUITY	8780,198	1309,881	118035,574	12,819	17827,721

2007-2009	MEDEL	MEDIAN	MAX	MIN	STD.DEV
TOBIN'S Q	1,227	0,812	27,666	0,181	2,054
CASH HOLD.	0,127	0,069	2,021	0,000	0,216
DERIV.DUMMY	0,649	1,000	1,000	0,000	0,477
MRA	0,043	0,001	0,569	0,000	0,117
LN(SIZE)	7,796	7,611	12,828	2,795	2,223
DIV.DUMMY	0,766	1,000	1,000	0,000	0,424
INV.OP	0,352	0,025	66,520	0,000	4,456
LEVERAGE	1,012	0,581	69,470	0,000	4,650
RISK	6,762	3,549	313,247	-6,413	23,167
TAX	0,029	0,021	0,165	0,000	0,031
ROA	0,013	0,047	0,429	-2,517	0,223
DOLLAR	7,150	7,162	7,822	6,467	0,553
EURO	10,205	10,248	10,933	9,436	0,612
OIL	69,720	64,200	91,480	53,480	15,997
MARKET VALUE OF EQUITY	8428,275	1078,483	131974,448	8,954	18379,055

2010-2012	MEDEL	MEDIAN	MAX	MIN	STD.DEV
TOBIN'S Q	1,138	0,870	5,924	0,275	0,821
CASH HOLD.	0,114	0,062	1,466	0,000	0,187
DERIV.DUMMY	0,667	1,000	1,000	0,000	0,471
MRA	0,035	0,001	0,569	0,000	0,101
LN(SIZE)	7,864	7,741	12,775	2,821	2,233
DIV.DUMMY	0,707	1,000	1,000	0,000	0,455
INV.OP	0,036	0,019	0,473	0,000	0,062
LEVERAGE	0,588	0,516	8,671	-17,22	1,448
RISK	6,721	3,697	134,440	-7,313	12,048
TAX	0,029	0,018	0,178	0,000	0,032
ROA	0,021	0,049	0,310	-0,842	0,146
DOLLAR	6,704	6,715	6,898	6,500	0,163
EURO	8,830	8,927	8,983	8,579	0,179
OIL	81,570	86,460	87,040	71,210	7,329
MARKET VALUE OF EQUITY	11707,645	1084,2468	155522,2486	20,14056	26331,7024