UNIVERSITY OF VAASA

FACULTY OF BUSINESS STUDIES

DEPARTMENT OF ACCOUNTING AND FINANCE

Emirhan Ansari

THE IMPACT OF CURRENCY HEDGING ON FIRM MARKET VALUE:

Empirical Evidence from Finland 2011 - 2015

Master's thesis in

Finance

VAASA 2018

TABLE OF CONTENTS **page**

LIST OF TABLES AND FIGURES **page**

UNIVERSITY OF VAASA

Faculty of Business Studies
Author: Emirhan Ansari
Topic of the Thesis: The impact of currency hedging on firm market value: Empirical Evidence from 2011 – 2015
Supervisor: Anupam Dutta
Degree: Master of Science in Economics and Business Administrations
Department: Department of Accounting and Finance
Line: Finance
Year of Entering the University: 2012
Year of Completing the Thesis: 2018 **Pages:** 67

ABSTRACT

Examining the impact that the use of foreign exchange derivatives have on firm market value is the main purpose of this study, whilst the observation period is 2011 – 2015. The sample firms are the non-financial firms that are listed in the main list of Nasdaq OMX Helsinki. The Finnish market has not been studied extensively on this regard, thus one of the purposes of this study is to provide new information. The Finnish market is interesting because of its distinctive nature, which comes from the small size and geographical location that makes the Finnish market highly dependent on foreign trade. Therefore, the use of currency derivatives is a substantive subject on this market.

Tobin's Q is used as an indicator for firm market value and its natural logarithm is used as a dependent variable in both univariate and multivariate regressions. All regressions are executed using the pooled OLS regression model. In addition, fixed effects regression is implemented to eliminate the bias of missing variables. Multivariate analysis includes six variables addition to foreign currency derivatives use.

The use of currency derivatives has a statistically significant negative effect on firm market value. Even firms with foreign sales that are categorized as non-hedger have a higher Tobin's Q values than firms that are categorized as hedgers.

KEYWORDS: derivatives, currency risk, hedging, firm value

1. INTRODUCTION

Derivative tools have recently been a popular subject of discussion and debate between many researchers. They are highly praised as risk management tools for companies as they can be used to hedge against many financial risks that corporates face, such as fluctuations in currency values and interest rates. However, there has been major losses in history that show how unprofitable and dangerous the misuse of these instruments can be (Becker & Mazur 1995). The latest proof of the danger of derivative tools is the financial crisis in 2007 that led many companies' derivative positions to backfire and drifted companies into big difficulties and even facing bankruptcies. Still, some companies managed to hedge against the crisis just because of the derivative tools.

The history of derivatives extends to the Dutch market for tulips from the 17th century, when farmers aimed to lock the tulip prices in advance before the flowering of the tulips. In Japan, in the 18th century, buyers and sellers agreed on raw material prices before the goods were handed over. However, the global growth in the derivatives market did not begin until the 1972 decision to start trading on standardized currency futures at the Chicago Mercantile Exchange (CME). Trading with various derivative contracts has exploded, and nowadays derivatives are traded in all the world's financial centers. Derivatives came to Finland when the financial market regulation was abandoned during the 1980s. There were two separate derivative exchanges in Finland, but in 1997-1998 they were merged into one marketplace, the Helsinki Stock Exchange. (Knüpfer & Puttonen 2012: 216.)

The increased awareness of financial risks and the importance of managing those risks are the main reason why derivative market has become so popular. The research on financial derivatives is rather wide but mainly concentrated on the volume and purposes of using derivatives. However, Allayannis and Weston (2001) have set the new tone for researchers on derivatives, as their empirical study on the matter was first of its kind. The direct impact that derivative hedging has on firm value had not been studied before. They found a positive correlation between the two.

1.1. Purpose of the study

Examining what kind of effects hedging with currency derivatives have on firm market value is the main purpose of this study. The observation period is 2011 - 2015 and the data consists of non-financial companies from Finland. The results will give an understanding whether hedging with currency derivatives is an economical and value-adding solution for Finnish companies. The most recent financial crisis period itself is an interesting period to study and see how well hedging positions manage under extreme market conditions. However, the observation period in this study is limited to the post-crisis period when the markets are more stabilized and improving from the effects of the crisis.

This study is highly influenced by the study of Allayannis & Weston (2001) with few significant differences. This study strictly focuses on Finnish firms and market, while Allayannis & Weston (2001) and other known researchers have mainly focused on the U.S. market in their work. The Finnish market has a much smaller economy compared to the U.S. and therefore more dependency on foreign trade. Furthermore, this study concentrates on currency derivatives use during the 21st century while Allayannis & Weston (2001) study the same matter during the 1990th.

The empirical part is conducted in two ways. First way is to execute the univariate test to examine the effect of currency hedging on firm market value without taking any other variables into consideration. After examining only one affecting variable, the multivariate regression is implemented to test out rest of the affecting variables. There are seven chosen control variables in total in this study, whose effects are examined. The study of Allayannis & Weston (2001) is used as a guideline when these mentioned variables are chosen.

1.1. Structure of the study

The study structure consists of three separate parts. The first part is the theoretical part, where the study presents an overview on the matter of risk management and financial derivatives in general. Second part is the literature review that surveys previous studies on the subject currency derivatives affecting firm value. Thirdly, the empirical part aims to answer the problem at hand that were presented as the purpose of the study. The study then ends with the summary and conclusion part.

The theory part firstly presents the subject of financial derivatives and examines different derivatives tools and compares their characteristics. The theory part then continues to financial risks where the focus is on currency risk. The backgrounds of exchange rates and forming of exchange risk exposure is explained. After that, these theories are combined and different derivative tools to control specific exchange rate risks are presented. The literature review part displays previous studies regarding currency hedging and firm market value. The findings and conclusions of previous studies are used to analyze the results of this study. The empirical part starts by introducing the data of the study and then continues to describe the research methodologies of the study. After the methodologies, the empirical results are shown and discussed in a deeply matter.

2. THEORY ON DERIVATIVES

Derivatives are financial instruments which value is tied to the price of the underlying asset. Underlying asset can be any item whose changes in value can be somehow measured. Most common and used underlying assets are interest and currency rates, stock shares and raw materials, such as gold. Thus, trading with derivatives happens with a wide variety of different underlying assets. However, trading with derivatives is based on trading of rights and obligations to sell or buy different commodities at the certain price and at the certain date. This means that the commodities that are serving as an underlying asset, do not usually change owners. Banks and other financial institutions maintain derivative exchanges and over-the-counter market places where derivatives are traded. (Hull 2017.)

Hull (2017) divides in his book the most common uses of derivative instruments in three different ways that investors and companies specializing in derivatives can use to achieve their own goals. Hedging with derivative instruments is typical for companies that are exposed to risks inherent in financial markets. Derivatives enable companies to hedge against these risks by manipulating risk exposure. Manipulation is such that any variation that the underlying asset's value develops, it can be replaced by a counterparty hedging position.

Speculation means the pursuit of high profits by using derivative instruments. Where risk managers know how to hedge against fluctuations in the market, speculators aim to maximize profits through derivative contracts. They take the market position believing that the price of the underlying asset will either rise or fall. The pursuit of arbitrage benefit is the third most important purpose of the use of derivatives. Arbitrage means a situation where it is possible to utilize the differences in the market prices of different investment instruments so that by buying or selling instruments it is possible to achieve a risk-free profit. However, according to the fundamentals of funding, there are no arbitrage opportunities in the market. (Hull 2017: 14-16.)

In the theory part of the derivatives, we will look further into different derivative contracts. Marketplace also plays a role in studying derivative instruments suitable for different uses. Certain agreements are better suited to the derivatives market and certain business needs require slightly more tailored contracts that can be found on the OTC market.

2.1. Standardized derivative contracts

Standardized derivatives refer to derivatives whose underlying asset, marketplace and maturity are strictly defined in advance. Standardized derivatives are traded only on exchanges specializing in derivatives. Individual traders, brokers and market makers can trade on the derivatives exchange. As in the share trades, brokers are also responsible for their customers, i.e. investors. A market maker, meanwhile, is a community that is committed to providing certain derivative instruments for buying and selling quotations. Market makers thus improve liquidity in the derivatives market and in return for this, market makers can trade at a lower cost than others. (Nikkinen et al. 2002: 191.)

Trading on derivative exchanges is very safe for trading parties, as trading in derivative contracts has preconditioned standard terms, that is, standardized terms. In addition, a clearing company operating between the parties on the derivatives exchange guarantees that the party benefiting from the derivative trade receives a settlement of its profits by daily balancing the accounts of the parties (Kuprianov 1993: 65). It is possible to trade with a number of different derivative instruments on the derivatives markets around the world, but in this study, we only concentrate on options and futures as they are in overall most used standardized contracts

Options

The option is a protection that gives its owner the right to buy or sell the underlying asset that represents the option at a predetermined price. Because the option is indeed a right, the holder of an option is not obligated to buy or sell, but also has a choice not to go through with the trade if the situation is unprofitable for the holder. Thus, the option agreement is not binding for its buyer but obliges its vendor, the option setter. The setter

is then obligated to sell or buy the underlying asset for a price that is determined in the agreement. Because of this obligation, the setter is compensated with a premium that can also be seen as the price that the buyer has to be pay for the option. (Black & Scholes 1973.)

Black et al. (1973) divide options into two categories, put and call options. The put option gives the holder the right to sell and the call option gives the right to buy the item that is serving as the underlying asset. Both options oblige their setter. Additionally, options are allocated to European and American options, depending on when the holder can exercise the mentioned right to exercise the option. Furthermore, the American option is possible to exercise at any time during its time, whilst the European option can only be exercised on its end date.

	BUYER (holder)	**SELLER** (setter)
Call option	Right to buy	Duty to sell
Put option	Right to sell	Duty to buy

Figure 1. Rights and duties of the options trading parties (Black & Scholes 1973).

Black et al. (1973) consider European options easier to analyze than American options, which makes European options more often used in different researches and formulas. However, most of the options available for trading are Americans, and this could be explained by the flexibility of American options. The trader will rather choose the option he can execute when he sees it best and does not have to wait for it to expire like in the European options.

Futures

Futures contracts are agreements on purchases or sales of products at prices that are determined beforehand. Parties that are involved in a futures agreement agree on a specific trading price in advance aiming to have some level of certainty on the price movements that surround the product in hand. However, there is a big difference between futures and options in the matter of their obligations. Where the option is a right for its holder and has a choice not to be used, the futures contract is always a binding obligation between the parties. (Klecka 1994: 49.)

Klecka (1994) explains that the other factor that separates futures and options is their price. Where the option buyer has to pay a premium to the setter, there is no such charge in futures trading. When comparing the absence of this payment for futures contracts, the payment for options may be considered as a fee for the freedom that the option holder obtains. However, the premium is the maximum amount that the holder may lose in the option agreement.

2.2. Non-standardized derivative contracts

Non-standardized derivatives can be exchanged outside the stock exchanges, for example through banks. The non-standardized derivatives market is the OTC market. Trading with non-standardized derivatives is always somewhat riskier than trading with a standardized derivative. There is no similar clearing company in the OTC market as in the stock exchange on standardized derivatives, which is why the trading parties have to face the risk of a credit loss. (Kuprianov 1993: 66.)

OTC markets differ from derivatives markets, above all in their flexibility and terms. Their contract does not have as precisely defined terms as in contracts in exchanges. As a result, contracts in the OTC market between banks and other financial institutions can be made very flexible and, when necessary, adapted to the needs of the parties. For this reason, OTC markets have been called unofficial marketplaces. (Kuprianov 1993: 67.)

Forwards

Forward is an option and futures-like agreement on future trading. Forward resembles with its features mostly the futures contracts. Since the forward contract also requires both parties to conclude an agreed transaction and does not include any additional premium payments. However, futures and forwards have their main difference in their standardization. Where the futures are traded in exchanges that only allow standardized derivatives, forwards can be traded on OTC markets where all the other non-standardized derivatives are traded as well. Hence, there is a constant risk in forward contracts that the other party will not be able to pay up on the contract date. (Kuprianov 1993: 64-65.)

Another clearly visible difference between futures and forwards is the implementation of contracts. Futures contracts are favored by traders, mostly speculators who seek to make profits with derivatives. Speculators usually foreclose the futures contracts before their expiry date when they see a possibility for a profit in the price movements of the underlying product. Forwards, on the other hand, are mostly used for hedging purposes, whereby the user tries to eliminate the volatility of the underlying product. In that case, forward contracts are generally in use throughout their maturity, which is then executed. (Kuprianov 1993: 64-65.)

Swaps

When two parties have different views on expected value changes of a certain underlying asset, parties can use a derivative contract called the swap to exchange the future cash flows of each other that are generated from that certain asset. The most essential ability that the swap contracts have is in their regulations.

Swaps are categorized as non-standardized derivatives so their market place is the OTC market and the agreements can be fixed to satisfy both parties. The currency and interest rate swaps are the most used swaps and the agreements mainly differ from each other in the matter of currency. In the interest rate swap, the change in cash flows happens in a same currency while in the currency swap the change happens with different currencies. (Kuprianov 1993: 66.)

3. FOREIGN CURRENCY RISK

Companies face many different risks daily, and the material and literature on different types of risks is immense. Thus, this research limits itself to examining only financial risks as the main subject of this research is to focus on hedging against foreign currency risk. In this chapter, financial risks are divided into three categories, liquidity, credit, and market risks. Furthermore, market risks are divided into four different categories that also include the main subject of this paper, the currency risk. Market risks also include interest rate risks as well as price risks of shares and commodities. (Knüpfer et al. 2012: 209.)

Alongside currency risk, interest rate risk is one of the most popular and researched market risk, so we leave the price risks away from closer scrutiny. The study continues by briefly presenting the interest rate risk followed by the study of currency risk and risk management in that field.

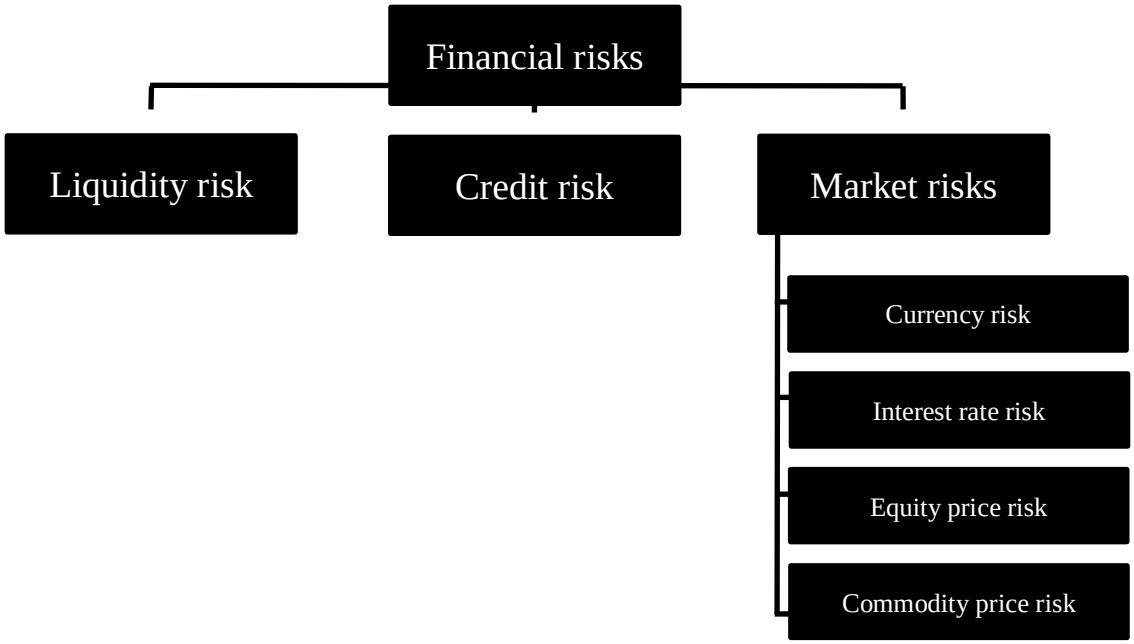

Figure 2. Financial risks (Kasanen et al. 1996: 27)

3.1. Financial risks

Liquidity risk means the chance that a certain company is not able to cover the costs that belong to it due to company's financial deficient. Therefore, company is at risk to slip into bankruptcy as unpaid obligations may lead to bigger problem, even to a substantial debt spiral (Brandon & Francois-Ihur 1995: 180). Brandon et al. (1995) break down the liquidity risk into two categories, the liquidity risk of the market and the liquidity risk associated with financing, the latter being related to the company's difficulties in meeting its own payment obligations. One of the first steps for a company to reduce its liquidity risk is to be very precise when assessing the cash flows that the company will be expecting. Having a strong liquidity reserve will help company to be ready for different market fluctuations. Another considerable decision could be changing the business to alternative, more sturdy market.

Credit risk occurs when company's credentials have financial problems or for some other reason are not able to pay their dues. Credentials are not the only risk factor as a company can face credit risk also when operating in the investment market. The risk in the investment is realized when, for example, the counterparty in a derivative agreement hits a default and does not fulfill its payment obligations. In these derivative contracts, the hidden credit risk is more prominent in the OTC market, as on standardized derivatives markets the implementation of contracts is closely monitored. Companies that aim to have a better control and management of their credit risk, should outsource the measurement of their credit risk to a third party to make the measurement as independent and objective as possible. (Brandon et al., 1995: 185.)

Market risks encountered by companies are interest rate and currency risks as well as price risks, which include changes in the price of shares and commodities. Even the smallest changes in commodity market prices are unpleasant for some market party. Thus, the risk of one of the parties is always another party's opportunity to make a profit. These changes create uncertainty for companies and exposure to this uncertainty is called market risk. (Gastineau, G.L. 1993: 17.)

The level of interest rate risk for a certain company highly depends on the maturity of its liabilities and the period that the interest rate is adjusted. Interest rate risks exists because institutions and individuals in the market are uncertain about the volatility of the bond market. This volatility can have an enormous effect on the possible future profits and present value calculations of companies. The present value of the debt will change as interest rates change. The value of fixed-rate investment falls as market interest rates rise and value rises as market interest rates fall. (Makkar & Shveta 2013: 59.)

3.2. Foreign currency risk

Companies that are active in foreign market with trading or investing, and have incomes from different countries and varying currencies, are constantly facing currency risk in their business. This is simply explained by the fact that company's receivable cash flow can be enormously reduced alongside changes in the exchange rates. Currency risk is hard to avoid as companies that only operate with their home currencies are also vulnerable to this risk due to ongoing international competition in the market. For example, if the currency is overvalued it means that the products are sold with higher prices due to currency that is overvalued at that moment. Thus, the competitive advantage will eventually fade off.

Exchange rates

Exchange rates are defined by the currency system of a certain country and they can either be fixed or floating. As per fixed interest rates, domestic currency is tied to other country's currency or for example to the price of gold. The exchange rate between these two currencies is constant, non-floating. On the other hand, the value of euro and other floating currencies is defined by the supply and demand of the market. Yet, these floating currencies are strongly supervised by monetary authorities. The currency risk arises when exchange rates change because this leads to values of currencies to vary with respect to each other.

While there exist many different causes that can affect the demand and supply of currencies, the difference in the interest rates between countries is the most essential

factor of all. Let's examine two countries, Finland and Unites States (U.S.), and assume that real interest rates between these two countries differ such that Finnish investors' real interest rate is lower than American investors'. Finnish investors would then convert their Finnish money to U.S. dollars as they would gain higher interest rate there. This peak in the currency exchange increases the demand of U.S. dollars so the dollar appreciates relative to the euro. When hedging against currency risk, the aim should be to hedge against these real exchange rate changes and not the changes caused by the divergence between inflations. This is because changes caused by the inflations are usually considered as shifts in nominal interest rates. However, varying levels of inflation can influence the supply and demand of a country, hence the inflation changes cannot be completely excluded when preparing for currency risk. (Hillier et al. 2012: 704.)

Purchasing power parity (PPP) is another important factor when defining exchange rates. PPP offers ways to evaluate the long-term development of exchange rates. The theory suggests that price levels and exchange rates are connected. When examining different countries, goods and services should cost the same in the long run in all countries. This is simply explained by the theory where arbitrage is causing an appreciation of exchange rate in the country with cheaper good and services. When there occur price differences, exchange rates will adjust so that the arbitrage opportunity of buying goods cheaper in one country and selling them more expensively to another country would be eliminated. There are also factors that weaken the PPP theory. For example, every country has their own unique costs and expenses to provide certain goods and services. Thus, the prices of goods and services cannot be the same in every country. Furthermore, trade imbalances, monetary policy, political decision and even speculators can affect the exchange rates (Feenstra & Taylor 2008: 503-514.)

Purchasing power parity is also a handy tool for currency investors who use it to find potentially overvalued or undervalued currencies. Investors who hold foreign companies' stocks or bonds study PPP figures to predict and evaluate the impact of exchange-rate fluctuations on a specific country's economy.

Risk components

Identification of risk exposure is the base of managing the risk of currency. Recognizing the risk exposure is merely an estimate as the risk that is happening in the future cannot be perfectly recognized beforehand. In finance literature, currency risk generally split into three different classes and identifying these classes is essential for companies to have a correct measurement of currency risk exposure. During difficult economic times, forecasting risks is even harder than usual but studying and monitoring these risk categories efficiently will help companies to act quickly and make the necessary arrangements when the risks are realized. (Collier & Davis 1985: 327.)

Figure 3. Currency risk components (Collier & Davis 1985: 327).

Transaction risk relates to the changes that occur between the time when the contract is concluded and the payment transaction made, such as sales, purchases and interest payments. It arises when performing a foreign currency transaction and the execution plan for the exchange rate differs from the current rate. Transaction risk can create great difficulties to dealing parties as the exchange rates are very volatile and can fluctuate significantly over a short period. However, there are many ways for companies to hedge against this volatility. Hedging transaction risk is also quite easy for firms, therefore a high degree of firms hedge against it. It can increase firm value by reducing the variability of future cash flows, and thereby it reduces expected costs associated with financial distress, underinvestment problem or taxes.

Translation risk arises in the firm when the foreign currency units in the accounting are converted into local currency in the financial reports. It is a foreign currency if it is different from the parent company in use. An international company that does business in a foreign country will eventually need to exchange the foreign currency back to its original currency. During this exchange period, the rates can fluctuate a great deal which can lead to a remarkable cutting in the original profits. Naturally, the risk for the company is greater the bigger the assets are in that foreign country. Nevertheless, hedging against translation risk is not that common since gains or losses from that risk tend to be unrealized and therefore have little influence on firm value.

Economic risk means the effects of exchange rate fluctuations to the company's competitiveness. Basically, it means that a firm can lose its competitive advantage due to unexpected exchange rate movements. It is important to realize that the company may have very reckoned economical currency risk through foreign competition or when they import supplies from foreign competition, even if the company operates solely in its home country. While transaction and translation risk predictions are a lot more accurate, they are easier and more profitable to hedge against than the economic risk. Economic risk exposure deals with unexpected exchange rates changes which are naturally impossible to predict correctly beforehand. This makes economic risk very hard to hedge against. (Collier & Davis 1985: 327.)

Currency risk exposure

Adler & Dumas (1984) define risk exposure as what a firm has at risk, what is the magnitude and importance of the subject that is at risk. Therefore, managing the currency risk is all about the successful measurement of foreign currency exposure. It is impossible to plan the effort and budget that is worth putting into the hedging process if the size of the company's risk exposure is unknown. In many cases, companies decide to ignore certain risks since the exposure is merely a small fraction compared to the firm's value

There are various ways to measure risk exposures. First, Adler & Dumas (1984) explain a regression model that is one of the most used tools for analyzing different risks and generating proper hedge practices. This regression method examines cash flows of the company that is unhedged and reveals how they have performed historically in relation to the risk factor.

(1) $$R_{it} = \alpha_i + \beta_i R_{st} + e_{it},$$

where

R_{it} = stock return of a firm

R_{st} = rate of change in an exchange rate

β_i= firm’s exposure to exchange rate

e_{it} = error term

This *regression model* can be executed in a time-series regression model using the exchange rate and firm values as formula (1) shows. This method was originally created by Jorion (1990). In the formula, changes in valuation of firms are the dependent variable and changes in exchange rates are the regressing units. Firm’s stock price is used as a firm value as the authors highlight that the stock price of a company should somewhat reflect the value of the company.

While regression model is based on history, Hillier et al. (2012) introduce the second method that concentrates more on the future events. The results of this *simulation method* are based on varying alternatives of gains and cash incomes that could happen in varying exchange rate scenarios. This more forward-looking point of view has been regarded as an advantage to the simple regression model. Nevertheless, there lies a possible disadvantage in the simulation method as the risk analyst needs to estimate future returns and cash flows, which can affect the outcome in an unreliable way if the estimates are not accurate.

As a third way to measure risk, Hillier et al. (2012) present the most common risk managing methods. These methods aim to find a single number that will show how exposed the situation is for that specific risk. Value at Risk is a probabilistic approach to measuring and forecasting the risks encountered by the company. It gives the maximum loss amount in a given time frame assuming the market state being normal. Volatility, on the other hand, reveals how much variation lies in time series data. Value at Risk is seen more reliable than volatility as it captures all variables in the market under a single number. This makes it the most used risk measurement method today.

4. MANAGING THE CURRENCY RISK

Copeland & Yoshi (1996) examine different purposes for which companies use derivatives and their findings suggest that derivatives are not used for speculation purposes as much as they are used to manage risks. Thereby, the prime goal is to decrease foreign exchange volatility as it is then expected to attenuate the volatility of company's earnings and total cash flows. Copeland & Yoshi (1996) suggest that reducing the volatility level on cash flows already has a lifting affection on the value of the company. Thus, stabilizing company's earnings are more important than concentrating to obtain profits or increase company value. This explains why companies use derivatives mainly for hedging.

This chapter will continue from the previous chapter where different derivative instruments were introduced and deepen in ways how those certain instruments can be used to hedge against foreign currency risk. In addition, this chapter will start with a part by introducing different incentives companies have for start hedging. We already covered the part where the primary reason was explained to be reducing earnings and cash flow volatility, but companies can benefit from using derivatives also in other ways.

4.1. Incentives to hedge

Finance studies have found several reasons why hedging with derivatives can have a positive effect on company's value. Company's risk management have been recognized to be beneficial for company shareholder during the capital market imperfections and uncertain financial times (Smith & Stulz 1985: 128). Companies have different needs and goals so the individual needs guide to define the best appropriate hedging approach and the proper amount of resources that are used for it. Hillier et al. (2012) explain three different benefits that company can acquire due to hedging with derivatives. These are reduced financial distress costs, mitigating the underinvestment problem and advancing the tax convexity. It is worth to mention that these benefits are an issue that is highly studied but the evidence and results are somewhat contradictory as is the general discussion behind the benefits of derivatives usage.

Financial distress costs

Costs that occur when company is in such a bad condition that it faces difficulties such as fulfilling financial obligations, possibility for a bankruptcy, revenues that are sensitive to market fluctuations or costs related to reorganizations is facing financial distress costs. Companies that are in distress may need to sell their assets more quickly at price that will cut possible profits to meet their financial obligations or face opportunity costs by turning down profitable projects. To so extent, financial distress costs can be avoided or significantly reduced by hedging tools. To get access to the cheaper capital markets and external capital with lower costs, company should use hedging to reduce volatility on its earnings and cash flows. Thus, investor confidence in the company will increase and company can continue investing in valuable projects and opportunities. (Hillier et al. 2012: 691.)

Underinvestment problem

Companies' investment decisions are strongly based on their cash flows and often investment planning must be done beforehand. Thus, companies tend to underinvest in the fear of earnings not being as big as they should. Furthermore, companies use more internal capital when investing because it is usually cheaper than external capital. This means that their investment amount is very dependent on the internal cash flow. This is where hedging can be used a solution as it stabilizes the earnings and cash flows which then makes it a lot easier for companies to make accurate and courageous investment decisions. (Hillier et al. 2012: 692.)

Tax convexity

Hillier et al. (2012) narrate how derivatives can be operated to reduce company's expected tax obligations under a progressive tax system. Since there exists an asymmetry in the tax treatment between gains and losses, company can lower the overall tax liability by consolidating the income before taxes. Hillier et al. (2012) also introduce Smith and Stulz (1985) to be the first researchers to find evidence behind the hypotheses that firms can reduce their tax payments with hedging. Thus, the gains that company make from lower tax payments increase the company value.

4.2. Derivatives

Bodnar & Consolandi (2013) propose different factors that influence how much European companies use derivative instruments. They mainly concentrate on firms that do not actively operate in finance sector and they compare their results with other studies done on companies that are ran in Europe. According to Bodnar et al. (2013), the more comprehensive the use of different derivative tools is, the more active influencer the company is in the specific market where the company operates. It also gives the company extra credibility and makes it more reliable as the strong knowledge in derivatives indicates that the company will not face big troubles in market uncertainties.

According to Bodnar et al. (2013), the increase in the use of derivatives has been significantly influenced by the introduction of the common currency, euro in 1999, which has increased the risk of currency and interest rate risk in companies. In addition, Bodnar et al. (2013) mention that the company management's educational level and the size of the company plays a major role in the use of derivatives. In larger companies, management generally requires more experience and education, where different financial instruments are more familiar and the threshold for their implementation is naturally lower.

Brewer, Jackson, and Moser (2001) found out that companies using derivatives are financially stronger and bigger in size than the average. This is usually explained by the noteworthy costs that starting to use derivative tools have. An example of start-up costs is the training of personnel or the recruitment of pre-trained personnel to which larger and more wealthy companies invest more easily. Guay and Kothari (2003) agree with these findings and add an important point about the evidence of companies that have a larger development and future expectancy to be more likely in using derivatives in their business.

Options

Brady & Hicks (1992) explain how well options operate on the foreign exchange market and when used accordingly, they can provide insurance against exchange rate fluctuations. Although the main purpose of options is hedging, they can also be used speculatively. For example, a company that is receiving foreign currency on a predetermined date can hedge their future receivables by buying a put option that expires on that same date. This way the company can guarantee the exchange rate to be as previously planned throughout the maturity while there is a possibility to benefit from a potential appreciation of the currency. In the worst case scenario, while hedging the entire foreign currency position, only the option premium can be lost. This gives predictability and stability to cash flow control, despite the lost premium that arises when buying an option. Options are a low-priced way to hedge against the negative effects of currency markets. Different protective strategies can also be achieved by combining call and put options.

Hull (2017) divides implementing the option agreements in two ways, American and European way. European option agreement may be concluded only on the marked date, whereas an American option is possible to exercise at any moment during its maturity, regardless of other circumstances. American options are more popular and because of their flexibility, they are more costly than Europeans. The pricing of an American option is more complicated because it can be implemented at any time during its maturity, so binomial trees are used when valuing American options. The European option pricing model is based on the Black-Scholes-Merton –model and it goes as follows:

(1) $c = S_0 e^{-r_f T} N(d_1) - K e^{-rT} N(d_2)$

(2) $p = K e^{-rT} N(-d_2) - S_0 e^{-r_f T} N(-d_1)$,

where

$$d_1 = \frac{\ln\frac{S_0}{K} + (r - r_f + \frac{\sigma^2}{2})T}{\sigma\sqrt{T}}$$

$$d_2 = \frac{\ln\frac{S_0}{K} + (r - r_f - \frac{\sigma^2}{2})T}{\sigma\sqrt{T}}$$

S_0 = foreign exchange rate
K = exercise price
r = domestic risk free interest rate
r_f = foreign risk free interest rate
T = maturity (years)
σ = volatility
N(d) = function of cumulative standard normal distribution

Futures

Hoppes (1995) explains the reasons behind the forward agreements' popularity over futures in the foreign currency market. Derivatives that are created to hedge against the currency risk are mostly found in the OTC-market, which makes forward agreements more common than future agreements as they are very much alike in their characteristics. The key difference, however, is how the proceeds are paid. Revenues from the forward contract are only paid after the termination of the contract, whereas in the futures contracts the worth is calculated when the each trading day ends and the revenue is paid accordingly to the parties of the agreement.

Forward contracts, therefore, have only a single delivery date while future contracts can have a range of delivery dates. In addition, futures are safer because of their standardized nature but forward are then more predictable in the terms of future cash flows. Foreign currency speculator and investors also prefer more free markets like OTC-markets which are more forthcoming to custom deals and agreements to satisfy both parties to the agreement.

Forwards

Hopper (1996) demonstrates an example of a forward agreement. Forwards always have two parties involved. The foreign currency buyer buys long and the seller sells short. Trading is usually done with standardized maturities, i.e. 30, 60, 90, 180 or 365 days. For example, if an investor decides to buy a long-term 30-day agreement of 1 million yen at a forward price of 100 yen per dollar, he is required to buy 1 million yen for 30 days at $ 10,000. If the spot price is bigger than the exercise price, investor's long position is profitable. This means that the long forward gains when underlying asset's spot price exceeds the exercise price at the maturity, and mutually, the short forward profits after the exercise price crosses the spot price.

As there is always an underlying asset in derivative agreements, in the currency forward agreement the asset is naturally one foreign currency unit. The foreign currency forward is priced after the relationship between the spot exchange rate of the currencies and the spread of the interest rates of the respective countries. The following equation (2) describes the relationship. (Hull 2017.)

$$F_0 = S_0 e^{(r-r_f)T}, \quad (2)$$

where
F_0 = forward rate
S_0 = foreign exchange rate
r = domestic risk free interest rate
r_f = foreign risk free interest rate
T = maturity (years)

Hull (2017) presents two different ways how foreign currency can be converted into domestic currency at time T. This is due to interest rate parity theory which is a base factor when evaluating forward rates. The first way is to exchange the foreign currency into domestic currency for the spot rate and investing the earning at rate r for T years. The

second way is to invest the foreign currency at r_f for T years, and after that sell the foreign currency by entering the forward contract.

Swaps

Currency swaps are used to convert investments or loans from one currency to another currency. Basically, swap can transform one currency's exposure to interest rate risk to another currency's interest rate exposure. Therefore, the most popular currency swaps are not only for fixed rates swapped for floating rates, tbut also currency swaps for fixed-for-fixed and floating-for-floating. (Hull 2017: 764).

There is two ways to calculate the valuation of a currency swap. The price can either be based on bond prices on the market or on a portfolio built on forward contracts. The interest rate is assumed to be fixed in the calculations so the price would be the most accurate. Hull (2017) demonstrates how the price can be calculated by using the value difference between domestic and foreign bonds:

(5) $$V_{swap} = B_D - S_0 B_f,$$

where

V_{swap} is the value of the bond

B_D is bond value in domestic cash flows

S_0 is exchange rate

B_f is bond value in foreign cash flows

5. LITERATURE REVIEW ON FIRM MARKET VALUE

This chapter is a literature review and it aims to present earlier studies on derivatives. Derivatives and especially using them for risk management purposes have been extensively studied for years and even decades now, but only after the 1990s these studies could concentrate on the direct impact that hedging against currency risk had on firm value. This is due to companies not being claimed to inform their derivatives usage in annual reports before 1990, thus the earlier empirical studies could only use survey data in their research. (Allayannis & Weston 2001.)

In addition to how derivative tools affect the company's market value, this section starts by examining what components the company's value on the market rests on and how it is measured. The biggest interest of company owners and stakeholders is to increase value and to maximize the benefits of capital. Therefore, decisions behind the derivatives usage are deeply depending on these findings of various studies that company analysts present to the board and stakeholders.

Studies in this field of the industry show that the most studies that concentrate on effect on firm valuations are in favor of using derivatives for risk management but still no clear proof have been found of whether hedging adds value to a firm. Since the previous studies on hand present varying views, the review section is split into different categories. Sections are divided three ways as to whether the hedging created zero, positive or negative net present value.

5.1. Firm market value

Firm’s market value describes the entire share capital of a listed company in the stock market. The market value does not necessarily tell what the value of a business would be, for example, when it came to an acquisition. Therefore, the market value and book value can differ. Market value is an essential instrument to show how good a firm performs considering all its resources and obligations, thus it is widely used in many studies. (Brealey, Myers & Marcus 2007: 52.)

The company's market value can be determined by various methods. In computing the value of a company, the computation is aimed at comparing firms in the same sector. This valuation method is called the benchmark (based on comparable values). In the benchmark, both small and large companies can be compared with each other because the ratios do not favor the company by size. The most popular key ratios are the P/E (price-earnings ratio), M/B (market-value-to-value ratio) and Tobin's Q (Brealey et al. 2007). Tobin's Q is presented slightly more accurately than other measurements as it is chosen as the most appropriate measure for this study and is used in the empirical part as well.

P/E is calculated by dividing the company's market price by the earnings received. The ratio tells how many years it takes until the company's profits have produced the value of the company, i.e. the repayment period. The company's profits are equal to its market value during the year when the ratio is one. The high P/E value is an indicator of high future return expectations, while low value reflects lower expectations or changes in yields. (Brealey et al. 2007: 121.)

The M/B is the ratio of the company's market value to the company's equity, i.e. the book value. The figure shows how the market has appreciated the company in relation to the company's equity. Just as in the case of the P/E ratio, the M/B number tells the expected future value of the company determined by the investors. The weakness of the measurement is that this number cannot be calculated for non-listed companies as market prices are not available. This limits the comparison only to a group of listed companies. (Brealey et al. 2011: 735-738.)

James Tobin (1969) created Tobin's Q and used it to measure firm market value and competitive advantage. Tobin's Q tells the relationship between market value of firm's assets and the replacement cost of these assets. In the ratio, the price for the newly produced goods functions as the replacement costs which is an estimation of how much it would take to replace firm's assets. Tobin's Q is used almost in every reckoned research that studies what kind of impact hedging has on firm market value.

Tobin (1969) assumes the replacement cost of assets to match the firm's market value of the asset. Thus, the ratio of Tobin's Q should equal exactly 1. Tobin (1969) also states that companies are usually eager to invest when the ratio is 1 or higher but when the ratio drops below 1, the desires to invest usually go away. This is explained by the fact that high Q ratio firms are usually those with significant competitive advantage as their capital assets are worth more than it would take to compensate it. This makes the stock overvalued. These are normally companies with strong and known brands. In contradictory, companies with low Tobin's Q have assets that worth less than the replacement so the stock is undervalued. There can be companies that operate in highly shrinking or competitive industries.

Ross, Randolph & Bradford (2013) explain over- and undervalued companies little further. Overvalued companies with higher Q ratio may soon start to see increased competition in their field as they are earning significantly more than their replacement costs. This will tempt competition to seize some of the profits. In time, increased competition will lower the market shares of the company in hand, and thus decrease it's price in the market and it's Tobin's Q. In the subject of undervalued companies, on the other hand, potential purchasers may appear as it is easier and effective to purchase an existing company than to build up a similar one. This, in turn, will increase interest in the company and the stock price together with the Tobin's Q may increase as well.

Hedging creates zero net present value

Modigliani and Miller (1958) started a trend in researches on managing risk and its effects on firm market value. In their study, they assume perfect market conditions and argue that risk management procedures are irrelevant for firms seeking to add additional value as shareholders can manage the risk on their own with same cost structure as the firm. Their study has aroused controversy arguments as their assumptions are only valid under efficient markets but in the real world, there exists different kinds of transaction, bankruptcy, and financing costs as well as taxes that make the market inefficient.

Adler and Dumas (1984) argue that there is no empirical evidence that hedging measures focusing on the exchange rate would increase the market share price of the firm. Cash flows reflect the market value of the share, so it can be concluded from Adler and Dumas that these hedging measures do not affect the company's income, at least to a significant extent. In their view, the currency risk does not differ significantly from the management of the market risk, so these two can be estimated and treated in the same way.

Jin and Jorion (2006) investigate the risk management measures of 119 firms that operate in oil and gas industries between 1998 and 2001. They compare firm values between those who used derivatives in their risk management and those who did not use any hedging tools. Their results do not detect a correlation with derivative hedging and firm market valuation. However, Jin and Jorion (2006) state that the connection with derivatives usage and firm market valuation does not have a clear and simple answer and different industries and market sizes can have a massive part in the results of this field of study.

Belghitar, Clark, and Mefteh (2013) examine how hedging affects shareholder value in a sample of French firms. They do not find derivatives to have an increasing effect on shareholder value. They (2013) also test if different plans of hedging have any favorable influence on the firm valution but the results are insignificant. Belghitar et al. (2013) note that even when hedging strategies are perfectly executed, gains from derivatives usage are usually not enough to cover the financial and hiring costs that effective hedging strategy might require.

Hedging creates positive net present value

Leland (1998) argue that risk management increases the company value mainly due to the optimum debt level. Advanced debt capacity gives the company the opportunity to grow their tax shield. Growth in debt capacity also improves the company's ability to achieve positive net worth investments. The most important aspect of Leland's model is that when making risk management decisions, other financial decisions of the company should also be considered. Companies should switch to using integrated risk management instead of protecting individual risks. This is because risk management integration can

reduce the possibility that the protection of an individual risk would, for example, affect other funding decisions negatively.

Allayannis and Weston (2001) study the relationship of over 700 major non-financial firms' market values and foreign exchange derivatives between 1990 and 1995. By using Tobin's Q to determine the market value of the company, they discover a favorable connection between the market value and hedging with currency derivatives. Companies using currency derivatives are 4.87% higher priced compared to companies not using derivative tools. To take this outcome further, Allayannis et al. (2001) examine whether there is a connection between the development of market price and hedging. Companies that started hedging increased market value more than those companies that did not hedge. In addition to this, those companies who started the protection but stopped it increased their value slower than those who continued their hedging policy.

Nelson, Jacquelyn & Affleck (2005) use Tobin's Q but in addition, they include abnormal stock returns in their study to measure the influence that foreign exchange derivatives have on firm value. Their sample consists of 1308 companies that are from the U.S. and the period is between 1995 and 1999. Nelson et al. (2005) state that only 21.6 % of the sample companies use derivatives in their risk management and explain the rather low percentage to be due to quite large sample size where they included all kind of firms from large to small sized firms thus, the smaller sized companies reduce the percentage quite a lot as they are usually less probable derivative users. Nelson et al. (2005) report an average of 4.3 % annual abnormal returns for companies using derivatives to hedge and they specify that the outperforming effect of hedging is entirely consequence of currency derivatives.

Bartram, Brown, and Conrad (2011) study exchange rates and the interest rate derivatives' impact on the volatility of corporate cash flows, the standard deviation of share yields, the beta factor, and the market value of companies. The sample they used in their research is from 2001, so they can also examine whether companies with the operating with derivatives can lower their influence of overall economic phenomena, such as the influence of a recession on the company valuation. They discover solid proof that

the use of corporate derivatives lowers both the overall risk level of companies and the level of systematic risk.

Bartram et al. (2011) show in their results that derivatives usage is significantly united with a bigger value of the company and bigger returns over 2001-2002 during the economic downturn. They argue that, on this basis, companies can use derivatives to hedge against downside risk. Bartram et al. (2011) discover that derivative operaters have a substantially weaker volatility of cash flows and equity returns than those who do not include derivatives to their risk management. They state that the level of volatility on cash-flow of derivative operators is almost 50% weaker than for companies that do not use derivatives. Bartram et al. (2011) deal with derivatives effects on the general level, so the impact that they found on the value of the company is not necessarily just a result of currency derivatives. Again, among the survey companies, foreign currency derivatives were the most used derivatives, so the results can also be considered relevant for the study at hand.

Hedging creates negative net present value

Copeland and Yoshi (1996) examine the activities of 200 firms operating in non-financial fields and concentrate on their hedging and managing methods of foreign exchange risk. The starting point was that hedging should compensate for cash flows, which means that the volatility should decrease in order to keep hedging measures active. The research showed that even the most well-designed and derived hedging activities do not reduce the standard deviation of cash flows. It was also noted that many hedging programs, on the contrary, increase the volatility on cash flows and, in the worst case, lower cash flow. This is explained by the difference in a mathematical and real world. What works on formulas and paper does not necessarily work in a real world where predicting the future is virtually impossible. The changing pressure on exchange rates is usually the sum of many different variables, and it is impossible to calculate the change mathematically. Without the adoption of this reality, there may be a delusion that there is a mathematical model that is able to reliably predict exchange rate movements.

Copeland and Yoshi (1996) use the total collapse of the Mexican Peso in 1994 as an example how hard or even impossible it is to be totally protected against exchange rate risks. They state that even if the company is hedged against the currency risk, these kinds of market situations will have effects on firm's cash flow and no hedging measure can avoid or foresee the consequences.

Hagelin & Pramborg (2004) provide evidence that when company's hedging is driven by incentives of the manager, it can significantly decrease shareholder value. When management's motives are not totally aligned with shareholders, it can lead to a situation where managers use hedging to protect the project that is in a key position with their commissions and rewards and not shareholders' best interest. However, Hagelin & Pramborg (2004) present results that confirm derivatives usage to reduce firms' foreign exchange risk exposure and therefore speak up for derivatives as risk management tools.

There are many arguments that can assume hedging to decrease firm value. In the studies where evidence is found to support the view of derivatives usage enhancing firm value, derivatives are always assumed to be executed properly and to work effectively. This includes an assumption of derivatives to be used for hedging purposes and not for other incentives. Thus, if any of these assumptions are not valid, hedging can in fact even decrease the firm value.

Summary of value studies

Protecting against exchange risk requires a lot of resources from the company, which may be the reason why only large companies are mainly protected against these risks. Even a surprisingly large number of companies do not in any way hedge against these risks or have a misguided understanding of how to reduce the risk or to measure it. This raises questions, whether the currency derivatives are too difficult to use or their costs are just too high. Speculative trading and market manipulative behavior also affect companies that seek to hedge against exchange rate risk. The company must know or at least be able to reliably predict how exchange rates will behave in the future in order to make it reasonable to hedge foreign exchange derivatives against currency fluctuations.

Table 1 is a overview of all studies that are presented in the literature review part. The study is pointed out in the first two columns, while the researcher of the study is marked with ‘’author’’ and the publication time is marked with “year”. Following columns briefly represent the used data. Countries that are studied is marked with ‘’market’’, research year with ‘’period’’, and the amount of firms is with ‘’sample’’.

Most of the studies concentrate on the U.S. market, but late researches also broaden their research to alternative countries. Apart from Copeland & Yoshi (1996), sample section of studies before 2001 are empty as mentioned before, empirical studies started mostly after the 2000s. Last two columns indicate the results of the studies and what type of hedging is researched. ‘’Value" is either positive, negative or no value. In some sections, positive values are specified with actual percentages. ‘’Hedging type" is either only foreign exchange derivatives or mentioned as all derivatives as some studies do not specify the derivative methods that are used.

Although the results of studies may vary a little due to some differences in sample construction and testing methods, it appears that most studies find currency hedging to have a favorable impact on the firm market valuation. This observation is derived from the reality that almost all studies that find negative value effects for hedging with derivatives are either statistically insignificant or they provide reasons why the firm market value might decrease. For example, using derivatives incorrectly, unethically or for speculative purposes could be the reasons why firm value or cash flow can be at risk.

Table 1. Summary of previous studies.

Author	Year	Market	Period	Samples	Value	Hedging type
Modigliani & Miller	1958	-	-	-	No value	All derivatives
Adler & Dumas	1984	-	-	-	No value	All derivatives
Copeland & Yoshi	1996	U.S.	1975 - 1985	198	Negative	FCDs
Leland	1998	-		-	Positive	FCDs
Allayannis & Weston	2001	U.S.	1990 - 1995	720	+ 4.9 %	FCDs
Hagelin & Pramborg	2004	-	-	-	- / +	FCDs
Nelson & Affleck	2005	U.S.	1995 - 1999	1308	+ 4.3 %	All derivatives
Jin & Jorion	2006	U.S.	1998 - 2001	119	No value	All derivatives
Bartram, Brown, and Conrad	2011	International	1998 - 2003	6888	+ 4-16 %	All derivatives
Belghitar, Clark, and Mefteh	2013	France	2002 - 2005	211	No value	FCDs

FCDs apply to foreign currency derivatives, - / + refer to both positive and negative value premiums.

6. EMPIRICAL RESEARCH

This section, chapters six and seven, focuses on how the use of foreign exchange derivatives has affected the returns on shares in the Finnish stock market and what kind of impact it has had on the companies' Tobin's Q ratios. Study concentrates on a period after the financial crisis, between 2011-2015. Earlier studies on the subject have mainly focused on the U.S. market and only limited information is available from Europe, especially from the Finnish market. At the beginning of empirical research section, the data that is used and related observations as well as the descriptive statistics are presented thoroughly. Further, the variables used in the regression along with the applied methodology are presented. The results of the empirical tests will be examined later in the chapter seven following the conclusion chapter.

6.1. Data

The data consists of the companies that are listed on the main list of Nasdaq OMX Helsinki in the years 2011 to 2015, and thus the study concentrates on the Finnish market after the financial crisis. The data includes companies that listed on the main list during the observation period and excludes companies that left the main list during this period. These mentioned listings and exits from the list have had only a little effect on the sample size. The largest annual sample size is 104 companies in 2014 and the lowest is 95 in 2011.

The Finnish market is different in many ways compared to other European countries and especially the widely studied U.S. market. The geographical location and Finland's rather small size makes them very depending on the other countries where U.S. could easily manage by trusting only its domestic market. This means that Finland is more exposed to foreign currency risk due to extensive foreign sales and trade. Bartram et al. (2009) provide evidence to show that the extent of using derivatives is much higher in Europe than it is in the U.S. Nonetheless, after introducing the Euro currency, trading and accessing to different markets have clearly been easier and using derivatives have become much clearer because of the clearer comparison.

6.1.1. Sample description

The data used in the research is best available for listed firms, thus all the companies in the sample is listed in Nasdaq OMX Helsinki. However, the sample do not contain any financial firms as they are all excluded from the sampling. The reason behind this is that financial firms differ significantly in their financial derivatives use due to nature of their industry so with this exclusion the distortion of the results is minimized. The collected data consists of an average of 495 observations between 2011 and 2015, with an annual average number of observations being 100. The sample has annual variations in some key figures due to lack of available data for some companies. Approximately 15 to 18 firms are eliminated from the sample for each observation year because of their industry or lack of enough data, which rises the total number of companies eliminated from the sample to 86. For companies that have more than one shares listed, for instance, share A and share B, the most liquid one of the shares is chosen. This ensures that the market price is updated without delay and is comparable with other companies.

The data for this research is primarily assembled from the database of Thomson Reuters and the share acquirements are collected from the DataStream. All the data is then completed by using annual reports. Annual reports and financial statements are also used to manually collect data on firms' derivatives usage. The search is implemented by using several keywords and trying to find a match in the annual reports and statements. One of the key variables in this study is the currency derivatives dummy variable that is used to point out whether the company has used derivatives for hedging purposes or not. If the company have used currency derivatives for hedging, dummy variable gets the value of one and if not, its gets the value of zero.

The data for the study consist of repeated observations on the same cross sections. This makes the data structure a panel data by its nature. One of the advantages of panel data is that it gives control over the variables that cannot be observed or measured, so control over unobserved characteristics. (Cheng 2014.)

6.1.2. Regression variables

In all the regressions, the natural logarithm of Tobin's Q acts as the dependent variable as in most of the studies examining the same subject on firm value. The exchange derivative use is the test variable in all the regressions. Tobin's Q functions as the proxy for the firm's market value, and it is considered very useful and reliable as it standardizes different firms regarding to their sizes. Tobin's Q is defined as the ratio between market value of firm's total assets and the replacement cost of firm's total assets (Equation 6). More specifically, the market value of total assets is defined as the book value of total assets which has been deducted by the book value of equity plus the market value of equity. The replacement cost of total assets is then the book value of total assets (Allayannis & Weston 2001; Belghitar et al. 2008).

(6) $$\text{Tobin's Q} = \frac{market\ value\ of\ total\ assets}{replacement\ cost\ of\ total\ assets}$$

To eliminate the impact of all other factors on the company's market value during hedging, a set of control variables are chosen that are used in the regressions. The control variables are mainly chosen subject to available data and they are all from the list of control variables that Allayannis and Weston (2001) used in their research and found evidence that they influenced the firm market value. Set of chosen variables allows study to outline other factors that are not relevant to this research. Chosen control valuables are total assets, return on assets, leverage, research and development to sales ratio, foreign sales to total sales ratio, dividend dummy, and currency derivatives dummy.

Total assets are used to measure firm size. The size of a firm is essential on how much derivatives are used for hedging purposes as it is more likely that a large company practices hedging with derivatives for scalable benefits compared to a small company. Further, there is evidence found that in addition to derivatives use, also the firm size affects the firm value Allayannis & Weston 2001). Therefore, the natural logarithm of firm's book value of total assets is used to control firm size.

Return on assets acts as a profitability indicator from firm's performance. It is predicted to have an influence on firm valuation positively, thus the Tobin's Q is also assumed to

be larger for more profitable companies. This control variable is calculated by dividing net income with total equity and it expressed in percentage. That makes comparison between other companies much more reliable. (Allayannis & Weston 2001.)

Leverage is one of the control variables because the capital structure of a firm affects the ability of the company to perform its obligations and thus influence its value. This is measured by the ratio of long-term debt to shareholders' equity. Allayannis & Weston 2001 explain that highly debt financed firms are seen less valuable than firms that are financed mainly with equity. Thus, the leverage is assumed to have a negative effect on firm value.

Research & Development to Sales ratio is calculated by dividing Research & Development expenses by total sales or revenue. It is used to evaluate firm's investment and growth opportunities. Géczy et al. (1997) explains that investments are a key part of a company's business. Growth in market value requires profitable investments, and thus, increasing the company's investment rate can increase the likelihood of revenue growth and hence market value growth. Géczy et al. (1997) presents evidence that companies that hedge against exchange rate movements have a higher investment rate than companies that do not carry out these measures.

Foreign sales to total sales ratio is used to measure firm's geographical diversification and it is controlled because diversification have been studied to increase the market value of a company (Bodnar et al. 1997). This is due in particular to the company's ability to acquire the necessary raw materials or to produce products where they are sold, reducing risks in the supply chain. Trading in local currency also reduces the risk exposure as currency fluctuations do not have impact locally. This control variable is calculated by dividing foreign with total sales. (Allayannis & Weston 2001.)

Dividend dummy is used to measure firm's ability to access financial markets. Dummy equals one if the company has paid a dividend during the observation year and zero if no dividends has been paid. When a company pays dividends, it can be assumed that the company's financial situation is stable and therefore Tobin's Q is likely to be lower than normally. (Allayannis & Weston 2001.)

Currency derivatives dummy divides companies into hedgers and non-hedgers. The company gets the value of one if there have been any open currency derivative positions during the observation year and zero if not. This information is gathered manually from the annual reports and statements.

6.1.3. The use of currency derivatives

Table 2 shows that in general, the popularity of using foreign currency derivatives has been stable as 62,43 % of OMX Helsinki companies (sample companies) have been hedging during the observation period. The number of hedgers is much larger than what Allayannis & Weston (2001) presented in their study regarding hedging in the U.S. market. This may partly be explained by their observation period which is between 1990 and 1995 as firms use of derivatives have increased significantly since the 1990s (Bartram et al. 2011).

Despite the stable and large percentage of derivatives users, there are still about a third from the sample that are not using currency derivatives. The simplest explanation for that could be that those firms are not exposed to foreign currency risk. However, the table 2 shows that even 20,40% of the firms with foreign sales are not hedging against currency risk. Again, it could be that majority of the sales were made to Europe, where customers are located in a country that is part of the European Monetary Union, so the same currency is used.

There are some controversy findings in the table 2 as it seems that few firms without any foreign sales or business are hedging against currency risk. Although this can be explained by the risk that even only locally operating businesses are exposed to currency risk via international competition. Nonetheless, the definitive majority of the firms without any foreign sales are categorized as non-hedgers, the percentage being 85,3 %. In general, most firms that have foreign sales and businesses, have reported that they use derivatives to maintain currency risk and firm that do not operate internationally or have foreign sales, are mainly non-hedgers.

Table 2. Firms' currency derivatives usage.

	2011	**2012**	**2013**	**2014**	**2015**	**All**
Number of firms	95	96	99	104	101	495
Hedgers	58 61,05 %	59 61,45 %	63 62,62 %	66 63,46 %	63 62,37 %	309 62,43 %
Non-hedgers	37 38,95 %	37 38,55 %	36 37,38 %	38 36,54 %	38 37,63 %	186 37,57 %
Hedgers with foreign sales	53 55,79 %	56 58,33 %	56 56,56 %	59 56,73 %	54 53,46 %	278 56,16 %
Non-hedgers with foreign sales	18 20,00 %	20 21,88 %	21 21,21 %	19 18,26 %	23 22,77 %	101 20,40 %
Hedgers without foreign sales	3 3,16 %	3 3,13 %	2 2,02 %	4 3,85 %	5 4,95 %	17 03,43 %
Non-hedgers without foreign sales	21 22,10 %	17 17,70 %	20 20,20 %	22 21,15 %	19 18,81 %	99 20,00 %

6.1.4. Summary statistics

Table 3 gives the summary statistics of the regression variables ran in this study. Stocks of the sample companies are mainly overvalued as their Tobin's Q values are clearly greater than one. It means that their capital assets are worth more than the assets that could be used to replace them. The mean of Tobin's Q for all companies is 1,29 while the median is 1,19. Allayannis & Weston (2001) found in their study that companies with foreign sales tend to have higher Tobin's Q values. That realization is still applicable to this study as the table 3 shows that Tobin's Q is bigger for companies with foreign operations with mean being 1,34 and median being 1,12, crosschecked to companies without any foreign sales with the mean of 1,05 and the median of 0,68.

Companies with foreign sales are on average larger than companies without foreign sales. While the median of total assets for firms with foreign sales is 432010, the corresponding figure for domestic companies is 53044. Table 8 also shows that foreign companies perform better by the median when considering profitability and opportunities for investment growth. However, there is no substantial differences between foreign and domestic operating companies in terms of their ability to access financial markets or their capital structures.

From the table it can be concluded that firms with foreign sales and operations are part of a totally different size category than firms without foreign sales. The Finnish market is quite small for larger companies so threshold to expand businesses abroad is lot easier to exceed. However, it may be strategically efficient for smaller firms to aim their focus only to domestic markets. These findings go along with the results of Géczy et al. (1997) who furthers suggests that larger firms are then more likely to use foreign currency derivatives as their expanded businesses require additional risk management tools.

Table 3. Summary statistics

	Mean	Median	Std. Dev	Observations
All firms				
Tobin's Q	1,29	1,19	1,32	495
Total assets (MEUR)	1710194	274811	4134513	494
Return on assets (ROA)	0,01	0,03	0,15	490
Leverage	0,48	0,37	0,81	492
Research & Development / Total sales	0,02	0,01	0,05	492
Foreign Sales / Total sales	51,6	54,4	36,2	490
Dividend dummy	0,68	1,00	0,42	495
Currency derivative dummy	0,63	1,00	0,46	495
Firms with foreign sales				
Tobin's Q	1,34	1,12	1,47	374
Total assets (MEUR)	1925034	432010	4813310	375
Return on assets (ROA)	0,04	0,05	0,13	370
Leverage	0,47	0,35	0,52	373
Research & Development / Total sales	0,02	0,01	0,05	373
Foreign Sales / Total sales	72,8	68,9	28,7	368
Dividend dummy	0,76	1,00	0,43	379
Currency derivative dummy	0,74	1,00	0,44	379
Firms without foreign sales				
Tobin's Q	1,05	0,68	1,26	111
Total assets (MEUR)	825355	53044	3657071	112
Return on assets (ROA)	-0,03	0,03	0,22	112
Leverage	0,41	0,33	1,61	110
Research & Development / Total sales	0,01	0,00	0,02	110
Foreign Sales / Total sales	0,88	0,00	2,17	114
Dividend dummy	0,53	1,00	0,51	116
Currency derivative dummy	0,21	0,00	0,38	116

6.2. Methodology

The connection between Tobin's Q and the use of currency derivatives is at first studied with one-variable model, a univariate analysis. This signifies that the study pattern contains a single variable alone, which in this case is the use of foreign currency derivatives. Thus, no other variables that are affecting firm valuation are involved in the univariate analysis as those will be used in the model following the one-variable model.

Clearly, foreign currency derivatives use is not the only factor that affects the firm market value, thus the other six factors that are listed in the regression variables section are included in the following regression model. It is likely that these other factors have a greater impact on the firm market value than just the foreign currency derivatives use alone. The method that also incorporates these additional variables is called the multivariate analysis.

Furthermore, it is important to notice that there might possible be many other factors that affect firm values that are not mentioned in this study. This study follows the methodology of Allayannis & Weston (2001) whose methods are further used in many studies, for example, by Bartram et al. (2011).

6.2.1. Univariate analysis

Univariate analysis compares the differences of Tobin's Q values with companies hedger and non-hedger companies. The comparison is made by analyzing the mean and median values of Tobin's Q. Additionally, the findings are grouped into two categories, companies with foreign sales and companies without foreign sales. The company is considered to have foreign operations if sales in abroad exceeds 10% of the sales in total over the observation period and mutually company is considered to act without foreign operations if the sales in abroad are less than 10% of the sales in total.

The single-variable analysis has been reduced and it merely aims to describe the differences between derivatives users and non-users. This is possible because the model assumes that there is only one independent variable that can influence the dependent variable. The regression model that is ran through the univariate analysis is presented in the equation 7. The univariate regression result is found in the table 5.

(7) $$\ln(Q) = \beta_0 + \beta_1 FCD + u$$

where,

$\ln(Q)$ = natural logarithm of Tobin's Q
β_0 = the intercept
β_1 = the coefficient for foreign currency derivative use
FCD = foreign currency derivative
u = the error term

6.2.2. Multivariate analysis

To find out all the factors that are affecting firm value, the study needs to expand the model to a multivariate analysis with multiple control variables. Multivariate analysis is an extended model of univariate analysis, with firm size, profitability, leverage, investment growth, geographical diversification, access to financial markets as additional variables. In addition to these variables, a currency derivative dummy) is maintained. To recap, β_0 is the intersection and u represents the error term of the equation 8.

(8) $$\ln(Q) = \beta_0 + \beta_1 FCD + \beta_2 \text{firm size} + \beta_3 \text{profitability} + \beta_4 \text{leverage} + \beta_5 \text{investment growth} + \beta_6 \text{geographical diversification} + \beta_7 \text{access to financial markets} + u$$

The multi-variable model will first process with all sample companies, then focus only in companies with foreign sales and then again in companies that operate without foreign sales. This study presents two different approaches to multivariate regression model. Pooled ordinary least squares model (OLS-model) is the first way, and a fixed effects regression is the second approach. The fixed effects regression is used to eliminate the

bias of missing variables. The bias arises if an essential variable is missing from the model. (Wooldridge 2009: 479.)

The correlation between the variables can be seen in the table 4, and it shows that the correlations are between -0,291 and 0,472. In this light, we can conclude that the correlations are, in general, quite low. Correlation level being 1 means that the variables are in full linear relation with each other. When correlating, variables being x and y, 10 % change in the variable-x changes the variable-y also by 10%. Correlation can be positive or negative. Positive correlation means the parallel movement of two variables per the number of correlation coefficients. In negative correlation, the variables move to opposite directions depending on the coefficient.

Tobin Q correlates positively to profitability (0,304), access to the financial markets (0,270) and geographical diversification (0,131) at 1% significance level. There is also a negative correlation (-0,291) with leverage, which is also correlated at 1% significance level. Correlation of exact 1,000 means that there exists a perfect linear dependence. However, 0472 is the highest correlation in the table 4 as the perfect dependence only occurs in correlations between a variable and itself. This excludes the multicollinearity problem from the regressions at involves all sample firms.

Access to financial markets is correlated at a statistically significant level with all variables apart from investment growth. The correlation is primarily positive except for leverage and again, investment growth. Negative correlation is as expected as dividend payouts are unlikely for companies that are highly leveraged. Table 4 shows that geographical diversification is positively correlated with FCD use, firm size, and profitability. Findings in table 4 mean that companies operating internationally with foreign sales, are larger in general, use derivatives and have a better return on their assets.

Table 4. Correlation coefficients for multivariate regression variables.

	ln (Tobin's Q)	FCD use	Firm size	Profitability	Leverage	Investment growth	Geographical diversification	Access to financial markets
ln (Tobin's Q)	1,000							
FCD use	0,011 (0,820)	1,000						
Firm size	0,018 (0,721)	0,311 (0,000)	1,000					
Profitability	0,304 *** (0,000)	0,156 (0,000)	0,064 (0,168)	1,000				
Leverage	-0,291 *** (0,000)	-0,010 (0,791)	0,059 (0,211)	-0,124 (0,003)	1,000			
Investment growth	0,028 (0,498)	0,027 (0,611)	0,150 (0,002)	-0,266 (0,000)	0,074 (0,141)	1,000		
Geographical diversification	0,131 ** (0,007)	0,416 *** (0,000)	0,121 ** (0,003)	0,172 *** (0,000)	-0,053 (0,249)	-0,090 * (0,062)	1,000	
Access to financial markets	0,270 *** (0,000)	0,241 *** (0,00)	0,150 *** (0,003)	0,472 *** (0,000)	-0,224 *** (0,000)	-0,012 (0,820)	0,139 *** (0,003)	1,000

P-values are in parentheses. ***, ** and * imply 1%, 5%, and 10 % significance levels, respectively

7. EMPIRICAL RESULTS

The results of the univariate test are in Tables 5 and 6. The results of the multivariate test are presented in two sections. Tables 7 and 8 show the results for the pooled OLS regressions and tables 9 and 10 then show the results for fixed effects regressions.

Table 5. Univariate pooled OLS regression results.

	Constant	FCD dummy	R^2	Obs
ln (Tobin's Q)				
Firms with foreign sales	0,9341 *** (0,000)	-0,0087 (0,6980)	0,0004	379
Firms without foreign sales	0,9100 *** (0,000)	-0,0861 0,1301	0,0199	116
All firms	0,9214 *** (0,000)	-0,0034 (0,9140)	0,0011	495

P-values are in parentheses. *** imply to 1% significance level.

Table 5 displays the outcomes of the univariate pooled OLS regression. Findings indicate that use of derivatives diminishes firm value. These results are against all previous predictions presented earlier in this study. Phan, Nguyen & Faff (2014) ended up with same conclusion when they studied the asymmetric binding that financial derivatives have with firm value. However, R^2 in the findings is quite low, which means that the used method does not declare the relationship between Tobin's Q and firm value most accurately. (Wooldridge 2009.)

Table 6 shows that the mean of Tobin's Q is on average higher in companies that do not use currency derivatives (1,0110) than in companies that use currency derivatives (0,8398). This result shown in the Table 6 is contrary to the assumption of this study that the use of foreign currency derivatives increases the value of the company. This result is significant at 10% significance level. However, the median of Tobin's Q is higher with hedgers (0,6991) than non-hedger (0,3815). This result is significant at 1% significance level.

When comparing Tobin's Q for companies with foreign sales, the results show that companies that do not use currency derivatives have a higher Tobin's Q value, both by mean and median. When the mean is insignificant, the median is significant at the 5% significance level. The same conclusion is also reached with companies that do not have foreign sales. Tobin's Q is higher for companies that do not hedge with derivatives the result being significant of 5% at the significance level.

Table 6. Mean and median of Tobin's Q values between hedgers and non-hedgers.

	Tobin's Q	
	Mean	Median
All firms		
Hedgers	0,8398	0,6991
Non-hedgers	1,0110	0,3815
Difference	-0,1712*	0,3176***
t-statistic	1,6982	
p-value	0,0921	0,000
Firms with foreign sales		
Hedgers	0,8911	0,5981
Non-hedgers	1,0610	0,7318
Difference	-0,1699	-0,1337**
t-statistic	1,4134	
p-value	0,1733	0,0412
Firm without foreign sales		
Hedgers	0,5591	0,3569
Non-hedgers	0,9811	0,5812
Difference	-0,4220**	-0,2243**
t-statistic	2,1920	
p-value	0,0312	0,0391

***, **, and * imply 1 %, 5 %, and 10 % significance levels, respectively.

Table 7. Pooled OLS regression results where the dependent variable is the Tobin's Q's natural logarithm.

ln (Tobin's Q)	Firm with foreign sales	Firm without foreign sales	All firms
Constant	-33,8405 *** (0,0039)	-41,5100 (0,2844)	-39,0116 *** (0,0051)
FCD use	-0,0711 *** (0,0006)	-0,0126 (0,7988)	-0,0613 *** (0,007)
Firm size	0,0000 (0,0821)	0,0000 (0,6998)	0,0000 (0,0988)
Profitability	0,4377 *** (0,0000)	-0,0101 (0,9655)	0,1977 *** (0,0038)
Leverage	-0,0802 *** (0,0000)	-0,0002 (0,9280)	-0,0321 ** (0,0191)
Investment growth	0,5989 *** (0,0000)	0,2291 (0,5131)	0,5101 *** 0,0004
Geographical diversification	0,0021 *** (0,0000)	0,0087 (0,4160)	0,0019 *** (0,000)
Access to financial markets	0,0611 ** (0,0122)	0,1315 (0,0610)	0,0829 *** (0,000)
Observations	364	109	473
R^2	0,3513	0,1422	0,2330

P-values are in parentheses. *** and ** imply to 1 % and 5 % significance levels, respectively.

Table 7 presents the multivariate analysis results for pooled OLS, which uses Tobin's Q's natural logarithm as the dependent variable. Findings are categorized for firm with foreign sales, firms without foreign sales, and finally, all firms. As there exists some amount of sample companies that do not have all the required information, they are excluded from the pooled OLS regressions. Therefore, there are 364 firms that are categorized to have foreign sales and 109 firms without them, making the amount of firms 473 in the regression 473 instead of the original sample size 495.

The results point on to the same direction as the previously examined univariate model stating that currency derivatives have devastating effects for firm values. The use of currency derivatives has a negative effect on Tobin's Q value at 1% significance level. The variables that have a positive correlation with Tobin's Q at 1% significance level are profitability (0,1977), investment growth (0,5101)), geographical diversification (0,0019) and access to financial markets (0,08299). In addition, leverage has a negative correlation (-0,0321) at 5% significance level. However, this is not a surprising finding as seldom does firms reach the optimal level of debt, where the leverage effect turns value-creating (Korteweg 2010). Once again, R^2 is quite low (0,2330), but this does not make the OLS regressions results useless as the estimate can still be true, regardless how big or low is the R^2 (Wooldridge 2009).

Table 8 displays the outcomes of the second multivariate regression used in the study. The fixed effects regression is used to rectify results and confirm the findings in the pooled OLS regression, which can in some cases be biased. One of the things that make the fixed effects regression more reliable is that the autocorrelation is controlled. Moreover, R^2 values are bigger than in the pooled OLS in general. R^2 is lower only for firms without foreign sales (8,19 %) in the Table 8 than in the Table 7.

The R-square value is significantly greater in the fixed effects regression for firms having foreign sales (84,11 %), and in the regression of all sample firms (79,21%) than compared to the R-squares in the pooled OLS regressions (35,13 % and 23,30 %). Thus, the results are now more solid as the findings in the second multivariate regression were also indicating that the use of foreign currency derivatives have a negative effect on firm value.

However, the results are not significant. From all control variables used in the regression of all firms, only access to financial markets has a positive and significant effect of 0,0625 at a 5% significance level. Variables that are significant for firms with foreign sales are profitability (0,2883), geographical diversification (0,0007), and access to financial markets (0,0466). They are significant at 1%, 10%, and 5% significance level respectively. In addition, leverage has a significance level of 1% and its correlation to Tobin's Q is negative (-0,0311) as expected from the pooled OLS regressions.

Regression results for firm without foreign sales in the fixed effects model are similar to results of the pooled OLS regression. Leverage is an expectation as its correlation is positive in the fixed effects regression (0,0019). However, all variables are again insignificant and as mentioned before, the R-square is the lowest of all regressions (8,19%).

Profitability has a positive effect on firm market value as it is usually expected. This expectation is realized both in the case of all sample firms and as well as in the case of firms with foreign sales. However, the effect is negative with firms without foreign sales. These findings are alike in two regression methods, the pooled OLS and the fixed effects. The positive influence is highly significant for both samples at the 5 % significance level in the pooled OLS, but in the fixed effects high significance is realized only with firms with foreign sales.

Table 8. Fixed effects regression results where the dependent variable is the Tobin's Q's natural logarithm.

ln (Tobin's Q)	Firm with foreign sales	Firm without foreign sales	All firms
Constant	-34,1108 ***	-31,8997	-30,9669 ***
	(0,0000)	(0,3522)	(0,0001)
FCD use	-0,03823	-0,09110	-0,0401
	(0,3003)	(0,1022)	(0,3180)
Firm size	0,0000	0,0000	0,0000
	(0,8109)	(0,6514)	(0,5984)
Profitability	0,2883 ***	-0,0007	0,08160
	(0,0051)	(0,9217)	(0,2933)
Leverage	-0,0311 ***	0,0019	0,0009
	(0,0209)	(0,8908)	(0,9722)
Investment growth	0,0314	0,1421	-0,1757
	(0,9183)	(0,7210)	(0,3194)
Geographical diversification	0,0007 *	0,0097	0,0005
	(0,0598)	(0,3991)	(0,2108)
Access to financial markets	0,0466 **	0,1090	0,0625 ***
	(0,0310)	(0,0993)	(0,0204)
Observations	364	109	473
R^2	0,8411	0,08192	0,7921

P-values are in parentheses. ***, **, and * imply 1 %, 5 %, and 10 % significance levels, respectively.

Access to financial markets has a positive effect in both regressions and with the exclusion of the sample of firms without foreign sales, the coefficients seems to be statistically highly significant. In both regressions, the sample of firms with foreign sales is significant at the 5 % significance levels, whereas the sample of firms is has the 1 % significance level.

Finally, geographical diversification is worth a mention as the results indicate that foreign operations has a value-adding effect on firm value. The regressions results seem to be at significant levels mostly in pooled OLS regressions as both samples, firms with foreign sales and all firms, are highly statistically significant. In the fixed effects, the significance is only valid in the case of firms with foreign sales.

8. SUMMARY AND CONCLUSIONS

Examining the impact currency derivatives on the firm's market valuation is the main purpose of this study. Tobin's Q is used as an indicator for firm market value. The sample is collected from the non-financial companies listed in the main list of Helsinki Exchange and the period of the observation is from 2011 to 2015. The total amount of observations is 495 companies, of which about 62% are marked as users of currency derivatives for hedging purposes.

The univariate analysis compares the mean of Tobin's Q values as well as the median between firms that are marked as hedgers and non-hedgers. The results show that by measuring the mean, companies with currency derivatives hold lower Tobin's Q values than companies are not active with currency derivatives, at 10% significance level. The result is contrary when it comes to measuring with the median, thus the Tobin's Q value is clearly higher, with a 31,76% difference, at 1% significance level.

The study used univariate pooled OLS regression to inspect the connection of Tobin's Q and using currency derivatives. The univariate regression excluded all other variables from the examination. The results indicate that the use of currency derivatives have quite the neutral effect on two sample categories, the sample of all firms and the sample of firms with foreign sales, as the values were quite low, -0,34 % and -0,87 %. The effect is strongly negative on the sample of firms without foreign sales. However, the outcomes are insignificant in the case of these regressions as the R-square is significantly low in all cases (R^2 less than 0,01). Thus, the univariate pooled OLS regression method cannot be considered as an accurate way to have valid results, at least when using only these variables. This means that no definitive conclusion can be made on the effects of using currency derivatives.

In the multivariate regression method, six additional variables were included into analysis. These were: firm size, profitability, leverage, investment growth, geographical diversification and access to financial markets. The aim for bringing these additional variables into another regression was to have a better understanding of what kind of

effects other elements can have on firm's valuation. Multivariate regressions were implemented by two different methods, with pooled OLS regressions method and fixed effects regression method.

The outcomes of the pooled OLS where the natural logarithm of Tobin's Q was used as the dependent variable, indicate that using currency derivatives have a decreasing impact on the firm valuation. For the sample of all firms, the negative return is -6,13 % at the 1 % significance level. The results of the fixed effects regressions using the same dependent variable indicate the same value decreasing effect for the sample of all companies, -4,01 %. However, the results are not at significant levels in the latter regression. The study presented a literature review where most of the former researches had shown the use of currency derivatives to have either positive or neutral effects on the firm value (Leland 1998, Allayannis & Weston 2001, Jin & Jorion 2006, Bartram, Brown, and Conrad 2011, Belghitar, Clark, and Mefteh 2013), but also some negative effect had been found (Copeland & Yoshi 1996, Phan, Nguyen & Faff 2014)

Based on the overall assessment made based on the both regression results, the use of foreign currency derivatives has had a negative impact on the firm value on non-financial companies that were listed on the main list of Nasdaq OMX Helsinki in between years 2011 to 2015. The impact of many unknown variables remain as a constraint on the methodology, thus in the future studies, the methodology ought to identify all possible variables affecting firm value so the true effect of currency derivatives can be recognized and more accurate and definite results found.

REFERENCES

Adler, Michael & Bernard Dumas (1984). Exposure to Currency Risk: Definition and Measurement. *Financial Management* 13:2, 41–49.

Allayannis, George & James P. Weston (2001). The Use of Foreign Currency Deriva tives and Firm Market Value. *The Review of Financial Studies* 14:1, 243–276.

Angelovska, Julijana (2013). Managing market risk with VaR (Value at Risk). Management. *Journal of Contemporary Management Issues* 18:2, 81-96.

Bartram, Sohnke, Gregory W. Brown & Jennifer S. Conrad (2011). The Effects of Derivatives on Firm Risk and Value. *Journal of Financial and Quantitative Analysis* 47:5, 968–99.

Becker, Brandon & Mazur, Francois-Ihur (1995). Risk management of financial derivative products: Who's responsible for what?. *Journal of Corporation Law* 21, 177-237.

Belghitar, Yacine, Ephraim Clark & Salma Mefteh (2013). Foreign Currency Derivative Use and Shareholder Value. *International Review of Financial Analysis* 29, 283-294.

Black, Fischer & Myron, Scholes (1973). The Pricing of Options and Corporate Liabilities. *Journal of Political Economy*, 80:2, 627-664.

Bodnar, Gordon M. Consolandi, Costanza, Gabbi, Giampaolo, Jaiswal-Dale, Ameeta (2013). Risk Management for Italian Non-Financial Firms: Currency and Interest Rate Exposure. *European Financial Management* 18:4, 884-912.

Bodnar, Gordon M. & Günther Gebhardt (1999). Derivatives Usage in Risk Management by US and German Non-Financial Firms: A Comparative Survey. *Journal of International Financial Management & Accounting* 10:3, 153-187.

Brady, Simon & Alan Hicks (1992). Currency Futures, Currency Options. *Euro-money* 12:12.

Brealey, Richard A., Stewart C. Myers & Alan J. Marcus (2007). *Fundamentals of Corporate Finance*. 6. ed. Boston: McGraw-Hill Companies, Inc. 725 p.

Brewer Elijah, Jackson William E. & Moser T. James (2001). The value of using interest rate derivatives to manage risk at U.S. banking organizations. *Economics Perspectives* 3:2001, 49-64.

Cheng, Hsiao (2014). *Analysis of Panel data*. 562 p. Cambridge University Press. ISBN: 110-703-869-3.

Collier P, Davis E (1985). The Management of Currency Transaction Risk by UK Multinational Companies. *Accounting & Business Research* 15:60, 326-335.

Copeland, Thomas E. & Yash Joshi (1996). Why derivatives don't reduce FX risk. *The McKinsley Quarterly* 1, 66-80.

Feenstra, Robert C. & Alan Taylor (2008). *International Economics.* New York: Worth Publishers. 982 p. ISBN 978-0-7167-9284-3.

Gastineau, G.L. (1993). The Essentials of Financial Risk Management. *Financial Analysts Journal* 49:5, 17-21.

Géczy, Christopher, Bernadette A. Minton & Catherine Schrand (1997). Why Firms Use Currency Derivatives?. *The Journal of Finance* 52:4, 1322–1350.

Guay, Wayne & S.P. Kothari (2003). How Much Do Firms Hedge with Derivatives?. *Journal of Financial Economics* 70, 424–460.

Hagelin Niclas & Pramborg Bengt (2004). Hedging Foreign Exchange Exposure: Risk Reduction from Transaction and Translation Hedging. *Journal of International Financial Management & Accounting* 15:1, 1-20.

Hillier, David, Mark Grinblatt & Sheridan Titman (2012). *Financial Markets and Corporate Strategy. European ed. London* etc.: McGraw-Hill Higher Education. 856 p. ISBN 978-0-0771294-22.

Hull, John C. (2017). *Options, Futures, and Other Derivatives*. 9th edition. USA: Pearson Prentice Hall. 896 s. ISBN-13: 978-129-221-2890

Hopper, Gregory P. (1996). Value at risk: A new methodology for measuring portfolio risk. *Business review* 19-30. ISSN 0007-7011.

Jin, Yanbo & Philippe Jorion (2006). Firm Value and Hedging: Evidence from U.S. Oil and Gas Producers. *The Journal of Finance* 61:2, 893–920.

Kasanen Eero, Lundström Thomas, Puttonen Vesa, Veijola Risto (1997). *Rahoitusriskit yrityksissä*. Porvoo: WSOY. 228 s. ISBN 951-0-20451-X.

Klecka, Eileen (1993). Understanding hedging and derivative products. *Journal of Cash Management* 13:3, 44-48.

Klecka, Eileen (1994). Understanding financial futures. *TMA Journal*, 14:4, 49-53.

Knüpfer Samuli, Puttonen Vesa (2012). *Moderni rahoitus*. Helsinki: Sanoma Pro Oy. 244 s. ISBN 978-952-63-0842-5

Kuprianov, Anatoli (1993). Over-the-counter interest rate derivatives. *Economic Quarterly* 79:3, 65-94.

Leland, Hayne E. (1998). Agency Costs, Risk Management, and Capital Structure. *The Journal of Finance* 53:4, 1213-1243

Makkar Anita, Singh Shveta (2013). Interest rate risk of selected Indian commercial banks: An application of GAP analysis model. *IUP Journal of Bank Management* 12:4, 58-70.

Mengle, David (2007). Credit Derivatives: An Overview. *Economic Review* 92:4, 1-21.

Modigliani, Franco & Merton H. Miller (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review* 43:3, 260-298.

Nelson, James M., Jacquelyn Sue Moffitt & John Affleck-Graves (2005). The Impact of Hedging on the Market Value of Equity. *Journal of Corporate Finance* 851–880

Nikkinen Jussi, Rothovius Timo, Sahlström Petri (2002). *Arvopaperisijoittaminen*. Helsinki: WSOY. 244 s. ISBN 951-0-26627-2.

Phan, Dinh, Hoa Nguyen & Robert Faff (2014). Uncovering the asymmetric linkage between financial derivatives and firm value: The case of oil and gas exploration and production companies. *Energy Economics* 45, 340-352.

Puttonen Vesa, Valtonen Erik (1996). *Johdannaismarkkinat.* Porvoo: WSOY. 283 s. ISBN 951-0-21242-3.

Ross, Stephen A., Randolph W. Westerfield & Bradford D. Jordan (2013). *Fundamentals of Corporate Finance.* 10. ed. New York: McGraw-Hill Irwin Inc. 727 p. ISBN 978-07-803463-3.

Smith, Clifford, W. & Stulz, Rene M. (1985). The Determinants of Firms' Hedging Policies. *The Journal of Financial and Quantitative Analysis* 20:4, 390- 404.

Tobin, James (1969). A General Equilibrium Approach to Monetary Theory. *Journal of Money, Credit and Banking* 1:1, 15–29.

Wooldridge, Jeffrey M. (2009). Introductory Econometrics: A Modern Approach. 4. ed. Mason, Ohio, USA: Thomson South-Western. 850 p.