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Does hedging affect firm value? Evidence from Finland

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ABSTRACT

This thesis analyses Nasdaq OMX Helsinki companies on how hedging affect firm value. The analysis bases its empirical part on theoretical literature and previous studies of the subject. The fundamental finance theory suggests that the ultimate measure of a company's success is the firm value. Previous literature regarding on this subject proposes various ways to determine how hedging affect firm value and how different hedging strategies and instruments can be used to reduce various risks. World has globalized over the past years and doing so, it has also become a much more volatile environment. Derivatives have become more common, since they offer various ways to reduce different risks. At the same time, derivatives are facing a lot more regulation standards to avoid and reduce the possible risks on open large derivative positions. Since the derivative products have a quite large default risk, the value of derivatives as a risk management strategy has been questioned. For example, Warren Buffett (2002) declared that derivatives are the financial weapons of mass destruction.

This thesis tests the relation between hedging with financial derivatives and firm market value in companies that are listed in Nasdaq OMX Helsinki between the years 2014 and 2020 and therefore to contribute to the existing literature regarding on this subject. According to previous literature, Tobin's Q has been proved to be an accurate measure for firm value, and therefore Tobin's Q is used as a dependent variable for univariate and multivariate tests in this thesis. A new addition to this type of studies, Covid-19 rates are used as a control variable to test, if a firm value is affected more or less during Covid-19 pandemic.

The results gained in this study suggests that hedging has a negative value premium. These results differ from some previous studies for example Allayannis & Weston (2001). However, the Finnish market is relatively small compared to U.S. markets and firm size has a huge effect in Finland regarding if the company is a hedger or a non-hedger. Therefore, a larger international sample would be required to confirm the findings.

KEYWORDS: Hedging, Firm Value, Risk Management, Derivatives

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TIIVISTELMÄ:
Maailma on globalisoitunut merkittävästi 2000-luvun aikana. Samalla maailma on myös muuttunut entistä epävakaammaksi ja vaikeammin ennustettavaksi. Epävakaiden markkinoiden vuoksi, myös johdannaisten käyttö on yleistynyt yritysmaailmassa niiden mahdollistamien erilaisten riskienhallintakeinojen vuoksi. Samaan aikaan johdannaisille on luotu paljon erilaisia säännöksiä, joiden avulla on voitu vähentää suurien johdannaispositioiden aiheuttamaa riskiä. Johdannaisilla on itsessään kohtalaisen suuri vakioriski, jonka vuoksi johdannaisten käyttöä riskienhallinta välineenä on myös kritisoitu. Esimerkiksi Warren Buffett (2002) ilmoitti johdannaisten olevan rahoitusmaailman joukkotuhoaseita.

Tämän tutkielman tarkoituksena on tutkia kuinka suojautuminen johdannaisilla vaikuttaa yrityksen arvoon. Tutkielmaan sisältyvät yritykset ovat Nasdaq OMX Helsingin pörssiin kuuluvia yrityksiä ajalta 2014–2020. Tutkielman empiirinen osuus pohjautuu aiempiin aiheesta tehtyihin tutkimuksiin ja kirjallisuuteen. Yrityksen arvoa pidetään perinteisen rahoituksen teorian mukaan parhaana mittarina yrityksen menestymiselle. Aiheeseen liittyvä kirjallisuus pitää sisällään monia keinoja, kuinka johdannaisilla suojautuminen vaikuttaa yrityksen arvoon, ja kuinka erilaisia suojautumisstrategioita ja erilaisia johdannaisinstrumentteja voidaan käyttää vähentämään yrityksen kohtaamia riskejä.

Aiemman kirjallisuuden perusteella on todettu, että yksi tarkin mittari yrityksen arvon mittaamiseen on Tobinin Q. Tämän vuoksi myös tässä tutkielmassa Tobinin Q toimii selitettävänä muuttujana yksiulotteisissa ja moniulotteisissa analyyseissä. Tässä tutkielmassa uutena kontrollimuuttujana tämänkaltaisissa tutkimuksissa käytetään Covid-19 vuoden lukuja. Tämän kontrollimuuttujan avulla voidaan verrata, vaikuttaako suojautuminen Covid-19 pandemian aikana yrityksen arvoon enemmän tai vähemmän, kuin ennen pandemiaa. Tutkielman tulokset viittaavat siihen, että suojautumisella on negatiivinen arvopreemio. Tulokset eroavat joistakin aiemmista tutkimuksista, esimerkiksi Allayannis & Weston (2001) mukaan suojautumisella on positiivinen arvopreemio. Suomen markkinat ovat kuitenkin huomattavasti pienemmät kuin Yhdysvaltojen ja esimerkiksi yrityksen koolla on valtava merkitys suomessa sille, onko yritys johdannaisten käyttäjä vai ei.

AVAINSANAT: Suojautuminen, Yrityksen arvo, Riskienhallinta, Johdannaiset

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1. INTRODUCTION

In the recent years researchers have been debating a lot about derivative tools. According to Becker & Mazur (1995) companies use derivatives as a risk management tool, since they can be used to hedge against multiple financial risks that a company could encounter. These risks include for example interest rates and currency rates. While derivatives can be a wonderful risk management tool, there have been multiple occasions in history, where incorrect usage of derivatives have caused major losses. One of the latest examples of the dangers of incorrect usage of derivatives can cause, is the financial crisis of 2007-2008 which caused massive amount of companies to go bankruptcy.

According to Jorion (2007: 10) derivatives are financial instruments, which are used to manage risk all over the world. Derivatives don't have value of itself, but like its name suggests, they derive their value from other financial assets, for example, bonds, stocks, or interest rates. Derivatives allow companies to manage credit exposure, exchange-rate risk, input costs and financial costs. According to Sundaram (2013), this partly explains why derivative markets have grown rapidly. For example, according to Deutsche Börse (2008), in the 1980s the derivatives market was not big and worldwide like it is today. It was small and domestic, but in the 1990s it grew about 24 percent per year, reaching 457 trillion euros of notional amount outstanding in 2008.

Since 2008, according to Bank for International Settlements (BIS), the derivative contracts reached to over 600 trillion euros in December 2013. After that, the trend for derivative contracts was descending, but since 2017 it has been slowly increasing again.

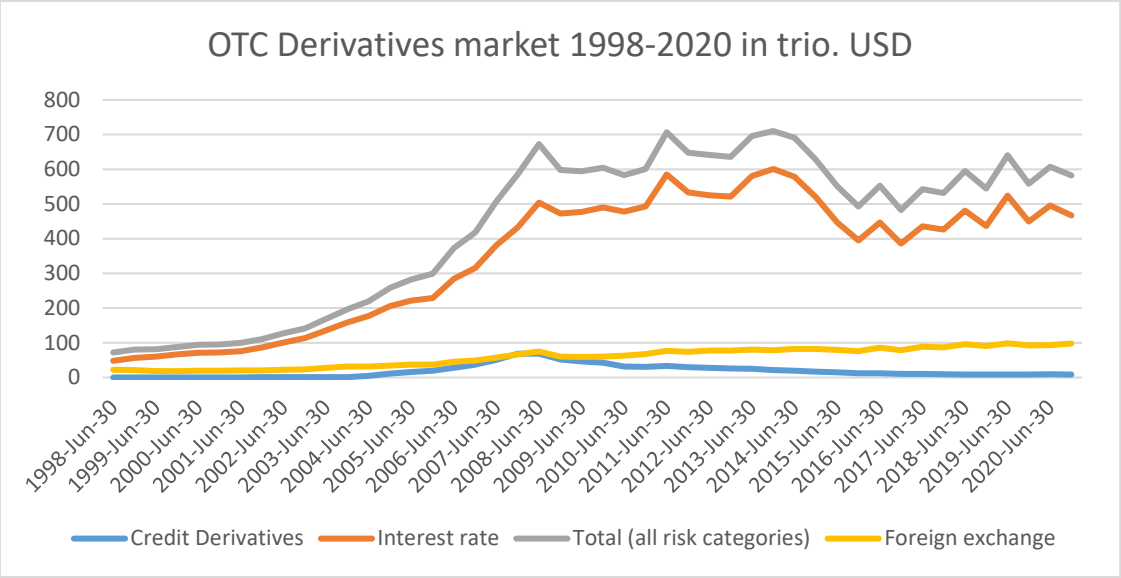


Figure 1: OTC-derivatives market 1998-2020. (BIS 2021.)

According to Hull (2014: 2-4) there is considered to be two main parts in global derivative markets, which are exchange traded markets and OTC markets. The Figure 1 above shows a graph of OTC Derivatives market 1998-2020. OTC markets have greater total value than exchange traded markets because OTC markets include trading between banks and large institutions.

Ephraim & Ghosh (2004: 1) state that derivatives have three main techniques of using. These techniques are Arbitrage, Speculation and Hedging. Arbitrage in short, is a form of trading a commodity or an asset in different markets with different prices, in order to make profit. Speculation is like its name suggests, a method of thoughtful assumption of risk. This means that speculation can be seen as gambling, since the point of it is not to hedge existing funds, but to gain large profits by assuming what will happen. These two previously mentioned techniques are not studied in this thesis, since they are not practiced in order to manage risks. This thesis focuses on the third technique, which is hedging. Hedging is simply put an insurance policy against any open position of a trader. Hedging will be explained more closely on the second chapter.

1.1. Objectives and research problem

The main purpose of this thesis is to examine if hedging adds value to a firm in Finland and if it does, is the foundation of the added value consistent with hedging theory? This thesis will investigate different companies and different industries in Finland and if the hedging is the source for added value in these companies. More specifically, the objective of this paper is to test whether different hedging strategies, more specifically, hedging by different types of derivatives, have different outcomes. The motivation for this study comes from a personal interest towards derivatives and risk management in companies.

Modigliani and Miller (1958) present a theory which suggests that every company's market value is independent of its capital structure. This theory is still one of the basic principles of corporate finance. According to Allayannis & Weston (2001: 1), the M&M theorem implies that unpredictable cash flows cannot be controlled effectively by derivatives. This is because according to the theory, derivatives have no effect on firm market value and that risk management is irrelevant for the company since the shareholders are able to manage their own risk by diversifying their investment portfolios.

Even though derivatives are relatively popular subject of a study, these studies are usually focusing on companies in the United States, United Kingdom or in some other large market. Because Finland has a much smaller domestic markets than for example United States does, it means that Finnish companies should have more motives to seek business and investment opportunities in foreign markets. Therefore, it is natural to assume that for example foreign currency hedging could be fairly popular in big Finnish companies.

The hypotheses of this study are listed below. They are decided by examining previous literature and empirical studies that are also researching derivatives and firm market value. The first and main hypothesis of the study is that if a company hedges with general derivatives, it affects its firm value positively. The second and third hypothesis of the study are focusing on derivative type. The second hypothesis assumes that that if a

company uses interest rate derivatives to hedge, it has a negative value premium on its firm value, while the third hypothesis assumes that hedging with foreign currency derivatives has a positive value premium on firm value. The fourth and final hypothesis of this study is a more recent assumption, and it has not been studied as much as the other hypotheses. It assumes that during Covid-19 rates, which is the year 2020 dummy variable, hedging has a more positive value premium for firm value, than pre-Covid rates, which is the time period between 2014-2019.

Hypothesis 1 : The value of a company is affected positively if a firm uses general derivatives in purpose of hedging.

Hypothesis 2 : The value of a company is affected negatively if a firm uses interest rate derivatives in purpose of hedging

Hypothesis 3 : The value of a company is affected positively if a firm uses foreign currency derivatives in purpose of hedging

Hypothesis 4: During Covid-19 rates, hedging affects firm value more than it does during pre-Covid rates

To test these hypotheses, a mean and median univariate tests will be constructed and after the univariate tests, multivariate regressions will be constructed with control variables that are proved to affect firm market value by previous literature. Tobin's Q is the dependent variable for firm market value while size, profitability, liquidity, leverage, dividend yield, growth and access to financial markets are control variables for the multivariate regressions. In the next subchapter, the structure and the motivation of the thesis will be revealed.

1.2. Structure of the study

The thesis is structured by the following way. Chapter one is the introduction, where the research problem and the hypotheses are presented. The second chapter reveals more closely what derivatives are and it also presents the most common types of derivatives used in the world. Third chapter reviews literature about the main theme of this study, derivatives, and hedging. The data and all the information related to key concepts used in this study will be presented in the fourth chapter. Chapter four also reveals the methodology of this study, and it also shows the theory of the models which are used in this thesis. The results and findings of this study will also be revealed later in chapter four, while the conclusions and suggestions for further research will be presented in the fifth chapter.

2. DERIVATIVES AND HEDGING

Companies are facing multiple different challenges and in order to survive, they need to figure out how to solve those challenges. These challenges can be anything from marketing to management, but this thesis will focus on risk management with derivatives, also known as hedging. This chapter presents the relevant and basic information about hedging.

According to Aretz & Bartram (2010) one of the key procedures in a company's performance is foreign currency risk management. The reason for this is that foreign exchange markets are highly volatile. The high volatility of these markets causes some companies to prefer domestic currency trading to prevent risk. However, trading domestic currencies is usually unprofitable and, in some cases, impossible. On the other hand, there are various risk management tools to lower the risk and financial derivatives are the most popular tools to do so. The most common financial derivatives are Forward contracts, Future contracts, Option contracts and Swap contracts. There are also different exotic derivative types, but this thesis will concentrate on the ones that were mentioned above. Derivatives and different combinations of them are the only way to provide multiple different hedging instruments.

2.1. Foreign currency risk

Risk exposure identification is the basis of foreign currency risk management. However, no one can see the future, and therefore the identification is always an approximation, which is also the most challenging issue in risk management. The difficulty to forecast the future risks of a company becomes even harder during uncertain economic times. Exchange rates are determined from a certain country's currency system, and they can be either fixed or floating. If the currency system is fixed, it is tied to a currency of another country or for some other asset, for example to the price of oil. The exchange rate is constant between the two currencies. However, euro is a floating currency, and it is

determined after the supply and demand in the markets, but monetary authorities are highly controlling them.

2.2. Risk Management

Hillier, Grinblatt and Titman (2012: 703) states that to be able to manage risks, the company must be able to detect the risks. Of course, like said above, future cannot be perfectly predicted, and therefore the risk identification is always an approximation, and this makes risk management challenging. Risks can be hard to predict in normal circumstances for a company, but it is especially hard in uncertain economic times. The risk exposure identification of foreign currency risk is usually divided in three categories, which are transaction risk, translation risk and economic risk.

According to Arcelus, Gor & Srinivasan (2013) companies usually face transaction exposure when the company itself has an account receivable or payable denominated in a foreign currency. Transaction exposure measures the gains or losses that occurs when settling exceptional financial obligations entered before the change in exchange rates, but not due to be settled until after the exchange rate changes. In other words, it measures the deviations in the rate of monetary cash flows because of unexpected changes in currency values.

Dufey and Srinivasulu (1983) indicates that in an imperfect market where transactions are pricy, a firm should manage its FX risk, particularly if its default risk is affected. Because monetary assets and liabilities involve contractual cash flows, transaction exposure can be hedged effectively with financial market instruments. For example, currency forwards, futures, options, or swaps. These instruments will be processed later in this study.

According to Nydahl (1999) translation risk is the difference between assets and liabilities that are exposed to current fluctuations. Belk & Edelshain (1997) says that

translation exposure is less important to manage than transaction exposure. According to Dufey (1972) translation risk is concerned with reporting past events and therefore it is not considered to have any meaningful implications for the future cash flows and, in turn, for the market values of firms. According to Dhanani (2004) multiple researchers also believe that translation exposure should not be managed at all. Dhanani (2004) also points out that when deriving hedging strategy, company should consider whether to hedge all its exposures or only a part of them.

Butler (2012: 214) states that translation exposure may not be a straight concern to debt and equity stakeholders, but it is crucially important to the managers of the firm. This is since performance evaluations and compensation are often tied to accounting performance, meaning that the managers can have a strong motivation to reduce their translation exposures as much as possible. This can create a conflict of interests with managers and debt and equity investors because the managers change their actions based on translation exposure, and therefore affects the value of the firm indirectly through the actions of the managers.

According to Adler and Dumas (1984) and Bartram and Bodnar (2007) economic exposure is caused by the effect of unpredicted currency fluctuations on a company's future cash flows, foreign investments, and earnings. Economic exposure could have a significant impact on a company's market value since it has far reaching effect and it is a long term in nature. To measure exchange rate and economic exposure, a simple regression should be used.

According to Jorion (1990) the equation for U.S. Multinationals estimates of the exposure coefficient can be obtained from the timeseries regression:

1) $R_{it} = \beta_{0i} + \beta_{1i} R_{st} + \in_{it,} \qquad t = 1, \dots T.$

Where R_{it} is the rate of return on the *i*th company's common stock, meaning that R_{st} is the rate of change in a trade-weighted exchange rate. It measures the dollar price of the foreign currency. β_{1i} reflects the expected values of rate of return on the common stock and the rate of change in the exchange rate, incase if they are constant over time.

To control market movement, Jorion (1990) uses alternative regression:

2) $R_{it} = \beta_{0i} + \beta_{2i}R_{st} + \beta_{3i}R_{m_t} + \eta_{it}, \qquad t = 1, \dots T.$

Where R_{mt} is the rate of return on CRSP value-weighted market index.

2.3. Incentives to hedge

Derivatives can be used for arbitrage, speculation, and hedging. The main incentives for hedging are to reduce cash flow or earnings volatility and to increase shareholder value. Hedging can also reduce financial distress costs, alleviate the underinvestment problem, and decline expected taxes under a convex tax system. Allayannis and Ofek (2001) studied the purposes which derivatives are mainly used and they find that derivatives are more likely to be used for hedging instead of speculating. Bartram, Brown & Conrad (2011) also finds that firms that use derivatives own a smaller estimated value in total and systematic risk. This means that derivatives are used to hedge risk, not to speculate. Therefore, the main purpose is to decrease uncertainty for example in foreign exchange rates or in interest rates and not to obtain additional profits.

2.4. Derivatives

Warren Buffett (2002) declared in the annual report of Berkshire Hathaway, that derivatives are financial weapons of mass destruction. This statement could raise questions that why such dangerous financial instruments are then so commonly used in the financial markets. Banks, companies and even governments rely on derivatives because they allow them to hedge potential risks and it could also allow to exploit opportunities. Even a consumer is relying on derivatives in their everyday life. This chapter explains what derivatives are and why they are so commonly used in today's world.

According to Hillier et. al. (2012: 201) derivatives are financial instruments, that were originally created for the needs of risk management. The value of a derivative is dependent on the underlying asset. This underlying asset can be nearly anything, for example a stock, currency, or an interest rate. It can also be a more exotic asset for example a weather, which are not as common as the previously mentioned derivatives. Therefore, exotic derivatives are not defined as specifically in this study, due to their more complex nature. However, they are still included in the empirical part in case a company has used exotic derivatives during the observation period because if a company uses exotic derivatives, it can be expected that the company also uses the common derivatives.

Hull (2012: 184-185) states that derivatives have received a lot of attention and criticism after the most recent financial crisis, which started in the United States in 2007. Derivatives had a big part in the starting stages of the crisis. The crisis evolved from financial products which were formed from mortgages in the United States. More specifically, in the 1960s, the banks in United States noticed that the demand for residential mortgages was greater than they could supply, because during that time banks mainly financed their loans from deposits from their customers. Therefore, banks developed the mortgage-backed security (MBS) market, which means that portfolios of mortgages were created and the cash flows, both interest and principal payments, were generated by the portfolios, which were packaged as securities and sold to investors.

According to Hull (2012: 185), eventually the banks started to see the possibility of extra profits from mortgages, compared to the financial solvency of the customers taking the loan. The banks saw the potential profits they could make from a new loan more valuable than the potential credit risk the consumer would cause if the bank would grant the loan. These loans would be gathered together into portfolios and transformed into commodities. These commodities were called asset-backed-security (ABS).

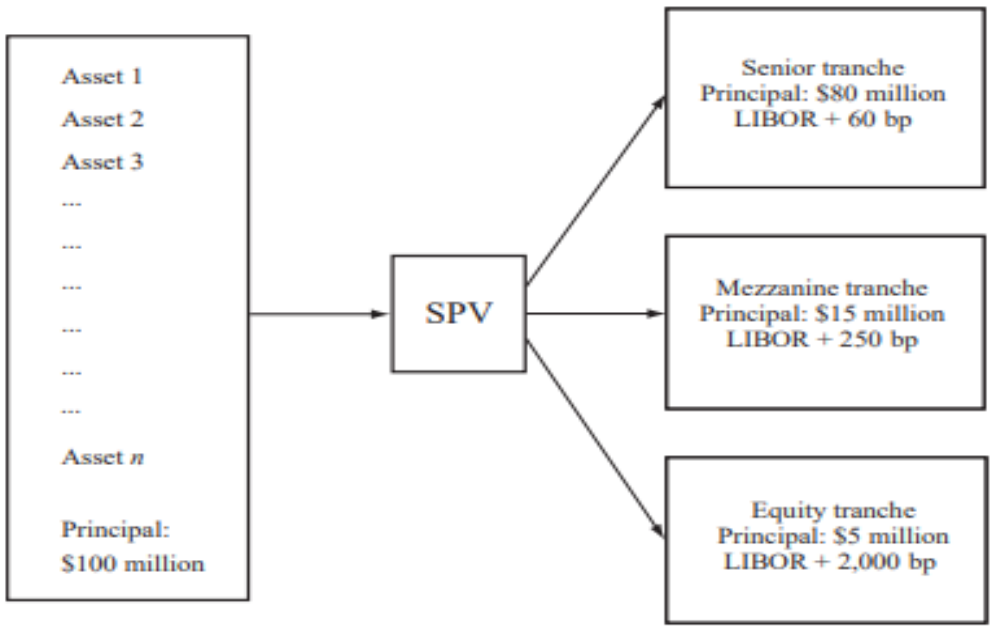


Figure 2: A simplfied asset-backed security. (Hull 2018)

As the figure 1 above shows, with ABS the risk from single portfolio could be relocated into several investment branches with different interest rates. If the underlining asset provides any cash flow, it will make profit for the investors. Hull (2012: 189-191) asserts that the investors who bought this derivative product had no idea about the risky assets it included and whether the ABS would provide any cash flow.

2.4.1. Forwards

According to Hull (2018: 6-8) and Bingham & Kiesel (1998: 3) forward contract is an agreement to buy or sell the underlying asset at a pre-specified price and time in the future. One of the parties to a forward contract assumes a long position, meaning that the party agrees to buy the underlying asset on a certain specified date and price. The other party assumes a short position and therefore agrees to sell the underlying asset on the same price and date that the buyer agreed to buy the underlying asset. This means that the buyer of a forward contract is obligated to buy, and the seller of the forward is obligated to sell the asset. There is no premium paid in forward contracts. Forward contracts are non-standardized because the trading of forward contracts is focused in over the counter markets.

For example, a farmer could make a forward contract with a financial institution for oat at a price of 5 euros per 10 kilograms in six months. The spot price for oat has three possible outcomes. The first possibility is that the price is exactly 5 euros after 6 months, and therefore neither of the parties owe nothing for the other party and the contract is closed. The second possibility is that the price of the oat is higher than six months ago. In this case the farmer owes the difference between the current spot price and the contracted rate of the oat, which was 5 euros. The third possibility is that the price of the oat is lower than six months ago. In this case, the financial institution would owe the difference between the spot price and contracted rate of the oat to the farmer.

2.4.2. Futures

According to Hillier et al. (2012: 204-206) a futures contract is similar as forward contract. It is also an agreement between two parties to buy or sell an asset at a specified time in the future for a specific price. However, futures contracts are standardized by the exchange, separating it from forward contracts. Therefore, since the futures contracts are

standardized, it means that the underlying asset, volume, and other possible terms of the trade are predetermined.

According to Hull (2018: 117-118) and Redhead (1996) futures also provide a constant market information and a guarantee that the contract can be traded before the maturity at a valid market price. Therefore, making futures contracts a bit more complex than forward contracts. The price of futures contract is normally expected to be generated the same way as forward contracts, and usually they are, but not always. Sometimes it can differ if for example the interest rate is not constant or if transaction costs, credit risk and liquidity risk can set the futures price apart from the forward price.

2.4.3. Options

Unlike forward or futures contract, options do not require any actions or responsibilities from the holder. Hull (2018: 7-9) and Redhead (1996) states that it gives its holder a right to buy or sell the underlying asset by a specific price and time in the future. However, the option writer has an obligation to sell or buy the underlying asset at a specific price in the future. The price of the option is called the option premium and it is the payment for the option writer for the obligation. Like it was said at the start of this subchapter, the option holder is not obligated to exercise the contract, while the option writer is always obliged to buy or sell the contract if the option holder so decides. Therefore, the maximum loss of option holder is the option premium that was paid for the option, while the highest possible gain for the option holder is unlimited in theory. This means that the maximum profit the option writer can make, is limited to the amount of the option premium, while the maximum loss for the option writer is theoretically unlimited. Options are traded in exchanges and in the over-the-counter market and need to be executed before their maturity, or else they expire worthless.

Hull (2018: 209) declares that there are two different categories for options, call options and put options. A call option gives its holder a right to buy and obligates the writer to

sell the underlying asset, while a put option gives its holder a right to sell and obligates the writer to buy the underlying asset. Options can also be divided into American options and European options, American option being the more common one. American options can be exercised at any time up to the expiration date, whereas European options can be exercised only on the expiration date itself, meaning that the American option has a time value, while the European options does not and therefore the American option is more valuable than the European option, if all the other parts are equivalent.

According to Hull (2018: 216) another way to distinguish among different types of options is to divide them after the difference between the strike or exercise price and the spot price of the underlying asset. The option is called at-the-money if the strike price is equal to the spot or market price. If the call option has a strike price lower than the spot price, it is called in-the money and having an intrinsic value. If the call option has higher strike price than the spot price, the call option is called out-of-the-money, having no intrinsic value. However, if the option is a put option and has a higher strike price than the spot price, it is in-the-money and if a call option has a lower strike price than the spot price, it is out-of-the-money.

Hillier et al. (2012: 268) states that multiple different factors can affect option price and this makes the pricing of the option complicated. The different indicators are spot price, which is the spot exchange rate in foreign currency derivatives, and an interest rate, which is the interest rate difference between the currencies. The price is also affected by the exercise price, time-to-maturity, possible dividends, and volatility.

To make the option pricing easier, there have been introduced several different option pricing models, while the Black-Scholes-Merton (BSM) option pricing model from 1973 is the most common and accepted. According to Black & Scholes (1973) BSM-model introduces an idea that from an underlying asset and an option, a risk-free portfolio can be combined, and the profit equals the risk-free interest in the market. This, and assuming that arbitrage is not possible, makes it possible to derive the option price.

Unfortunately, there are multiple unrealistic assumptions in BSM-model because it is based on efficient market hypothesis. Efficient market hypothesis assumes:

1. The short-term interest rate is known and is constant.
2. The stock price follows the geometric Brownian motion. Meaning, that the distribution of possible stock prices at the end of any finite interval is log-normal.
3. The underlying asset pays no dividends or other distributions.
4. The option is "European", meaning that it can only be exercised at maturity.
5. There are no transaction costs in buying or selling the stock or the option.
6. Investors can lend and borrow at the risk-free rate.
7. There are no penalties to short selling.

Black & Scholes (1973) reminds that these assumptions cannot be achieved in reality.

According to Garman & Kohlhagen (1983) the foreign currency options can be priced with the same formula as BSM-model, which takes dividends into account. However, the dividend rate is replaced with the foreign currency rate. The model allows to exercise American options at any time, making the pricing much more complicated than the pricing of European options. The European currency option price formula are:

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

4) $p = K e^{-rT} N(-d_2) - S_o e^{-r_f T} N(-d_1)$

where

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

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

c = call option price

p = put option price

S_0 =spot foreign exchange rate

K = exercise price

T = maturity in years

r = domestic risk-free interest rate

r_f = foreign risk-free interest rate

σ = volatility

$N(d)$ = function of cumulative standard normal distribution

Hull (2018: 323) shows that volatility is the measure of standard deviation and therefore it shows the price fluctuation. The estimation of volatility is seen as the most crucial part in option pricing since volatility has a significant impact on the option price. However, its estimation is also the hardest part, since it cannot be directly noticed, meaning, that usage of historical or implied volatility need to be used.

Market expectation of the future volatility is called implied volatility and it can be determined by setting the market price as an option price in BSM-model.

2.4.4. Swaps

According to Hull (2018: 155) & Hillier et al. (2012: 206) swap is an over-the-counter derivatives agreement between two parties. While in forward contract the cash flows were exchanged on just one specific date, the cash-flow exchanges in swaps are commonly made on several future dates, not just one. In swap contract two companies agree to exchange cash flows in the future. The dates of the cash flows and the way in which

they are to be calculated are prespecified in a swap contract. The most common calculation of the cash flows includes the future value of an interest rate, an exchange rate, or other market variable. Swaps have multiple different variations, but the most common ones are interest rate, in which a fixed interest rate is changed into floating interest rate, or a floating interest rate is changed into a fixed interest rate. According to Hull (2018: 156) London Interbank Offered Rate (LIBOR) is the most common floating rate in interest rate swap agreements. However, it should be noted that according to the Federal Reserve and regulators in the UK (2021), LIBOR has recently had questions and scandals regarding its validity as a benchmark rate and therefore it is being phased out by June 30, 2023, and it will be replaced by the Secured Overnight Financing Rate (SOFR).

Hillier et al. (2012: 206) says that swaps are typically used to manage the risk the companies are facing. For example, if a company makes an interest rate swap agreement, the interest rate flow is usually stable. These types of agreements can help companies to predict their future needs better when there are no surprise changes in rates. Hull (2018: 156-157) demonstrates the interest rate swap agreement with simplified example. Let's say there is a principal of 100 million dollars and company A agrees to pay 3% interest per year to financial company B and the company B agrees to pay the six-month LIBOR rate on the same 100-million-dollar principal to company A. This means that the company A is paying the fixed-rate to the company B and company B is paying the floating-rate to company A. This means that company A would pay 3 million dollars to company B in a year, while company B would pay the LIBOR rate to company A. If the LIBOR rate would be 2%, they would pay 0,02*100 million = 2 million dollars in a year.

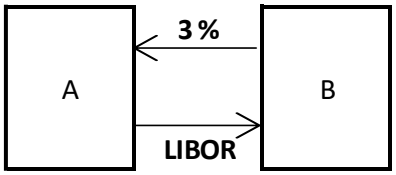


Figure 3: Interest rate swap between A and B

According to Duffie & Huang (1996) another common swap is currency swaps, in which two parties exchange an equivalent amount of money with each other but in different currencies. Currency swaps which involve an exchange of principals in different currencies generally have more exposure to default risks than interest rate swaps. In a currency swap two parties, generally from other countries that use different currencies, agree in advance whether they will exchange the principal amounts of the two currencies at the beginning of the transaction. For example, the swap could involve exchanging 10 million euros to 12,5 million U.S. dollars. In this case, there would be an exchange rate of 1,25.

3. LITERATURE REVIEW: HEDGING AND FIRM MARKET VALUE

In this chapter the previous research about derivatives and hedging will be discussed. In the first subchapter the firm market value will be discussed and after that studies that concludes that hedging creates zero net present value or negative value premium will be discussed. After that, studies stating that hedging creates positive net present value will be discussed.

Derivatives have been widely studied for years. However, only until 1990s these studies have been more concentrating on the immediate effect that hedging had on firm value. Multiple research states that firms can increase value by hedging. For example, Smith & Stulz (1985) find out that hedging can increase the firm value by decreasing the probability of bankruptcy. However, this result is more likely to firms that have higher costs of financial distress. Other notable studies that find out that there is a positive value premium with hedging includes Allayannis & Weston (2001), which found a 4,9% positive value premium, Graham & Rogers (1999) who found a 2,2% - 3,5% positive value premium and Carter, Rogers & Simkins (2006) who found a 5,5% - 10% positive value premium. There have also been many studies that results in a negative value premium, for example Jin & Jorion (2007) who studied gold mining companies, Khediri & Folus (2010) who studied French companies, and Naito & Laux (2011) who studied U.S. companies. Later in this chapter, studies that results both positive and negative value premium between hedging, will be processed.

Firm value is an economic concept that reflects the value that a business is worth. Therefore, it shows the entire capital of a listed company in the stock market. The previous studies on this subject have shown that most of the studies have focused on the effect that firm valuations are in favor of using derivatives for managing risks. However, there are still no proof that is hedging with foreign currency derivatives adding the firm's value. Firm value can be shown as market value or book value, and the value between these two can differ.

3.1. Firm market value

According to Brealey, Myers & Marcus (2007) firm market value is an important tool to show how well a firm performs if all its resources and obligations are considered and therefore it is frequently used in research. The current value of all shares of a firm is called firm market value. Therefore, the firm market value tells the present value of a firm. Firm market value is a core indicator in firm performance. It provides an estimation of the current value of firm's assets and liabilities and therefore multiple studies use it. Tobin's Q is the most common tool that have been used to measure firm's market value and will also be used in this study. Only Nelson, Moffitt and Affleck-Graves (2005) have used abnormal stock returns to study the impact of foreign currency derivatives to firm's market value. Value can also be estimated with book value, which is based on historical and original values of a firm. However, book value is usually different than market value, and market value is seen as a better estimator between these two.

According to Allayannis & Weston (2001) and Brealey et al. (2007) there are many different factors that affect the firm market value. For example, for the most part the measures consider the firm size to assess the comparability. However, there are differences in geographical locations and industries which are not included in the measures, making the measures not fully comparable.

The firm market value can be measured in many ways. According to Brealey and Myers (2000: 829-830) one of the most used measures is P/E ratio (price-earnings ratio), which is the stock price divided by earnings per share. This means that it measures how much the investors are willing to pay for each unit of earnings. Commonly a high P/E ratio means that there are relatively safe earnings or good growth opportunities.

Brealey et al (2000: 829-830) states that another highly used measure is called dividend yield, which is the dividend per share divided by the stock price. It can be concluded that

a high dividend yield can mean underpriced stock or decrease in future dividends. Another measure is market-to-book ratio which can be calculated by dividing the stock price by the book value per share. As we can see it tells what the worth of a firm is regarding to its book value. The current stock price is the same as the book value if market-to-book ratio value is 1. If the market-to-book ratio is higher than 1, it means that the stock price is overpriced or that the firm has grown fast in a short time becoming more valuable.

The last measure and also the measure that is used in this study, is called Tobin's Q. James Tobin (1969) created Tobin's Q in 1969. Tobin's Q has different variations, but the most common form is the market value of firm's assets per estimated replacement costs of the assets, where replacement costs are the market price for newly produced commodities. The market value of firm's assets includes all firm's equity and debt securities. If we compare it to market-to-book ratio, we can see that the difference is that market-to-book ratio only includes common stock and the replacement costs includes all assets, meaning that that in theory, the value should always equal to one.

If Tobin's Q is over one, it is considered high, and it means that capital equipment is worth more than the cost of replacing it, meaning that the stock is overvalued. Vice versa, if the Tobin's Q is considered low, it means that the stock is undervalued. According to this, if a company has a high Tobin's Q, the company should invest more and therefore the company has good growth opportunities. Companies that have high Tobin's Q are usually companies with a strong brand and companies that have low Tobin's Q are usually in a highly competitive industry.

3.2. Hedging does not provide positive net present value

There have been countless studies regarding on hedging and how does it affect firm value. In this chapter there will be discussed studies concluding that hedging provides zero net present value. One of the earliest studies that provides background for hedging

and for the impact on firm value is from Modigliani and Miller (1958). According to Modigliani et al. (1958) firm's hedging policy is irrelevant regarding to firm value. They argue that shareholders can manage the risk alone with the same costs as firms. Modigliani and Miller (1958) assume that the markets are efficient. Therefore, their findings do not reflect the real world, since in the real world the information is asymmetric, taxes exist and many more costs that makes the real markets inefficient. Modigliani and Miller (1958) results started a discussion of the value-adding effect of risk management and generated multiple studies from the same subjects, even though reality does not function as assumed in their paper.

Jin and Jorion (2006) research oil and gas firms and find no value effects. The sample for their study consists of 119 U.S. firms during 1998–2001, for which they test the difference in firm values between those who hedge and those who choose to not hedge. Jin and Jorion (2006) suggest that companies who hedge does not add more advantage as investors can hedge on their own, similar as Modigliani and Miller (1958). Just like Modigliani and Miller (1958), Jin and Jorion (2006) results could be biased since their sample consists of companies that function in oil and gas industry and the investors might want the firms to stay unhedged. Jin and Jorion (2006) suggests that foreign currency risk is more difficult to hedge away by investors, than it would be for companies, because the foreign currency exposure is harder to recognize. Therefore, the hedging of foreign currency risk could be more useful for firms, than to hedge certain commodity risk, like oil and gas price risk.

Guay and Kothari (2003), research cash flow and market value sensitivities of financial derivative portfolios to extreme changes in the underlying asset prices. According to them, the value implications of derivatives use are modest, based on the magnitudes of notional amounts of derivatives used by U.S. firms. They argue that median firm's derivatives portfolio can create 15 million dollars in cash and 31 million dollars in value at most, when interest rates, foreign exchange rates, and commodity prices change by

three standard deviations at the same time. The median amounts they argued, can be seen small if it is compared to overall values and cash flows of companies.

Guay and Kothari (2003) also argues that median company holds derivatives so that they cover only 3% to 6% of the company's interest rate or foreign currency exposures. According to this, usage of corporate derivatives seems to be insignificant portion of nonfinancial firms' risk profile suggesting that derivatives are not used with a degree that is economically important.

Khediri and Folus (2010) studied French companies with a sample size of 320 nonfinancial companies. Khediri and Folus (2010) constructed a univariate test and multivariate test and the results suggested that hedging does not provide positive value premium, but it actually provides a negative value premium.

3.3. Hedging provides positive or negative value premium

This subchapter will process different studies which suggest that hedging provides positive net present value. According to Graham and Rogers (1999) hedging increases debt capacity and interest deductions and therefore, eventually firm market value. Graham and Rogers (1999) also conclude that the tax gain associated with increased debt capacity is greater than the estimated increase in value related to tax convexity, leading to positive value premium from tax benefits and therefore possibly increasing firm value.

Allayannis and Weston (2001) were the first ones to study the direct relation between firm market value and financial derivatives usage. To study this, they use Tobin's Q for 720 large U.S. nonfinancial firms between 1990 and 1995. They start by performing a univariate test to present the relationship between firms that hedge and firms that do not hedge. After the univariate test they perform a multivariate test for controlling the size, profitability, leverage, growth opportunities, ability to access financial markets, geographic and industrial diversification, credit quality, industry classification and time

effects. Allayannis and Weston (2001) finds that companies exposed to exchange rate risk have a positive and significant relation between firm value and the use of currency derivatives during 1990-1995.

Allayannis and Weston (2001) also investigates how sensitive their results are. To perform this, they construct three alternative measure of company values, first being the measure suggested by Perfect and Wiles (1994), which is a simple measure of the market value of a firm to the book value of assets.

3.4. Increasing firm value with derivatives

Financial derivatives can be used by several ways to influence the firm value. Positive firm value effect has been revealed in several studies, however, the results have not always been significant. Bartram et al. (2011) find out that companies who use derivatives for hedging have lower cash flow volatility, idiosyncratic volatility, and systematic risk than companies who do not use derivatives for hedging. Their findings also shows that companies who use derivatives have significantly lower betas than companies who do not use derivatives. It might suggest that hedging effects on company's cost of capital, and therefore the investment policy and economic profitability of a company.

Hillier et al. (2012: 670-689) states that it is important to manage cash flow volatility in every industry or business model. This is because irregularities in cash flow can raise the company's risk level and therefore decrease value. For example, if a company has a negative cash flow, the company is not able to self-finance its possible growth and therefore it could force the company to seek for more expensive outside funding. Since gains and losses are taxed differently, hedging can also be helpful in reducing expected tax payments. The changes in expected cash flows can be controlled by hedging and therefore the irregular tax obligations can be minimized. Therefore, the expected cash flows can be increased by hedging since it reduces financial distress.

There have been multiple studies how firm value can be increased by using different types of derivatives. Multiple studies have studied how the usage foreign currency derivatives, interest rate derivatives or more common derivatives affect firm value. However, Pérez-González and Yun (2013) are analyzing how weather derivatives affects firm value by studying electric and gas utilities. They state that energy is one, if not the most sensitive sector to weather in the economy. This is since weather conditions affect highly to heating and cooling demands. They find out that hedging has a positive and significant effect on firm value.

4. DATA AND METHODOLOGY

This chapter introduces the data of the thesis. The chapter begins with the description of the data sample. After that, the dependent variable and independent variables that are used in the regressions are presented. Furthermore, the methodology of how the univariate regressions and multivariate regressions are made are presented. The chapter ends with the revelation of the results for the univariate and multivariate regressions and robustness check are made for the regressions.

4.1. Data

The data for this study is gathered from companies that are listed on the main list of Nasdaq OMX Helsinki during the years of 2014-2020. To make the data comparable and due to availability of data, only the companies which were listed on Nasdaq OMX Helsinki's main list at the end of each year are taken to the data sample. However, since the data has cross-sectional characteristics, and the data is formed independently for each year, the companies do not need to be listed at the end of every observation year to be included in the data sample.

Finnish market is significantly smaller than many others which have been studied previously. This may and probably will cause the results vary from previous studies. For example, a study by Allayannis and Weston (2001) used U.S. companies and the data differs in various ways. This is due to the fact, that in the United States companies can grow relatively large even in domestic markets, but Finland is a small country. Therefore, the domestic sales are limited, and usually companies have to seek investment and growth opportunities in foreign countries. This can produce different risks, for example foreign exchange risk and companies might want to hedge their exposure.

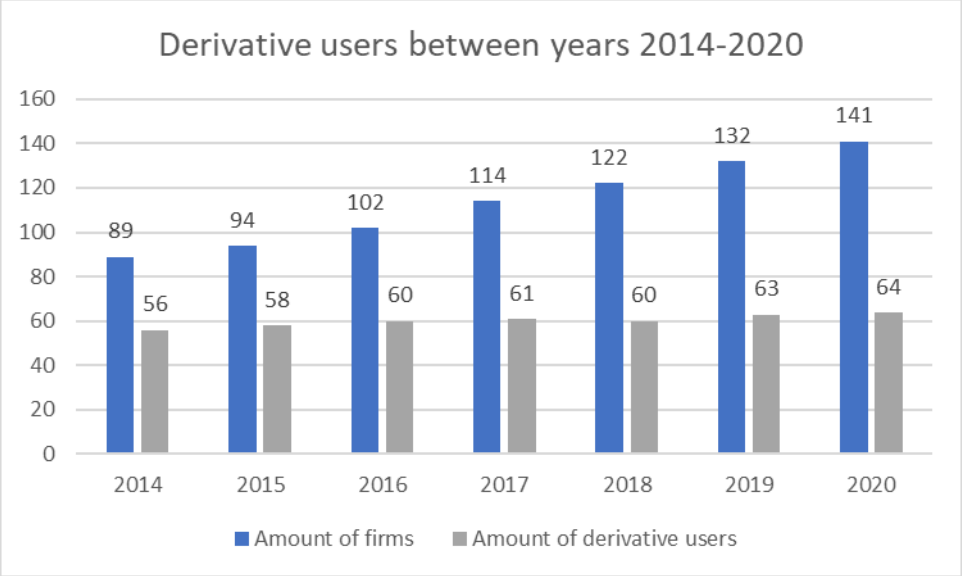
4.1.1. Sample description

De-listed companies are taken out of the sample and newly listed companies are added to the sample. This will cause that the observations vary slightly through the sample period. To make the data comparable and due to available data, the sample only consists of companies that were listed on OMX Helsinki at the end of each observation year.

According to Wooldridge (2010: 4-8) since the data has cross-sectional characteristics, the companies do not need to be listed at the end of each observation year to be part of the sample, since the sample is formed individually for every year. The data also has pooled cross-section characteristics and panel data because the observations are taken repeatedly for the same companies every year, except for those that were not taken due to de-listing.

A table below shows the amount of companies in OMX Helsinki in each year of the observations, and it also shows the number of companies which uses derivatives.

Table 1: Derivative users between years 2014-2020



As we can see from Table 1, the usage of derivatives has changed during the years between 2014 and 2020. Even though the amount of derivative users has stayed relatively

the same during the observation years, we can see that the number of companies in OMX Helsinki have increased frequently every year. The number of companies in OMX Helsinki increased 3,9% per year by average and at the same time the amount of derivative users compared to total companies in OMX Helsinki has decreased by 2,3% per year by average. However, we can indicate that the new additions to the sample are mostly non-derivative users, since the amount of derivative users stays relatively same even though the number of companies increases.

4.1.2. The dependent variable

Dependent variable for the univariate and multivariate regressions is chosen by previous studies in this subject. In previous studies, Tobin's Q has been proven to be a reliable variable for studies regarding on derivatives and firm market value. This is because the data for calculating Tobin's Q is available and easy to find from the databanks since it can be calculated by the values in balance sheets, because it is calculated by dividing market value of total assets by replacement cost of total assets. Therefore, Tobin's Q will also be used as a dependent variable in this thesis. In Tobin's Q, the market value of total assets is calculated as a book value of total assets from where book value of equity is subtracted, and market value of equity is added. The replacement cost of total assets is the book value of assets, since the replacement cost of total assets is a lot harder to estimate and in previous literature, book value of assets has been used as a replacement cost of total assets.

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

In previous literature, for example Allayannis & Weston (2001), the market value of equity has been calculated by the amount of preferred shares and the market price for said

share. This method is also used in this thesis and the amount of shares and the price for the share is taken from the end-of-year reports. Because the values are calculated separately for each company from end-of-year reports through the sample period, companies that are missing information needed to calculate the value of Tobin's Q are deleted from the sample. Because the values are calculated for each year, a company could be deleted from the sample for one year but be back for other year, if there is needed information for values available for the other year.

There have been multiple variations of Tobin's Q in previous literature. However, the main function of Tobin's Q is to measure the market value of firm's asset to the replacement cost of assets. The parts of Tobin's Q formula have been modified multiple times in previous literature, some being more complicated than others. However, according to Allayannis & Weston (2001) and Nguyen & Faff (2007), the results are affected only a bit when more advanced techniques for Tobin's Q are used. While the results are only affected a small amount, the data availability becomes much harder when multiple different factors are added to the formula. Therefore, the more simplified method is chosen to measure Tobin's Q for this study.

4.1.3. Dummy variables

To identify the derivative users from the non-users in the sample, dummy variable will be applied. There are total of four main dummy variables, first being the dummy variable for general derivative (GD) users. If a company clearly states that they have used any type of derivatives during that fiscal year, the dummy variable will get a value of one (1). If the company either states that they have not used any derivatives during that fiscal year, or if there are no clear statement of derivatives, the company will get a value of zero (0).

Additionally, companies that are labeled as general derivative users are also divided into subcategories by three more dummy variables, regarding of the type of derivatives the

company is using. These subcategories are interest rate derivatives (ID), foreign exchange derivatives (FD) and commodity price derivatives (CD). This means, that if a company is using only interest rate derivatives, the GD dummy and the ID dummy gets value of one (1), while the other dummies get a value of zero (0). If a company uses every type of derivatives, every dummy gets a value of one (1).

The data for the dummy variables is collected manually from each of the sample firm's financial statements. This information is observed yearly, so if a company does not provide any information regarding of its derivative usage one year, but the next year it reports that it has used derivatives, the company will be labelled as a derivative user from the year it first states that they are using derivatives. If a company reports that derivatives are part of their risk management policies, but they do not have any open derivative positions, the company is labelled as a non-user and the dummy variable for GD gets a value of zero (0).

4.1.4. Control variables

Previous literature in the field of firm value studies was used to determine the control variables for this study. For example, Allayannis & Weston (2001) and Jin & Jorion (2006) are both using variables that are proven to be suitable for this kind of study. Therefore, in this study mostly the same variables as Allayannis & Weston (2001) and Jin & Jorion (2006) will be used. As control variables this study uses company size, leverage, growth, profitability, liquidity, accessibility to the financial markets and the rates from Covid-19 year. Next, all the control variables will be explained more in detail.

Size like its name suggests is a measure for comparing how large a company is. It has been used as a control variable in almost every relevant study regarding on firm market value. However, its effect to Tobin's Q has not always been robust. The results by Allayannis & Weston (2001) suggests that size has a negative impact on Tobin's Q. The results are also supporting the hypothesis that smaller firms have more value than large firms

and that large firms are more likely to be derivative users than smaller firms. This would also suggest that there is a positive correlation between using derivatives and size and negative correlation between using derivatives and firm value. In this study, size is measured the same way as Allayannis & Weston (2001), meaning that size is natural logarithm of firms' total assets.

Leverage is another control variable which will be used in this study. Findings relating on leverage and Tobin's Q are mixed, since at least Jin & Jorion (2006) found a positive correlation between leverage and Tobin's Q, while Allayannis & Weston (2001) found a negative correlation between leverage and Tobin's Q. However, since the firm value can be affected by capital structure and highly leveraged companies are more vulnerable to interest rate risk, this might lead the companies to hedge their exposures. Allayannis & Weston (2001) measured leverage as long-term debt to shareholders equity, and it will be measured as such in this study also.

Growth is also calculated the same way as Allayannis & Weston (2006), capital expenditures divided by total sales. Growth is used as a control variable since the growth possibilities can have a positive relation with firm value. Investments made by the company can bring profits to the company in the future if the investment is profitable. This means that the profitable investments increase firm value.

Profitability is return on assets (ROA). It is calculated by dividing net income by total assets. Typically, profitable companies have higher firm value and therefore profitability is one of the controlled variables. Profitability is expected to have a positive relation between Tobin's Q, like Allayannis & Weston (2001), and Bartram et. al. (2009).

Liquidity is measured the same way as in previous literatures, with current ratio. It is chosen to be one of the controlled variables because if a company has a lot of cash available it can affect the firm value by increased risk. However, according to Pramborg (2004), companies with a low liquidity are more likely to invest only on lower risk projects with

positive net present value and therefore it could result in a higher Tobin's Q in the future, unlike the companies with high liquidity.

Access to financial markets has been controlled in most of the previous literature and therefore it is controlled in this study also. Access to financial markets can be measured with dividend payment decision or with dividend per share value. In this study a dummy variable will be used to measure access to financial markets, so if a company has paid dividend during that year, it gets a value of one and otherwise a value of zero. According to Allayannis & Weston (2001) and Jin & Jorion (2007), companies that have problems with cash flow are expected to pass on negative net present value projects more likely than companies that don't have problems with cash flow. According to this, access to financial markets should have a negative relation to Tobin's Q.

Covid-19 rate is a dummy variable for the year 2020, when the worldwide pandemic started. It is exciting to see if any hedging premium can be found this year. However, the sample size for only Finnish firms in 2020 is really small and therefore there is a possibility that the results are not statistically significant. Furthermore, the results cannot be explained solely by the Covid-19 pandemic, due to the small sample size.

Several previous studies are focusing on only one or two derivative types. For example, Allayannis & Weston (2001) are studying foreign currency derivatives, Belghitar et al. (2008) are studying foreign currency derivatives with interest rate derivatives. However, since Finnish market is a small market and therefore the sample size is quite small compared to U.S. markets for example. This means that there is expected to be a high correlation between different derivative type users. Table 2 below shows the summary for the variables.

Table 2: Variables summary.

Variables	Predicted sign	Definition
Tobin's Q (ln)	+	Natural logarithm of total assets from which book value of equity is subtracted and market value of equity added. The result is divided by total assets
General hedgers (d)	+	Dummy variable for firms that use derivatives
Foreign currency hedgers (d)	+	Dummy variable for firms that use foreign currency derivatives
Interest rate hedgers (d)	-	Dummy variable for firms that use interest rate derivatives
Commodity hedgers (d)	+	Dummy variable for firms that use commodity derivatives
Size (ln)	-	Natural logarithm of total assets
Leverage	-	Total liabilities divided by shareholder's equity
Profitability	+	Return on Assets = Net income divided by total assets
Growth	+	Capital expenditures divided by total assets
Liquidity	-	Current ratio = Current assets divided by current liabilities
Access to financial markets (d)	-	Dummy variable for companies with dividend payment
Covid-19 rates (d)	+	Dummy variable for the year 2020

4.1.5. Summary statistics

The table 3 below introduces the sample descriptive statistics from all the firms included in the study and it also presents the main regression variables for said firms. The table has four panels, panel A, B, C and D. Panel A offers the detailed statistics of the full sample, which is 794 firm year observations. Panel B presents the same statistics as panel A, but only for the companies that are using derivatives. Panel B has a total of 422 firm year observations. Thus, panel C is presenting the same statistics as A and B, but for companies that are not hedging, totaling to 372 firm years. Panel D is showing the comparison of Tobin's Q values between different sub samples.

Panel A shows us that the mean for Tobin's Q within all firms is 1,36 and the median is 0,80. Therefore, we can confirm that the distribution for Tobin's Q is skewed and in the upcoming multivariate regressions the natural logarithm of Tobin's Q will be used as the dependent variable. Tobin's Q is considered to be high if the value is over 1. If the value is over 1, the cost to replace the firm's assets is smaller than the value of its stock, meaning that the stock is overvalued. Hence, we can see that the stocks in OMX Helsinki are

overvalued during the observation period, as the firms are worth more than the cost of their assets.

By comparing the values of Tobin's Q between the hedgers and non-hedgers, we can see that the non-hedgers have a higher mean than the hedgers. Since our first hypothesis was that firm value is affected positively by hedging with general derivatives, this evidence would lead us to reject the second hypothesis. However, more analysis should be made to confirm the findings and therefore, a univariate and multivariate regressions will be revealed later in this chapter.

Table 3: Sample descriptive statistics.

Panel A: All firms

Variables	Obs.	Mean	Median	Maximum	Minimum	Std.
Tobin's Q	794	1,36	0,80	15,79	0,08	1,69
Market value of equity	794	1375605,00	160559,60	45425213,00	1801,32	4002872,00
Total assets	794	1654632,00	171665,00	56721000,00	2720,00	4622758,00
Total sales	794	1448240,00	158643,50	49015000,00	0,00	3516021,00
Dividends per share	794	0,30	0,14	2,43	0,00	0,40
Growth	794	2,32	1,47	22,09	0,00	2,66
Leverage	794	1,36	1,17	9,09	-13,93	1,65
Liquidity	794	1,66	1,36	11,49	0,00	1,35
Profitability	794	1,14	1,03	4,61	-0,07	0,64

Panel B: Hedgers

Variables	Obs.	Mean	Median	Maximum	Minimum	Std.
Tobin's Q	422	1,06	0,70	7,39	0,08	1,01
Market value of equity	422	2452304,00	608140,50	45425213,00	5432,62	5256934,00
Total assets	422	2950348,00	864016,50	56721000,00	11201,00	6035351,00
Total sales	422	2459252,00	976517,00	49015000,00	15256,00	4467314,00
Dividends per share	422	0,42	0,27	2,43	0,00	0,45
Growth	422	2,05	1,06	12,05	0,00	1,48
Leverage	422	1,50	1,29	8,28	-12,56	1,46
Liquidity	422	1,62	1,37	7,51	0,00	0,99
Profitability	422	1,11	0,99	4,61	0,05	0,55

Panel C: Non-Hedgers

Variables	Obs.	Mean	Median	Maximum	Minimum	Std.
Tobin's Q	372	1,70	0,94	15,79	0,09	2,18
Market value of equity	372	154188,10	54022,48	2538960,00	1801,32	272520,40
Total assets	372	184759,90	49040,50	6640400,00	2720,00	516574,20
Total sales	372	301340,50	56045,00	10720300,00	0,00	1138485,00
Dividends per share	372	0,17	0,05	1,55	0,00	0,29
Growth	372	2,64	1,80	22,09	0,00	2,81
Leverage	372	1,20	1,03	9,09	-13,93	1,84
Liquidity	372	1,72	1,33	11,49	0,00	1,66
Profitability	372	1,18	1,10	4,23	-0,07	0,73

Panel D: Tobin's Q

Variables	Obs.	Mean	Median	Maximum	Minimum	Std.
All firms	794	1,36	0,80	15,79	0,08	1,69
Hedgers	422	1,06	0,70	7,39	0,08	1,01
Currency hedgers	226	1,06	0,66	5,90	0,13	1,08
Interest rate hedgers	372	0,96	0,68	7,39	0,08	0,89
Commodity hedgers	88	0,86	0,49	4,64	0,13	1,00
Non hedgers	372	1,70	0,94	15,79	0,09	2,18

4.2. Methodology

In the previous literature regarding on hedging and firm value, the most used methodology has been the comparison of differences in Tobin's Q values for derivative users and non-users. This study will also use this method since it has been proved to be an effective way in this line of studies. Allayannis & Weston (2001) and Bartram et al. (2011) found a positive value premium and in this study, this is first tested by univariate tests that include comparisons between the sample years. Different derivative user categories will also be tested against non-derivative users. These are done by simple mean and median tests. Also, the correlations between the variables presented in Data section will be compared.

After the univariate regressions, multivariate regression tests will also be done since firm value can be affected by multiple different factors. For controlling different firm characteristics that may impact Tobin's Q, control variables are included to prevent value effects from different variables than use of derivatives. Pooled OLS regression method is used with fixed effects OLS regressions to find out if the value premium found by Allayannis & Weston (2001) can be found from the Finnish sample.

4.2.1. Univariate analysis

In this chapter the results for the univariate analysis from Tobin's Q mean and median tests will be presented. The result of the univariate analysis indicates how the Tobin's Q values that were presented earlier in Table 3 are formed. It also considers if time or hedging with derivatives are driving the results, since the univariate analysis is divided between different subgroups of derivative users. These different derivative types are interest rate, foreign exchange, and commodity derivative hedgers. The sample is also split between two time periods to see if the rates from Covid-19 time period give different results compared to normal rates. In the end of this chapter, a correlation matrix will be presented for the multivariate regression variables, and it will be analyzed.

The results are split into two different categories in Table 4. On the left side are the normal rates that includes years 2014-2019. The right side is for Covid-19 rates, so it only includes the year 2020. Since the data is based on end-of-year figures and they are collected annually, the year 2020 can be used as a Covid-19 rate year even though the first few months of the year was not affected by the pandemic. Panel A includes all the 782 firm year observations, where 646 observations are for normal rates and 136 observations are for Covid-19 rates. For panel B, panel C and panel D the amount of observations differs each year since the other hedgers, except the one tested in every Panel are not involved in the sample.

As it was stated earlier that Tobin's Q is skewed, both mean and median tests will be involved in the analysis. This is done because these tests determine if there are differences in Tobin's Q values between companies that are considered as hedgers and companies that are non-hedgers. To determine the significance levels of the results, p-values will be obtained from t-test in mean tests. Median test p-values are collected using Wilcoxon-Mann-Whitney test. Consequently, the limits for T-statistics to be significance are 1,645 for 10% significance level, 1,96 for 5% significance level and 2,58 for 1% significance level.

From Panel A in Table 4 it can be seen how general hedgers have performed against non-hedgers during Pre Covid rates period and during Covid-19 rates period. In previously presented Table 3, the Tobin's Q mean for the whole sample was 1,36, for the hedgers the mean was 1,06 and for the non-hedgers it was 1,70. By comparing the results from Table 3 to Panel A in Table 4 it can be seen that difference between hedgers and non-hedgers before Covid-19 (-0,62) is a little lower compared to the whole period (-0,64). The results are similar with median value, since the difference for median before Covid-19 is -0,26 while for the whole time period it is -0,24. While the differences are not that remarkable, they are statistically significant. The results are similar for Covid-19 rates since non-hedgers have higher mean and median, however, the difference between mean and median are lower for non-hedgers than it is during Pre Covid rates. The mean

and median values are higher for hedgers and non-hedgers during Covid-rates than in normal rates. Panel B, C and D are having the same mean and median values as in Panel A, but for different derivative type hedgers. These results are not as reliable as in Panel A, since as mentioned earlier, the observations in different hedging subcategories are overlapping with each other. According to these results the negative value premium can be seen in Pre Covid rates, and therefore the findings are in contrast to Allayannis & Weston (2001), while the results are more similar with Nguyen & Faff (2007). However, it can be seen that the negative value premium is even higher during the Covid-19 period.

In panel B the Tobin's Q mean and median values are slightly lower with -0,66 value difference in mean and -0,42 in median for the pre covid rates. For the Covid rates the difference in mean is -1,21 and for median -0,93. The median value is similar to Panel A, but the difference is more significant for mean value. In panel C and D, the results are similar as they are in panel A and B. We can also see that commodity hedgers are having the biggest difference between hedgers and non-hedgers in mean and median values, both in Pre Covid rates and during Covid rates.

Table 4: Tobin's Q mean and median tests

Tobin's Q	**Pre Covid rates**			**Covid rates**		
	Mean	Median	Obs	Mean	Median	Obs
Panel A: General						
Hedgers	1,01	0,68	358	1,30	0,92	64
Non-Hedgers	1,63	0,94	295	1,97	1,1	77
Difference	-0,62	-0,26		-0,67	-0,18	
p-value	0,0000***	0,0000***		0,0252**	0,0918*	
Total obs			**653**			**141**
Panel B: Interest Rate						
Hedgers	0,90	0,66	316	1,35	0,93	55
Non-Hedgers	1,63	0,94	295	1,97	1,1	77
Difference	-0,73	-0,28		-0,62	-0,17	
p-value	0,0000***	0,0000***		0,0446**	0,1685	
Total obs			**611**			**132**
Panel C: Foreign Currency						
Hedgers	1,04	0,66	192	1,16	0,66	34
Non-Hedgers	1,63	0,94	295	1,97	1,1	77
Difference	-0,59	-0,28		-0,81	-0,44	
p-value	0,0002***	0,0000***		0,0353**	0,0314**	
Total obs			**487**			**111**
Panel D: Commodity						
Hedgers	0,85	0,50	74	0,95	0,4	14
Non-Hedgers	1,63	0,94	295	1,97	1,1	77
Difference	-0,78	-0,44		-1,02	-0,7	
p-value	0,0009***	0,0000***		0,0686*	0,0045***	
Total obs			**369**			**91**
***, **, * imply 1%, 5% and 10 % significance levels, respectively.						

According to Wooldridge (2009: 84-94) in order to estimate the effect of derivatives to the value of a company with OLS regression, there are requirements that should be met in order to prevent biased coefficient results. There are a total of five OLS assumptions which needs to be met or controlled in order to confirm unbiased regression results. One of these OLS assumptions is called MLR.3 and it is also known as the "No Perfect Collinearity" assumption. For this hypothesis to be correct, none of the independent variables

can be constant and there can be no perfect linear relationships between the independent variables.

Table 5: Pearson correlation matrix

Correlation matrix (p-value)	Tobin's Q (ln)	Hedgers	Size (ln)	Growth	Leverage	Liquidity	Profitability	Access	Covid
Tobin's Q (ln)	1,000								

Hedgers	-0,176***	1,000							
	(0,000)	---							
Size (ln)	-0,262***	0,574***	1,000						
	(0,000)	(0,000)	---						
Growth	0,074**	-0,111***	-0,229***	1,000					
	(0,037)	(0,002)	(0,000)	---					
Leverage	-0,161***	0,091**	0,121***	-0,117***	1,000				
	(0,000)	(0,010)	(0,001)	(0,001)	---				
Liquidity	0,226***	-0,038	-0,031	-0,003	-0,184***	1,000			
	(0,000)	(0,291)	(0,384)	(0,943)	(0,000)	---			
Profitability	0,004	-0,058	-0,127***	-0,094**	0,174***	-0,102***	1,000		
	(0,914)	(0,101)	(0,000)	(0,008)	(0,000)	(0,004)	---		
Access	-0,08**	0,233***	0,457***	-0,046	-0,036	0,019	0,033	1,000	
	(0,023)	(0,000)	(0,000)	(0,200)	(0,318)	(0,601)	(0,346)	---	
Covid	-0,083**	-0,072**	-0,002	0,022	-0,000	0,003	-0,107***	-0,082**	1,000
	(0,021)	(0,042)	(0,953)	(0,538)	(0,990)	(0,929)	(0,003)	(0,020)	---

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

Table 5 reveals the correlations between dependent and independent variables. The p-values are shown under the correlation coefficients. The p-values are shown to establish the significance levels of said variables. The largest correlation is 0,574 while the lowest correlation is -0,262. The correlations are also mainly low and therefore we can conclude that the requirements for MLR.3 are met and therefore there are no perfect collinearity. Wooldridge (2009: 89-94) also states that the sample could have multicollinearity if there are two or more variables in the regression that have high but not perfect collinearity. This would be ruled out by inspecting closer the correlation coefficients. By looking the results in Table 5 we can see that Tobin's Q (ln) as dependent variable has a highly significant negative correlation with hedgers, size (ln), leverage, access to financial markets and covid rates, while it has positive correlations with growth, liquidity, and profitability. Profitability, however, is not statistically significant for the natural logarithm of

Tobin's Q. The results for the natural logarithm for Tobin's Q as dependent variable are expected, since for example there is a negative relation between Tobin's Q and general hedgers, size, and leverage, and they are all statistically significant and they are in line with previous literature.

For hedgers, the results are similar as they are for the natural logarithm of Tobin's Q. The results are statistically significant for each of the variables when compared to Tobin's Q, except for profitability and liquidity. The high positive correlations for size and access to financial markets are expected since hedgers are usually large companies that tend to pay dividends. The highly positive correlation with size and access to financial markets is also expected since large companies typically have larger derivative positions and larger companies typically pay more dividends than smaller companies. These findings show that there are no multicollinearity problems with the independent variables since there are only a few high correlations and all of them are lower than 0,564. The results of Table 5 are expected because they are in line with previous literature for the most part, except for the Covid-rates which is fairly new addition. In the next chapter, the value premium and variables will be studied even more with OLS multivariate regressions.

4.2.2. Multivariate analysis

The factors that are affecting firm value and the possible value effects of hedging, can be captured by estimating multivariate regression models for the sample. Multivariate analysis is consisting of OLS assumptions and additional regression models for pooled OLS regression and fixed effects OLS regression are determined later on.

OLS regression, also known as Ordinary-Least-Squares regression, has been a popular method across previous literature for estimating the coefficients in multivariate regression models. The sum of squared residuals is minimized in OLS regressions, which causes the distance between the actual sample observations and the chosen linear regression model to be reduced.

For the pooled OLS regression, three different models will be applied. In the first model, the natural logarithm of Tobin's Q is the dependent variable. The independent variable is general hedgers, and the control variables are size, leverage, profitability, growth, liquidity, ability to access financial markets and the Covid rates.

6) $Tobin's\ Q\ =\ \beta_0 +\ \beta_1 general\ hedgers + \beta_2 size + \beta_3 leverage + \beta_4 growth + \beta_5 profitability + \beta_6 liquidity + \beta_7 access\ to\ fin.markets + \beta_8 covid\ rates$

The second and third model for the pooled OLS regressions are similar to the first one, but the independent variable of interest is different in each model. In the second model the independent variable of interest is interest rate hedgers and in the third model it is foreign currency hedgers. The commodity price hedgers are left out from the models since the amount of observations is fairly low and the companies who are using commodity derivatives are usually also using either interest rate derivatives or foreign currency derivatives and therefore there is a high percentage of overlapping. The first hypothesis is that the value of a company is affected positively if the company is using general derivatives for hedging purposes. Model 6 provides proof for the first hypothesis, while model 7 and model 8 provide proof for the second and third hypothesis, which were that the firm value is affected negatively if a company hedges with interest rate derivatives and the value of a company is affected positively if it uses foreign exchange derivatives for hedging purposes.

7) $Tobin's\ Q\ =\ \beta_0 +\ \beta_1 interest\ rate\ hedgers + \beta_2 size + \beta_3 leverage + \beta_4 growth + \beta_5 profitability + \beta_6 liquidity + \beta_7 access\ to\ fin.markets + \beta_8 covid\ rates$

8) $Tobin's\ Q\ =\ \beta_0 +\ \beta_1 foreign\ currency\ hedgers + \beta_2 size + \beta_3 leverage + \beta_4 growth + \beta_5 profitability + \beta_6 liquidity + \beta_7 access\ to\ fin.markets + \beta_8 covid\ rates$

These models are estimated for the whole sample, which is 794 firm year observations. The variables are chosen by previous literature, where they have been proved to affect firm value. These studies include for example Allayannis & Weston (2001), Belghitar et al. (2008), Khediri & Folus (2010) and Bartram et al. (2011). Since the Covid-19 pandemic has happened fairly recently, there are not many studies regarding on firm value during the pandemic era. Therefore, the Covid-19 rates bring additional information compared to earlier studies.

According to Wooldridge (2009: 481-489) to estimate how firm market value is affected by hedging it is important to remember that there is a possibility of autocorrelation. There can be many variables that can cause autocorrelation. For example, the growth of GDP over the years is affecting firm values certainly and this causes Tobin's Q values to be biased in the sample and therefore it also makes the OLS regressions to be biased. Wooldridge (2009: 481-489) also states that to control the autocorrelation in panel data pooled OLS regression, there should be a large amount of time periods while the amount of cross-sections should be small. However, the Finnish market is relatively small-scale, meaning that the characteristics in this study sample are opposite of what Wooldridge (2009) states. Therefore, the fixed effects regression has better statistical abilities for the characteristics of this type of panel data and it can correct the autocorrelation and as well heteroskedasticity and multicollinearity.

Table 6 in the next page presents the yearly Tobin's Q values between the time period of this study. It also demonstrates the time effect, and it also shows hove large the cross-section is while the time period is quite low.

Table 6: Yearly Tobin's Q values

All firms	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Mean	1,08	1,14	1,25	1,38	1,27	1,53	1,67
Median	0,66	0,67	0,83	1,01	0,72	0,87	0,93
Observations	89	94	102	114	122	132	141
Hedgers							
Mean	0,96	1,07	1,06	1,09	0,90	0,99	1,30
Median	0,60	0,64	0,67	0,79	0,69	0,78	0,92
Observations	56	58	60	61	60	63	64
Non-Hedgers							
Mean	1,27	1,26	1,52	1,70	1,63	2,02	1,97
Median	0,68	0,77	1,09	1,23	0,79	0,94	1,10
Observations	33	36	42	53	62	69	77

The fixed effects regression will be estimated to each model among side of OLS pooled regressions due to its abilities to give more accurate results and it should also not change the regression coefficients remarkably and it should also improve the R-squared which measures how well the dependent variable is explained by the independent variables in the regression model. According to Wooldridge (2009: 481-489) fixed effects models' pros and cons are that if there are any time-constant variables in the model, they cannot be used among the independent variables. However, in models 6,7 and 8 there are not any sector dummies or other similar constant variables and therefore it causes no problems.

4.3. Results

In this chapter the results for the univariate and multivariate regressions are presented. The subject of this study has been widely studied in the past and for example Allayannis & Weston (2001) find a positive value premium among foreign currency hedgers and it was one of the first innovative findings regarding on this subject. Therefore, their findings also influenced the hypothesis of this study. The preliminary results of the univariate

tests were different than what Allayannis & Weston (2001) find, since the univariate tests suggests that there is a negative premium value and not a positive premium value. In below, the results for pooled OLS and fixed effects are shown and it can be seen if the results are repeating the signs of negative premium value or if the results differ from univariate test results.

At the start of the empiric part of this study, one of the first things that was observed was the sample descriptive statistics in Table 3. There it was shown that there is a difference regarding on Tobin's Q values between companies that are hedging and companies that are not hedging. The companies that are labeled as hedgers have a mean value of 1,06 on Tobin's Q while the non-hedgers had a mean value of 1,70. This means that the companies that are not hedging with derivatives have 62,4% higher Tobin's Q value than companies that are practicing hedging. Since the difference is so significant, it cannot be explained exclusively by hedging activities, especially since companies that tend to hedge are considered to be large companies while companies that are not hedging are usually smaller companies. In previous literature, however, firm size has been proved to affect firm value. This means that more estimations are needed and therefore the differences between Tobin's Q are tested by mean and median tests in Table 3 where the whole sample is divided in two different time periods.

Pre-Covid rates is the first time period which range from 2014 to 2019, shows a negative hedging premium of -61,39% for hedgers, while during Covid-19 rates in 2020 the hedgers have a negative hedging premium of -51,54%, both being highly statistically significant. The results are similar when observing only interest rate hedgers and foreign currency hedgers, both having significant negative premium in Tobin's Q. One notable difference is that while the values of Tobin's Q are higher for both hedgers and non-hedgers during Covid-19 rates than they are during pre-Covid rates, the hedging premium difference is lower during Covid-19 rates than it is during pre-Covid rates. Table 5, which is the Pearson correlation matrix, additionally indicates that there is a highly significant negative relation among hedgers and Tobin's Q value. These results suggest that the first and

second hypothesis are correct, and they should be accepted. However, they also provide evidence for the third hypothesis.

A positive value premium has been more common result in previous studies, for example Allayannis & Weston (2001), Belghitar et al. (2008) and Pramborg (2004) all find a positive value premium in their studies. While negative value premium has not been as commonly found result as positive value premium, there are studies where a negative value premium has been found. Studies where a negative value premium has been discovered are for example Khediri & Folus (2010), Nguyen & Faff (2007). Since a majority of previous literature are resulting in a positive value premium, the results of this univariate analysis are unexpected. However, most of the previous literature are studying much larger markets than Finnish markets and that could possibly explain the findings. Most of the studies are also made before the financial crisis of 2007 and during a positive interest rate period. Next, the results for the multivariate regressions will be presented.

Table 7: Pooled OLS and Fixed effects for general hedgers, interest rate hedgers and foreign currency hedgers.

Tobin's Q (ln)	Model 6		Model 7		Model 8	
	Pooled	**Fixed**	**Pooled**	**Fixed**	**Pooled**	**Fixed**
Observations	794					
R-squared	0,129	0,808	0,133	0,809	0,132	0,808
Constant	0,374***	1,089***	0,320***	1,126***	0,353***	1,072***
(p-value)	(0,001)	(0,008)	(0,004)	(0,006)	(0,001)	(0,009)
Hedgers	-0,024	-0,069				
	(0,489)	(0,117)				
Interest Rate Hedgers			-0,069**	-0,126**		
			(0,045)	(0,018)		
Foreign Curreny Hedgers					-0,056*	-0,123**
					(0,089)	(0,039)
Size	-0,045***	-0,103***	-0,039***	-0,103***	-0,044***	-0,102***
	(0,000)	(0,001)	(0,000)	(0,001)	(0,000)	(0,001)
Leverage	-0,024***	0,024***	-0,025***	0,024***	-0,024***	0,024***
	(0,006)	(0,000)	(0,005)	(0,000)	(0,006)	(0,000)
Growth	0,001	0,004	0,000	0,004	0,002	0,004
	(0,841)	(0,356)	(0,972)	(0,347)	(0,758)	(0,415)
Profitability	0,011	0,039	0,013	0,029	0,015	0,044
	(0,640)	(0,380)	(0,582)	(0,513)	(0,504)	(0,319)
Liquidity	0,062***	0,008	0,062***	0,008	0,063***	0,009
	(0,000)	(0,432)	(0,000)	(0,478)	(0,000)	(0,415)
Access to financial markets	0,023	0,030	0,025	0,030	0,024	0,031
	(0,490)	(0,248)	(0,468)	(0,245)	(0,412)	(0,232)
Covid rates	0,090**	0,075***	0,087**	0,072***	0,090**	0,075***
	(0,014)	(0,000)	(0,017)	(0,000)	(0,014)	(0,000)
	***, **, and * imply 1%, 5% and 10% significance levels respectively.					

Table 7 shows the results for the pooled OLS and fixed effects for model 6, model 7 and model 8. On the left side of each model is presented the pooled OLS regression coefficients and on the right side is the fixed effects. The dependent variable for each of the models is the natural logarithm of Tobin's Q. The control variables are presented in Table 3. The sample size for all the regressions in Table 7 is 794 firm year observations.

The R-squared for each of the models is around 13%, meaning that the pooled OLS regression models are suffering from heteroscedasticity and autocorrelation. Like it was stated earlier, according to Wooldridge (2009: 40), if the panel data don't have long time period and small number of cross-sections, fixed effects should be used to get more

accurate results. From the results we can see that this is true since the R-squared for fixed effects is over 80% for each of the models, meaning that the fixed effects provide more robust results on panel data with short time period and high number of cross-sections.

By looking at the Model 6 we can see that there is no significant relation for general hedgers. However, the results are similar as they were for general hedgers in univariate analysis and since this multivariate analysis did not have any significant results for the value premium, the results got from univariate analysis should be accepted. Because it could be seen that there is also a negative value premium for general hedgers, the first hypothesis should be rejected, as it could be seen that there is a negative value premium for general hedgers. In Model 7, we can see that the results are highly significant for interest rate hedgers. There is a negative value premium of -6,9% for the pooled model and -12,6% for the fixed effects model. These findings confirms that companies that use interest rate derivates for hedging are having negative value premium. These findings are in line with the previous results in Table 4 and with the findings of Nguyen & Faff (2007). Since the second hypothesis is that interest rate hedging affects negatively on firm value, it should be accepted. The results are similar for foreign currency hedgers, as the pooled model shows that there is a significant negative value premium of -5,6% and for the fixed effects the negative value premium is -12,3%. These findings are also in line with the findings of Nguyen & Faff (2007) and since the third hypothesis is that foreign currency hedging affects firm value positively, it should be rejected since it can be seen that there is a negative value premium.

For the other control variables, the coefficients are following the results shown previously in Table 7. For example, the size has a negative correlation with Tobin's Q and the results are highly statistically significant, meaning that it confirms the results in previous models and previous literature that smaller companies are having bigger value premiums than larger companies. While the leverage has a negative correlation with Tobin's Q in pooled OLS, the fixed effects are actually having positive relation with Tobin's Q and

like it was stated earlier, the fixed effects are explaining the results more accurately. Even though the relation is not that considerable, it can be said that there is a positive value premium for companies that have better leverage than companies with less leverage. The fourth hypothesis is that during Covid-19 rates, hedging affects firm value positively. The result for Covid-19 rates are highly statistically significant with a positive value premium and therefore the Tobin's Q values are increased in the year 2020. While the fourth hypothesis can be accepted, it should be noted that there is a lot of macroeconomic factors that are affecting the rates and Tobin's Q values and therefore it cannot be said that Covid-19 is solely causing the rise of Tobin's Q values.

5. CONCLUSIONS & SUGGESTIONS FOR FURTHER RESEARCH

This thesis was created in order to examine hedging with derivatives between Finnish non-financial companies and to see if hedging has any effect on firm value. To examine this, the companies which are used in this study are initially put into groups for the univariate tests. There are three different groups, each for a type of derivative the company is using. The three groups are interest rate derivatives, foreign currency derivatives and commodity derivatives. If a company is using any of said derivatives, it is labeled as a general hedger and if the company is not using any derivatives, it is labeled as non-hedger. This information is gathered from the financial statements from each company of the sample group. The sample for the studies is gathered from Nasdaq OMX Helsinki and it has a total of 794 firm year observations during 2014-2020.

Many of the previous studies are not including years after the financial crisis, and years during Covid-19 pandemic. Therefore, this thesis contributes to the existing literature by providing results with said variables for derivatives, hedging and firm market value studies. While there have been studies, which results in that hedging provides negative value premium, most of the previous studies have resulted in a positive value premium. The majority of said studies have been done before the financial crisis and during positive interest rate periods, while most of the sample years in this study are during negative interest rate period. The negative and positive interest rates could have effects to the value premium, and it also could be further research for this subject, where the value premiums could be compared during negative and positive interest rate periods.

The results found in univariate tests suggest that there is negative value premium for companies that use derivatives for hedging. Further so, when companies are tested by a specific derivative type, it seems that companies which use interest rate derivatives for hedging have a higher negative value premium than companies which uses other derivative types. The result is in line with Khediri & Folus (2010) and with the second hypothesis of this thesis. The second hypothesis of this thesis suggests that the value of a

company is affected negatively if a company uses interest rate derivatives in purpose of hedging.

In multivariate tests a pooled OLS and fixed effects regressions are estimated. Size, leverage, growth, profitability, liquidity, access to financial markets and covid-19 rates are control variables for the multivariate regressions. The results are similar to univariate tests, since there is also a negative value premium found for hedgers. While the result for general hedgers is not statistically significant, it is statistically significant for interest rate hedgers and foreign currency hedgers. The results are in line with Khediri & Folus (2010) and Nguyen & Faff (2007) and they also lead us to reject the first and third hypothesis. The first hypothesis is that the value of a company is affected positively if a firm uses general derivatives in purpose of hedging and the third hypothesis is that the value of a company is affected positively if a firm uses foreign currency derivatives in purpose of hedging. It can also be seen from the results that Covid-19 rates have a positive effect on firm value. However, it should be noted that there are many factors that affect company value during this period and Covid-19 can not be solely responsible for this effect.

The results found out in this study suggests that Finnish companies have a negative value premium during negative rates period, meaning that hedging is generating negative firm value, instead of positive firm value. However, there are many other aspects that could affect the value of a company which are not controlled by regression models in this study and therefore would require additional studying. For example, it can be seen from the descriptive statistics in Table 3 that companies that don’t use derivatives are smaller companies than companies who do hedge with derivatives. Therefore, firm size must have an impact for Tobin’s Q, but the effect is tough to eliminate since most of the large Finnish companies are hedging with derivatives.

For further research, like it was stated earlier in this chapter, the difference between positive and negative interest rate periods could have an effect on this issue and therefore it could be tested. Also, since the Covid-19 pandemic has lasted longer than just one

year, there is more data that could be analyzed and see how it affects firm value. Lastly, since the Finnish market is so small, the sample size could be enlarged by studying a bigger market, for example the whole Northern Europe. This could possibly provide even stronger results.

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