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The Positive Effects of Currency Hedging Derivatives for Firm Valuation

Evidence from the Finnish Public Market 2019 - 2023

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ABSTRACT:

The study examines the effects of using currency derivatives on publicly listed companies' valuation. In an increasingly globalizing world, it is relatively uncommon not to address any of the risks affected by the fluctuation of the changing exchange rates. Even if the firm operates only within the one domestic country and is not directly exposed to currency exchange rate movements, the risk of changing rates may come in multiple different ways. The most common way of this is through different steps in the supply chain, such as raw materials. However, international competitors can also benefit from the exchange rate fluctuations in the form of favorable changes, affecting the competitiveness of the domestic counterparty.

In a perfect world with a fully functioning financial market, such a thing as hedging would not have any positive or negative effects on valuation. In a perfect world, every shareholder would be able to hedge their own financial risks leaving no need for additional risk management done by the company itself. However, the imperfectness in the global financial markets created by such things as taxes, transaction costs, and information asymmetry provide a high incentive for corporate hedging activities. Nowadays, there are multiple ways of hedging companies' business activities, making it more predictable. This has led to a situation where almost all the major companies have separate risk management departments focusing on making the best possible strategies, one of which is using currency derivatives.

This study focuses on the hypothesis that using currency derivatives as a risk management tool positively affects company valuation. We will be focusing on Finnish publicly listed companies, excluding firms in the financial sector. The data will be gathered from 160 different companies from the timespan from 2019 to 2023. The main goal is to have a better understanding of the actual effects in the Finnish market. The findings will help better understand the effects of currency derivatives on risk exposure and the predictability of future cash flows. This information will be useful not only for the internal shareholders but also for investors, policymakers, and regulators to have a better understanding of the real-life effects for future decision-making.

KEYWORDS: Derivatives, Futures, Options, Risk Management, Currency Risk, Exchange Rates

Table of Contents

Figures & Tables

1 Introduction

Changing exchange rates has multiple negative aspects affecting companies' normal business activities. For example, the uncertainty of future cash flows depended on the future exchange rates of foreign currency. Another unwanted element is that floating rates may significantly impact the company's competitiveness compared to foreign competitors. Therefore, many companies have started using different ways to hedge against currency risk. One way of trying to mitigate currency risk is by using derivates to stabilize exchange rate fluctuations. It is an easy way for companies to minimize the risk with small margins. The study will try to find if this assumption is correct or not.

In a perfect world with a fully functioning capital market without taxes, transaction agency costs, and information asymmetry, it would not be possible to get an advantage with financial risk hedging. Therefore, it should not add any extra value to firms as shareholders could hedge themselves and mitigate the risk individually. However, in practice, capital markets do not work that way, and there is a large number of imperfection elements that create a rationale for corporate hedging activities. One of the main risk management tools, especially with multinational corporations, is managing foreign exchange risk. According to International Swaps and Derivatives Association (ISDA), in 2009, 94% of the world's 500 largest companies use derivatives to hedge their business and manage risks (Schieffer 2009).

1.1 Purpose of the study

Most multinational companies tend to hedge against floating exchange rates, if not all, at a certain level. The most common way is buying currency. Hedging against currency risk makes it easier to predict the company's future cash flows and creates certainty about the amount of cash coming into the company's use. More stable rates also reduce volatility, which can be directly equated with lower risk exposure to the company. There are many ways to reduce foreign exchange risk, and this study analyses currency risk management with options. It can be assumed that every company performs some

degree of risk management as part of its business strategy. But the research raises the question: can we find ways between the different ways that create more value for the company than others from the investor's point of view?

H1: The use of derivatives in currency hedging to mitigate exchange rate risk positively affects a company’s value.

After the study, we can better understand the effectiveness and profitability of options as a way to hedge against currency fluctuations and risk exposure. The objective is to comprehensively understand how much investors value companies that have significantly reduced their currency risk by using derivatives or whether this even has adverse effects from a firm value perspective.

1.2 Structure of the study

The structure of the study consists of three main sections. Before those main sections, the study consists of basic information and an introduction to the topic. The two main sections of the study are 1. Theoretical background, 2. Literature review and 3 Empirical research. The first one of these main sections is also divided into two separate chapters because there are two different fields of study to explain in the theoretical background before going into a literature review and empirical research which is the primary purpose of the study.

The first section of the theoretical background contains the basic information of the derivatives. It answers to question “what are financial derivatives?” and gives all the basic information needed to understand what derivatives do and why they are such a used thing in the financial sector. The section starts with the history and overall look at financial derivatives and over-the-counter-markets. It then discusses different types of financial derivative instruments in a more detailed matter, including forwards, futures, options, and swaps.

The second section of the theoretical background focuses on another main field of the study; currency risk and currency risk management. It begins with explaining currency risk at a general level and then moves to look at currency risk from the risk management perspective. At the end of the second section, two different theoretical background fields combine to the last section of the theory, titled “derivatives in currency hedging”. The last section sums up all the previously handled theories to one individual field, which gives all the basic information needed to understand the literature review.

In the literature review section purpose is to analyze how the use of derivatives in currency hedging affects the firm value according to previous studies. Multinational companies commonly use hedging strategies to mitigate the uncertainty associated with fluctuating exchange rates. Currency hedging, especially using options, improves the predictability of future cash flows, reduces volatility, and lowers the risk exposure of the firm. By collecting earlier studies of the effectiveness and profitability of options as a risk management tool, the study aims to collect earlier insights from the value creation potential and investor perceptions of firms that effectively reduce currency risk.

In the last sections, we make our own analysis of how the use of currency hedging derivatives affects valuation in publicly traded Finnish companies. The section starts by defining the data and the quality of the observations, and it describes the criteria for the selected companies. This is followed by an explanation of the selected dependent and independent variables and the logic behind them. After that we will open up the chosen methodologies followed by the empirical analysis. In the last part, the study concludes all the results and findings in a readable format to get an understanding of the actual effects of currency hedging.

2 Financial derivatives theory

This section of the theory examines the theoretical background of the theory of financial derivatives. The section gives a basic understanding of the derivatives and opens a little bit of the derivatives' primary use purposes. In the beginning, is background information of the derivatives, and then the various instruments are described in more detail.

2.1 Derivatives background

The financial derivative is a financial instrument whose value depends on (or is calculated from) the values of other, more basic, and common fundamental variables. In most cases, the variables underlying derivatives are the prices of the assets traded in more traditional and liquid exchange markets. For example, a stock option is a derivative whose value depends on the underlying shares' stock price. However, derivatives can depend on almost any variable, from a milk liter's market price to the amount of snow falling on a particular ski resort on one specific winter. (Hull 2017: 23.)

Over the last 40 years, derivatives have become increasingly important in finance. Futures and options are actively traded on many exchanges around the world. Financial institutions, fund managers, and corporate fund managers enter into a wide variety of forward contracts, swaps, options, and other derivatives in the over-the-counter market. Derivatives have become such an important and massive thing that one working in the financial sector has to know the basics of those and understand what the main reasons are why companies use different kinds of financial derivatives. But not only do companies use derivatives, but increasingly individuals have also become interested in derivatives mainly as a speculative instrument. (Hull 2017: 23.)

The history of derivatives begins in 1848 when The Chicago Board of Trade (CBOT) was established. In the beginning, CBOT was a place to connect farmers and merchants to standardize the quantity and quality of the traded grains. A few years later, the first contracts were developed that can be referred to as the first version of current futures-

type contracts. That time, these contracts were known as *to-arrive contract.* Speculators soon became interested in the new contract and saw the deals as an interesting alternative to trading the underlying asset, this time grain, itself. Soon after that, more different kind of exchange markets was arranged all over the US with the most notable rivalry future exchange mentioned was the Chicago Mercantile Exchange (CME), established in 1919. Which later merged with CBOT to form the CME Group, which currently is the most sizeable exchange in the world. (Hull 2017: 23.)

Many of the derivatives are traded outside of the exchanges in so-called over-the-counter (OTC) markets. For example, large financial institutes, banks, multinational corporations, and fund managers are the major players in OTC derivative markets. Usually, counterparties of the contract in OTC markets contact each other by phone or email and mutually negotiate the terms of the contract. (Hull 2017: 25.)

The freedom and lack of regulation are one of the key elements in OTC markets. Contract´s counterparties have almost limitless space of tailor contracts just right to fit their needs and ability to precisely achieve the contract type they wanted. Key players in the OTC markets are institutions that are willing to take a risk for acquiring profit in different market circumstances. These kay players usually mean banks and other risk-taking parties, such as hedge funds. Since 2007 also OTC markets have become more regulated. However, OTC markets have still managed to maintain the freedom of tailor contracts to fit their needs. (Gregory 2014: 16-17.)

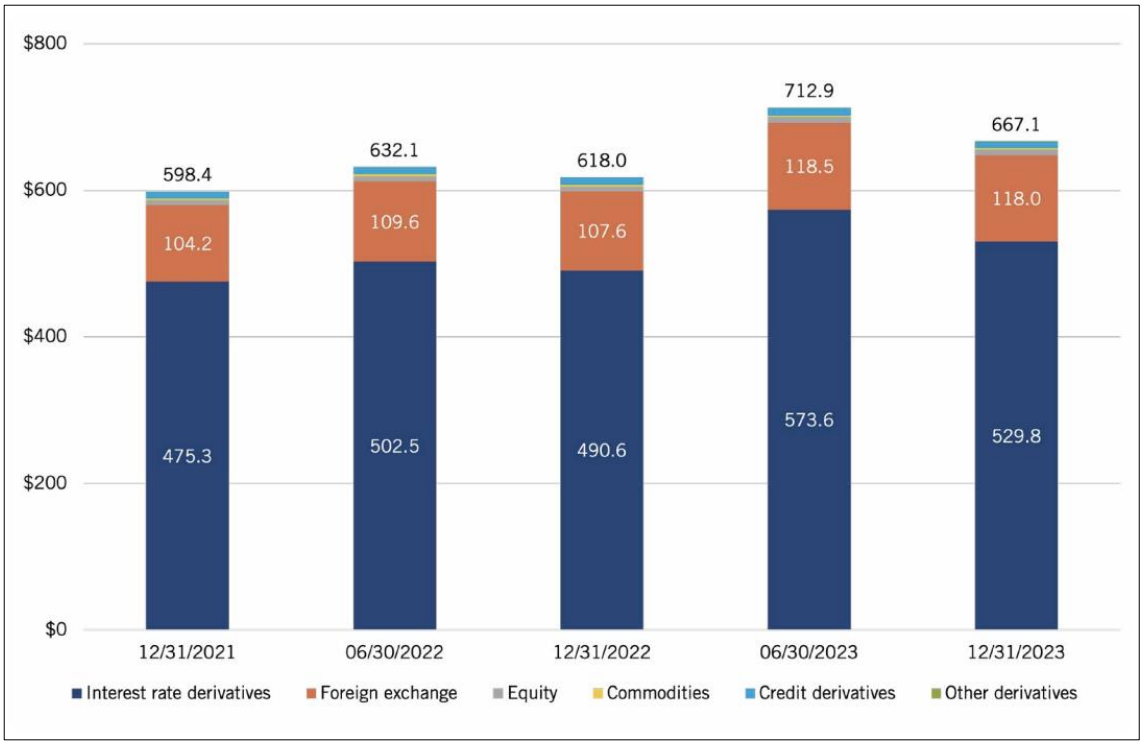

Figure 1. Global OTC Derivatives Notional Outstanding in trillions of USD (BIS OTC Derivatives Statistics 2024)

2.1.1 Forwards

A forward contract is the first type of different derivatives. The forward contract is one of the most commonly used financial derivative instruments, especially in foreign exchange. It is an agreement made by two counterparties that allow to buy or sell an asset at a certain time in the future for the price agreed already at the contract stage. For-ward contracts are typically traded on the OTC markets between two financial institutions or between the institution and one of its customers. The easiest way to think of a forward contract is to imagine a spot contract, but the deal itself occurs to take place on some other day in the future, not as an agreement date. (Hull 2017: 28.)

In the forward contract, the one who agrees to buy the underlying asset for an earlier specified price has a long position, and the one who is agreed to sell the underlying asset has a short. The most common use for forwards is hedging the future cash flows. For example, a British company knows that it has to pay a million euros in 6 months and

wants to hedge against movements in exchange rates. It can buy a 6-month for-ward contract at a specified exchange rate and be sure about the actual cost of the payment of the deal in pounds. Whether the contract was profitable or not depends on the exchange rates of the asset's spot price at the maturity of the contract. (Hull 2017: 28.)

Consider the position of the company in that one million euros trade mentioned earlier. If the deal authorizes the company to buy one million worth of euros for 870 000 pounds, the exchange rate of 0,87 pounds equals one euro. But the spot exchange rate rose to 0,9 at the end of the maturity of the contract. The forward contract would be worth 900 000 GBP – 870 000 GDB = 30 000 GBP for the company's benefit. It would allow the company to buy one million worth of euros for the rate of 0,87 instead of the spot price of 0,9. But on the other hand, if the exchange rate would have fallen to 0,85 at the end of the maturity, the contract would negatively value the company, but the short position holder would have made 20 000 GBP profit. (Hull 2017: 29.)

The payoff from forward contract in a long position in is

$$S_T - K$$

Where K is the delivery price agreed earlier when making the forward contract and S_T is the spot price of the underlying asset at the end of the contract maturity. This because the contract holder is agreed to buy an asset worth S_T with the pre-agreed value of K. On the other hand, in a short position, the outcome of the forward contract is determined

$$K - S_T$$

Payoffs for both sides of the counterparties can be profitable of unprofitable depending on the exchange rate’s spot price at the end of the maturity. Since the forward contracts are free of charge to enter and you don't have to pay any premium, the payoff is always

the contract's total outcome. Illustrated below is the payoff from both a short and a long exposure counterparties perspective. (Hull 2017: 29.)

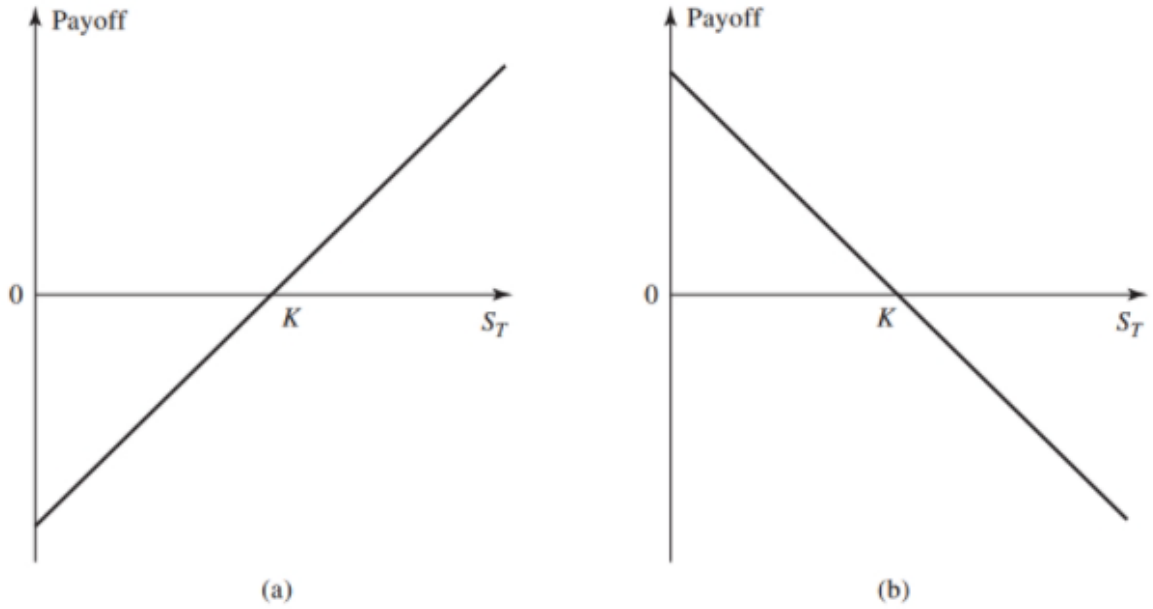

Figure 2. Payoff from (a) long position and (b) short position in a forward contract. K = delivery price agreed when making the contract, S_T = price of the asset at the end of the maturity

2.1.2 Futures

Future contracts are in many ways a lot like forward contracts. It is also an agreement between two parties that allows one to buy and another to sell an asset at a specific time after the maturity for a pre-agreed price. (Hull 2017: 30.) When forward contracts take place in over-the-counter (OTC), futures contracts are traded on exchanges. Future contracts are like forward contracts, but with the standardized features made by the exchange. Futures are also more regulated, and two parties of the deal don't usually know each other. In futures contracts, the exchange also works as an intermediary who assures the parties that the transaction will take place at the end of the maturity. (Gottesman 2016: 40 - 41.)

2.1.3 Options

An option contract is a deal agreed with two counterparties that give the right to buy or sell an underlying asset at the certain agreed date for a certain agreed price. Unlike forward and futures contracts, option contracts are not obligated to make a transaction at the end of the maturity. Options are traded in both OTC markets and also in exchanges. The majority of the options traded in exchanges are *American options* that give the right to exercise at any time up to the expiration date. The other variation of options is *European options* that can only be exercised at the end of the maturity. One equity option contract traded in the exchange usually contains an agreement to buy or sell 100 shares of the underlying asset. (Hull 2017: 30-31)

There are two types of options, *call options* and *put options*. The call option provides its holder the right to purchase an underlying asset at a specific price at the end of the contract. On the opposite, put options provide its holder the right to sell an underlying asset at the end of the contract for the price agreed when making a contract. Option contract contains price, which is known as the *exercise price* or *strike price.* The options contracts can last from few days to several months, and the date is known as *maturity* or *expiration date*. In the exchanges, there are a lot of options with different maturities for popular assets. (Hull 2017: 30 - 31)

A call option contains two counterparties: *the long call* and the *short call.* The long call gives the position holder permission to purchase an underlying asset at a certain price at the expiration date. Hence, the long call holder is free to decide whether or not to buy the underlying assets. The short call has to sell the asset at the certain price if the long call exercises its right the purchase the underlying asset at the strike price. However, because the short call is obligated to sell the asset at the strike price, the long call has to pay a free for providing this right to short call. The fee is known as the *call premium* or just simply *premium*. The premium is paid to short call immediately when option contract is agreed. (Gottesman 2016: 43 – 44.)

Because the long call is not an obligation, it can expire either profitable or worthless. If it expires worthless, its value is 0, and the loss is only the premium paid to short call. If the contract expires profitable, the profit is underlying assets price at the expiration date minus strike price. If the option expires worthless, the short call can keep premium paid, and from that angle, it expired profitably. But if the price of the underlying asset is more than the strike price, the short call expires unprofitable, and the short call has to pay the difference to the long call. (Gottesman 2016: 46 – 47, 49 – 50.)

Below is payoff from the contract at the expiration date and P&L for both counterparties:

	The exercise decision at expiration	**Long call Payoff**	**Long call P&L**
$S_T > K$	The option will be exercised, as $S_T > K$	$S_T - K$	$S_T - K - c_o$
$S_T \leq K$	The option will not be exercised, as S_T *is less or equal than K*	0	$-c_o$

Figure 3. Long Call Payoff and P&L, K = underlying assets price at the expiration, S_T = strike price, c_o = the premium

	The exercise decision at expiration	**Short call Payoff**	**Short call P&L**
$S_T > K$	The option will be exercised, as $S_T > K$	$K - S_T$	$K - S_T - c_o$
$S_T \leq K$	The option will not be exercised, as S_T *is less or equal than K*	0	c_o

Figure 4. Short Call Payoff and P&L, K = underlying assets price at the expiration, S_T = strike price, c_o = the premium

Like a call option, also a put option has two counterparties: The long put and the short put. These contracts are in many other ways also similar. As the long option gives the right to buy, the put option gives a right to sell an underlying asset at a certain price. Like in call option also in put option selling is not an obligation so long put holder can decide

whether sell the asset or not. The short put is obligated to purchase the underlying asset at a certain strike price if the long put chooses to sell it. (Gottesman 2016: 65 – 66.)

Because the long put is not obligatory, it can expire either profitable or worthless. Like in the call option contract, the long put has to pay the premium to the short put. If the asset's price is more than the strike price, the option expires worthless, and the short put profits the amount of premium. If the price of the underlying asset is less than the strike price, the short put has to pay the difference to the long put, and the long put expires profitable. (Gottesman 2016: 68 – 69.)

Below is payoff from the contract at the expiration date and P&L for both counterparties:

	The exercise decision at expiration	**Long put Payoff**	**Long put P&L**
$S_T \geq K$	The option will not be exercised, as *K is greater than* S_T	0	$-p_o$
$S_T < K$	The option will be exercised, as $K > S_T$	$K - S_T$	$K - S_T - p_o$

Figure 5. Long Put Payoff and P&L, K = underlying assets price at the expiration, ST = strike price, co = the premium

	The exercise decision at expiration	**Short put Payoff**	**Short putP&L**
$S_T > K$	The option will not be exercised, as *K is greater than* S_T	0	p_o
$S_T \leq K$	The option will be exercised, as $K > S_T$	$S_T - K$	$S_T - K + p_o$

Figure 6. Short Put Payoff and P&L, K = underlying assets price at the expiration, S_T = strike price, p_o = the premium

2.1.4 Swaps

A swap is an agreement made by two companies to exchange cash flows with each other in the future. Swap deals are made in OTC markets, and the agreement defines when the cash flows will be paid and how the price paid will be calculated. In OTC can be many ways to determine the terms of the contract. Still, the calculation usually involves the future value of some market variable, such as an interest rate or an exchange rate. The easiest way to understand a swap contract is to think of it as a more complex version of the basic forward contracts. (Hull 2017: 785 – 786.) According to a statistic by Bank of international settlements (2021), the interest rate swaps cover 59,9% of the entire notional amount of OTC markets, while currency swaps are 4,3% in the H1 of 2020. However, in this study, we are focusing on currency swaps.

In a cross-currency swap, two counterparties of the deal, usually multinational companies from two different countries, agree to switch pre-agreed amounts in their own country's currency in exchange for a foreign currency. The most common cross-currency swap type is a *fixed-for-fixed currency swap*, which means exchanging the capital and interest payment at a fixed rate in one currency. The swap contract requires the capital to be determined in both currencies, and the amount of money is usually calculated to be approximately equal using the exchange rates. The capital is usually paid at the beginning of the contract. The capital is returned to its original owner at the end of the maturity. However, values may have been changed significantly due to changes in exchange rates. (Hull 2017: 190 – 191.)

The basic example of the cross-currency swap is when a European company makes 5-years agreement on the currency swap with an American company. The European company gives 10 million euros with an interest rate of 5% in exchange for 11 million dollars with an interest rate of 6%. At the beginning of the contract, the European company pays 10 million euros to the American company and receives 11 million USD.

For the next five years, it pays a 6% interest rate in dollars to the American company and receives a 5% interest rate in euros, as shown below.

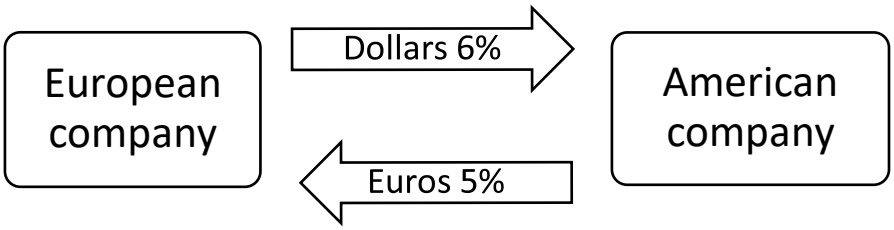

Figure 7. A currency swap contract

At the end of the swap's maturity, the original commitments are returned to the original owner. The European company receives its 10 million EUR and the American company its 11 million USD. However, the changes in exchange rates may have significantly affected the actual amount of capital. (Hull 2017: 191 – 192.)

3 Currency risk management

This section of the theory examines the theoretical background of risk management related to currency and, more especially, foreign exchange risk. First, we look through the foreign exchange risk. What it means and what kind of action it creates for different companies. We then discuss how this risk can be prevented and, in particular, how it is done through derivatives. Finally, the final section explains how different types of derivative instruments can be used in currency hedging to mitigate the company level's foreign exchange risk.

3.1 Foreign exchange risk

There is no individual currency that is globally used in every part of the globe. Many different currencies often lead to a situation where you cannot trade in another country's markets with your local currency. The issue can be solved by exchanging your local currency for the country's currency where the transaction takes place. Markets, where these exchanges occur from one currency to another, are called foreign exchange markets. In this market, each currency has its spot price, which is called the exchange rate. In the exchange markets, there are prices for every exchange between each pair of currencies. (Gerdes 2014: 21.)

The exchange rates can be either floating or fixed. Fixed rates mean that the currency's exchange rate is pegged to another currency's rate. When converting another currency to the pegged one, you will always get the same amount with the exact exchange rate. Another option is a floating rate. The floating rate means that the conversion rate of one currency is not linked with any other currency's exchange rates. A currency with floating rates is free to float in one direction or another without any tied forms. (Friedman 1989.)

There are multiple reasons why each of the two alternatives is good or bad. Having a fixed rate gives a country/area more stability and predictability on currency movements.

However, countries with fixed rates are more susceptible to the markets' shocks. On the other hand, floating rates are more unpredictable due to the environment of freely changing exchange rates. However, floating rates allow a country to use monetary policy for its purposes, which may help the country's economic situation, especially during recessions and shocks. Currencies with fixed exchange rates don't have this option. But being able to use monetary policy makes the currency way more unstable than currency with fixed rates. (Friedman 1989.)

Multinational corporations that operate in different world parts or trade with foreign countries have to pay attention to hedging the risk ignites due to changing currency rates. Varying rates can affect highly on company's cashflows and as well as its profits and numerical profitability. Changes in foreign currencies also effect on company's market value as well as its book value. The main risk factors associated with changing rates between foreign currencies are generally divided into three categories which are: transaction risk, translation risk, and economic risk. These are explained in more detail below, starting with the transaction risk. (Hiller 2008: 778.)

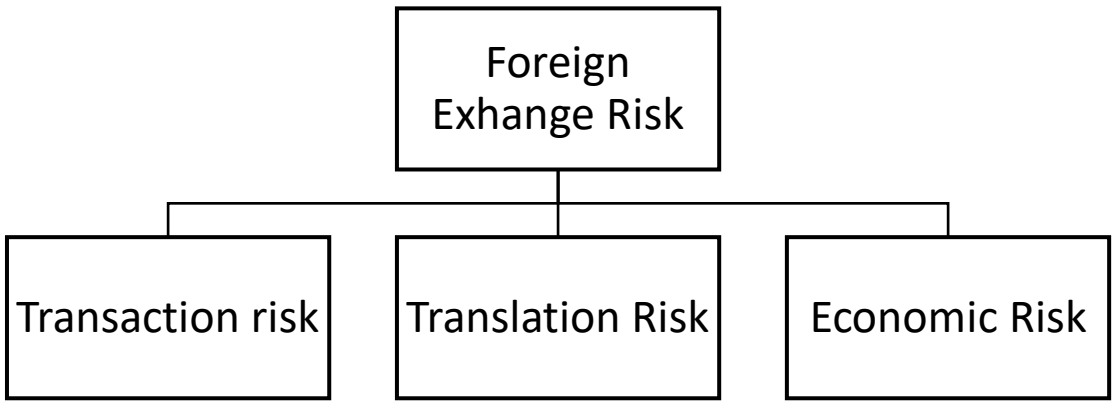

Figure 8. Currency risk components

3.1.1 Transaction risk

Transaction risk is a risk factor that only represents the direct effect of changing exchange rate, which occurs to the amount of cash flow. The company is constantly exposed to transaction risk when it buys or sells a product priced in a foreign currency if buying or selling on credit without hedging the exchange rate. For example, if a European company buys phones from the United States for 10 million US dollars. According to Bloomberg (2021), one USD is roughly 0,85 €, so the deal's total amount is € 8,5 million. If the payment requirement is six months, there are six months for currency to appreciate or depreciate during the deal timeline. Suppose the USD appreciates and the exchange rate for one USD is 0,9 EUR. In that case, the deal's price rises to 9 million euros rather than 8,5 million, which the European company originally expected the deal to cost. (Hiller 2008: 778 – 779.)

Hedging against the transaction risk is a relatively easy and highly recommendable thing to do. For example, in the example above, the European company may try to get a payment and the deal through in euros rather than in USD. However, in this situation, transaction risk transfers to the company from the United States, so it is not likely for the company to be willing to take the risk. Alternatively, the European company would enter into a forward contract to buy 10 million USD at the pre-agreed EUR/USD exchange rate with six months contract to be sure about the exact price to pay in euros for the phones worth 10 million USD. (Hiller 2008: 779.)

This type of hedges are typically pretty straightforward and commonly used in business around the world. These hedging instruments are usually short-term additions that can be profitable or unprofitable. (Hiller 2008.) For example, in an earlier example of the USD would have depreciated, European company would have made a loss compared to the actual costs. On the other hand, it is still more valuable to have an exact estimate of the future cash flows, and therefore companies tend to hedge their future cash flows volatility. (Smith & Stulz 1985.)

3.1.2 Translation risk

Translation risk occurs because a foreign holding in foreign currency has to be converted into domestic currency when making a consolidated statement. Usually, this means statements of the foreign subsidiary's when making a consolidated statement of the parent. Subsidiary's book value in the parent company's local currency can vary significantly depending on the appreciation or depreciation of the foreign exchange rate. (Hiller 2008: 779.)

Companies need to manage translation risk because changes in value related to exchange rates usually reflect fundamental economic changes that affect a company's future profitability. However, translation risk can be an important consideration even when an exchange rate change does not directly affect a company's cash flows if it has contracts whose terms depend on its book value. For example, many loan covenants require companies to keep their debt-to-book ratio above a certain level throughout the loan period. In such cases, degreases in a subsidiary's book values may create loan covenants violations due to the exchange rate changes. Covenant violations can be costly, so companies may find it beneficial to hedge against such threats. (Hiller 2008: 779.)

3.1.3 Economic risk

Economic risk means the situation where a company may lose the competitive advantage achieved in some countries due to movements in exchange rates. It is more long-term and not so easy to analyze than two other risk factors of exchange risk. The easiest way to understand economic risk is to think of a situation where competitors from two different countries compete in the thirds country's markets. For example, Swedish and Russian companies are competing in Finland. If the rubles exchange rate compared to the Swedish krona weakens with euros exchange rate remaining stable. The Russian company can lower its prices in Finland without losing ruble-denominated income while also increasing its competitive advantage over the Swedish company. (Hiller 2008: 779 – 780, 782.)

Unlike two other risk factors related to foreign exchange risk, economic risk is way more complicated and not so effective to hedge. Hence, successful economic risk hedging requires knowledge of the current and long-term effects of exchange rate changes on the company's cash flows. (Hiller 2008.) Therefore, most of the multinational companies hedge against transaction and translation risk (at least to some extent), but don't do it against the long-term economic risk (Chang, Hsin & Shiah-Hou 2013).

3.2 Hedging the Currency risk

The study conducted by Allayannis and Ofek (2001) investigated the reasons why companies use currency derivatives. Their research indicates that these financial tools are not primarily utilized for speculation but rather for managing and reducing risks related to exposure in floating currencies. The data they collected suggests that firms can mitigate their exposure to fluctuations in exchange rates by using derivatives as a form of hedging. Therefore, the primary objective of using derivatives is to stabilize a company's earnings by decreasing the level of volatility in its exchange rate exposure.

However, more recent study constructed by Bodnar (2011) shows a bit different result. According to paper, 50% of the 1161 global companies participating in the survey stated that company's market view and expected future events being important factor when building the currency hedging strategy.

Moreover, it is essential for stakeholders to understand the purposes and intentions of nonfinancial companies using derivatives. Corporate use of derivatives can adjust the risk profile of a company's stock, which can affect its value on the market. Regulators are also concerned about the potential involvement of derivatives in accounting controversies and the broader market stability, especially given the role that derivatives played in recent financial crises. Furthermore, it is important to acknowledge the potential impact of new regulations on OTC derivatives, which may lead to reduced access and increased costs, and how it may affect end-users' behavior. (ISDA, 2015).

3.2.1 Currency risk exposure

The key element of being able to reduce the risks related to foreign currencies is to 1. Determine the exposure to foreign currencies and 2. Decide how much of the risk company is willing to take and how much company is willing to pay for lowering the costs to certified levels (Henderson 2006.) Measuring the exposure company is facing can be measured in multiple ways. The most common and straightforward way of analyzing different risks and generating suitable hedging practices was introduced by Adler and Dumas in 1984. They explained a regression model that examines the company's unhedged cash flows and indicates how these have performed historically in relation to the risk factor. This helps identify the firm's risk position, which is the key to managing its exposure. See equation 1. below.

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

where :

R_{it} = stock return of a firm

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

β_i = firm’s exposure to exchange rate

e_{it} = error term

We can apply this regression model as a time series regression model by incorporating exchange rates and firm values, as depicted in the equation mentioned earlier. This particular approach was initially developed by Jorion (1990). In this equation, variations in company valuations serve as the dependent variable, while changes in exchange rates act as the independent regression variables. The authors prioritize using a company's share price as its value since the share price of the company should reflect, as closely as possible, the company's total value.

The simulation method, introduced by Hillier et al. (2012), is a way of estimating risk that concentrates more on future events. The method involves using multiple forecasts of various outcomes to estimate the possible cash flows that can occur under different assumptions. This forward-looking approach can be an advantage over the simple regression model, which is based on history. However, there is a potential disadvantage in that the risk analyst needs to estimate future returns and cash flows, which can affect the outcome in an unreliable way if the estimates are not accurate. Furthermore, the forecasts can be biased and may not be precise, which is a disadvantage of the simulation method.

3.2.2 Hedging incentives

Risk management has evolved into a separate corporate function since it was first discovered in the 20th century. After World War II, companies with diverse assets began self-insuring against risks, and in the 1970s, financial risk management expanded beyond market insurance coverage. Today, risk management encompasses a range of activities, including self-insurance, advance-based risk mitigation, and self-protection.

In the beginning, self-insurance involved setting aside funds to cover losses, while advance-based risk mitigation reduced financial consequences related to natural disasters. Self-protection activities aim to reduce the likelihood and impact of losses through measures such as accident prevention and preventive measures. The evolution of risk management reflects the growing recognition of its importance in mitigating risks and protecting assets.

According to Söhnke M. Bartram (2019), recent regulations on derivatives markets have raised concerns among end-users due to limited access and higher costs. This has led to the question of how the new regulation will impact corporate risk. While derivatives are versatile financial instruments that can be used for hedging and speculation, the academic risk management literature primarily assumes a hedging motive for corporate derivatives use. In order to analyze the relationship between the use of financial

derivatives and various corporate risk measures, this paper aims to assess whether nonfinancial firms consistently employ derivatives for hedging purposes or with speculative motives.

The paper by Bartram (2019) highlights that, based on a sample of 6896 firms from 47 countries, firms employ derivatives to mitigate risk, and there is no evidence of corporate speculation with derivatives at the individual country level or across different types of derivatives. However, firms using commodity price derivatives exhibit marginally higher net commodity price exposure. These findings hold true across different countries and remain robust even when accounting for variations in country risk, such as exchange rate or interest rate volatility, political risk, and trade dependency. Firms utilize derivatives for hedging purposes regardless of country-level corporate governance or access to derivatives.

3.2.3 Value at risk

Different stakeholders need to understand the level and likelihood of various risk factors related to the company. Therefore, Value at Risk (VaR) was introduced to provide this essential information. VaR is a widely used risk management tool that provides a quantitative estimate of the potential loss in a portfolio due to market movements. It is a statistical measure that calculates the maximum loss that a portfolio could experience over a specific time horizon with a given confidence level. VaR is used by financial institutions, investment firms, and risk management departments to evaluate the market risk of their portfolios. (Dionne, 2019)

VaR is based on the assumption that financial markets follow standard distribution patterns. The calculation of VaR involves estimating the mean and standard deviation of the returns of the portfolio assets and then determining the loss that is unlikely to be exceeded with a certain degree of confidence. For example, a 99% VaR would indicate that there is a 1% chance that the actual loss will exceed the VaR estimate. The time

horizon of VaR can range from daily to annually, depending on the frequency of portfolio evaluations. (Dionne, 2019)

A graph illustrating the 99% VaR indicates that there is a 1% probability that the actual loss will surpass the VaR estimate. For instance, if a portfolio has a VaR of $5 million at a 95% confidence level, it implies that the portfolio is projected to incur losses exceeding $5 million on only 5 out of 100 similar trading days. VaR serves as a benchmark for risk management, performance evaluation, and regulatory purposes.

VaR has become an important risk management tool as it provides a concise summary of market risk. It helps financial institutions and investment firms to make informed investment decisions, set risk limits, and monitor the risk exposure of their portfolios. VaR is also useful for regulatory purposes, as it provides regulators with a clear and consistent measure of the market risk of financial institutions. (Dionne, 2019)

However, VaR has some limitations and limitations. Firstly, it assumes normal market conditions, and the accuracy of VaR decreases in times of market stress, when financial markets tend to exhibit non-normal behavior. Secondly, VaR only considers the magnitude of potential losses and does not consider the probability of occurrence of these losses. To address these limitations, VaR has been supplemented by other risk management tools, such as Conditional Value at Risk (CVaR), which focuses on the distribution of potential losses beyond VaR. (Dionne, 2019)

3.3 Derivates in currency hedging

In this section, we will look in more detail at the different strategies of hedging against currency risk. We will go through three common options and explain their specificities in more detail.

3.3.1 Hedging with Futures:

The easiest method of hedging against currency risk is using futures contracts. Futures markets provide a platform for individuals and companies to set positions that neutralize potential losses associated with adverse price movements. For instance, if the company expects to receive a specific amount of foreign currency in the future but is concerned about the volatility of exchange rates. This event can happen, for example, when the company is selling hardware with pre agreed price in foreign currency. By taking a short futures position, the company can protect itself from potential losses caused by a decrease in the currency's value. On the other hand, a long futures position can help mitigate losses resulting from a currency's appreciation. (Hull 2022.)

The principle behind hedging with futures is to neutralize the risk as much as possible. When the hedger already owns the underlying asset or anticipates owning it in the future, they can set a short hedge futures contracts and mitigate the risk related to volatility and fluctuation of the currency. This position ensures that any losses incurred due to adverse price movements are offset by gains in the futures market. Similarly, a long hedge can be established by taking a long position in futures contracts to protect against potential price increases. (Hull 2022.)

3.3.2 Hedging with Currency Options:

Another method of managing currency risk is through the use of currency options. Currency options provide the holder the right, but not the obligation, to buy (call option) or sell (put option) a specific amount of currency at a predetermined exchange rate, known as the strike price, on or before the option's maturity date. This flexibility allows companies to protect themselves against unfavourable exchange rate movements while still benefiting from favourable fluctuations. (Hull 2022.)

By purchasing put options, a company can hedge against a potential decrease in the value of a foreign currency. This strategy sets a minimum exchange rate, ensuring that

the company will not suffer losses below the strike price. On the other hand, buying call options can protect against an increase in the currency's value, limiting the maximum cost of the transaction. Currency options provide a level of insurance against adverse movements in exchange rates, allowing companies to manage their currency exposure more effectively. (Hull 2022.)

3.3.3 Hedging with Range Forwards:

Range forwards offer a variation of standard forward contracts for hedging foreign exchange risk. A range forward contract involves the combination of buying a put option with a lower strike price and selling a call option with a higher strike price. This strategy allows companies to establish a predetermined range within which the exchange rate will be fixed. (Hull 2022.)

For example, a company expecting to receive a certain amount of foreign currency in the future could enter into a range forward contract by buying a put option with a lower strike price and selling a call option with a higher strike price. If the exchange rate at maturity falls within the specified range, the company will receive the current market rate for the currency. However, if the exchange rate exceeds the upper or lower strike price, the company's exposure is limited to the pre-agreed range. (Hull 2022.)

Range forwards provide companies greater flexibility and control over their currency risk management. By defining a range of acceptable exchange rates, companies can protect themselves against extreme fluctuations while still benefiting from favourable movements within the established range. (Hull 2022.)

In conclusion, hedging currency risk can be achieved through various strategies such as futures contracts, currency options, and range forwards. Each method offers unique advantages and allows companies to mitigate potential losses arising from unfavourable changes in exchange rate movements. By using these hedging techniques, businesses

can better manage their currency exposure and reduce the uncertainties associated with volatile foreign exchange markets. (Hull 2022.)

4 Literature review

According to Hillier (2012) and the finance theory, corporate hedging offers several advantages, such as reducing the expected costs of financial distress, addressing the underinvestment problem, and minimizing corporate tax liability. Empirical research has identified various incentives for companies to engage in hedging activities. The relationship between hedging and the company market value has been widely studied, but a conclusive agreement regarding the impact of derivatives on company value remains inaccessible. However, the majority of evidence suggests that derivatives are more likely to contribute to the value creation for companies rather than affecting negatively on the value.

4.1 Why do companies use derivatives for hedging?

According to Bruno Biais, Florian Heider, and Marie Hoerova (2016), derivative markets have a great potential to enhance risk-sharing opportunities but can also lead to increased risk-taking in the financial sector. The study focuses on hedging within an optimal contracting framework with moral hazard. It is found that a moral hazard problem arises when the protection seller becomes aware of potential losses. This problem undermines risk-prevention incentives and limits the scope for risk-sharing, leading to endogenous counterparty risk.

The analysis demonstrates that margin deposits can improve risk-sharing and provides insights into optimal margin requirements. When a financial institution with risk-exposed assets seeks to hedge, it enters into a risk-sharing contract with a protection seller. However, bad news about the underlying risk of the derivative trade transforms the position into a liability for the protection seller, reducing their incentives to mitigate downside risks. This liability embedded in the derivative trade can result in the default of the protection seller and generate counterparty risk for the protection buyer.

The research suggests that margins play a crucial role in enhancing insurance and discouraging risk-taking. Variation margins, which require the protection seller to liquidate risky positions after bad news, help mitigate the incentive problem. Initial margins, on the other hand, prevent the accumulation of excessive derivatives positions. The model predicts that financial institutions engaged in derivatives trading are more likely to take on risk when their balance sheets are perceived to be safe which may lead to potential volatility paradoxes.

In a paper by Söhnke M. Bartram (2019), concerns arise among end-users regarding limited access and higher costs resulting from recent regulations on derivatives markets. The study aims to understand the impact of these regulations on corporate risk and examines whether nonfinancial firms use derivatives for hedging or speculative purposes. The findings indicate that, overall, firms use derivatives to reduce risk rather than for speculation. The use of derivatives for hedging purposes is consistent across different countries and independent of factors such as corporate governance or access to derivatives. However, countries with stronger creditor rights experience lower reductions in stock return volatility, while those with easier access to derivatives observe larger risk reductions. These results suggest that policymakers should encourage the development of local-currency derivatives markets to facilitate corporate hedging activities and reduce financial risks for firms.

Brunzell et al. (2011) adds to the existing literature by providing insights into the derivatives market with evidence from Nordic countries. The study analyzed data from 2006, examining 112 publicly listed firms across Finland, Denmark, Iceland, and Sweden. The researchers were in contact with the firms, collecting data on the motives behind firms' use of derivatives and analyzing the possible positive impact on the market value of firms. After all, the study revealed a positive correlation between hedging activities and higher firm value. It is also good to note that the study found hedging activities to be highly more common in more major and less risky firms. Interestingly, while risk management remains the primary reason for using derivatives, nearly half of the firms

also employ them for profit-making purposes. Contrary to expectations, they find that long-term debt is negatively related to hedging activities, and smaller firms may achieve more significant benefits from hedging than larger ones.

4.1.1 The Role of Employee Treatment in Hedging

In the study by Pinghsun Huang, Hsin-Yi Huang, and Yan Zhang (2019), the authors investigate the relationship between a firm's workforce and its risk management policy. The study is influenced by the theory put forward by Titman (1984) and Smith and Stulz (1985), which suggests that the welfare of a firm's nonfinancial stakeholders, including its employees, can play a role in the formation of its policies, including hedging activities aimed at reducing risks. The authors focus on a sample of firms with foreign sales, as these firms are more likely to face exchange rate risk.

The study's results support the idea that a firm's employee treatment is linked to its currency risk management. The authors show that the fraction of overseas sales hedged by a firm using foreign currency derivatives is positively related to its employee treatment score. This result is robust to various risk management rationales and various forms of endogeneity bias, heteroskedasticity, and serial correlation. The authors also find that the relationship between employee treatment and currency hedging is closely tied to the cost and importance of human capital in a given firm. Firms operating in competitive industries with unique products or whose success is more dependent on labor inputs are more likely to consider employee interests when forming their hedging policies.

Overall, the study by Pinghsun Huang, Hsin-Yi Huang, and Yan Zhang (2019) provide evidence that a firm's employee treatment can play a role in its risk management policy, particularly in the area of currency hedging. The results suggest that firms that value and invest in human capital are more likely to consider employee interests in their hedging decisions.

4.2 The effect of the use of currency derivatives

4.2.1 The Effects of Derivatives on the firm value

The paper by Bartram, Brown and Conrad (2011) uses a large sample of firms from 47 countries to analyze the impact of derivative use on risk and value measures. In univariate tests, they found that derivative use is more common in firms with higher exposures to various types of risks. Still, despite this higher exposure, these firms had lower estimated values of both total and systematic risk. This suggests that derivatives are being used to hedge risk rather than for speculative purposes. The authors then conducted a multivariate test using propensity score matching to determine the impact of derivative use on risk and value measures.

Their results showed that compared to firms that do not use derivatives, firms that do use the instruments have lower cash flow volatility, idiosyncratic volatility, and systematic risk, and these results are robust to different matching specifications. The authors also found a weak statistical significance of a value premium associated with derivative use, similar to the evidence found in Allayannis and Weston (2001). The authors explored the possibility of selection bias in their results and found that the effects of derivative use on risk measures are robust, but the value effects are sensitive to selection bias.

Finally, the authors found that the reductions in risk they found were unlikely to be specific to their primary sample period and that market betas varied in a way that was consistent with firms hedging downside risk, which could impact a firm's investment policy and economic profitability. In further analyses, they explored whether a firm's access to derivative markets or type of derivative use affected the effects of derivatives on a firm's risk and value but found little evidence of variation. However, they caution that the cross-sectional differences in their sample were too small, and the estimates of the benefits of derivative use on risk were too large to make a definitive claim about the impact of new derivative rules on firms' risk management.

A survey of CFOs from 36 countries by Lins, Servaes, and Tamayo (2011) indicates that these rules on fair valuation and hedge accounting have substantially reduced foreign exchange hedging, as well as the use of nonlinear hedging instruments. Nevertheless, FAS 133 might have changed firms' risk management behavior by pushing them to hedge more effectively. Although Choi et al. (2015) did not observe any significant change in the median notional derivative ratio (notional derivatives scaled by total assets) before versus after FAS 133 implementation, it is possible that firms alter their risk management strategy by employing a more significant portion of derivatives that qualify for an effective hedge under FAS 133. A potentially attractive opportunity for future research includes the investigation of whether and to what extent FAS 133 has influenced hedging effectiveness and corporate risk management strategies and how this varies for firms with different operational, managerial, and governance profiles.

Bae, Sung C., Kim, Hyeon Sook & Kwon, Taek Ho (2017) studied currency derivatives used for hedging purposes and those's impacts on company risk and performance for Korean companies. The research involved different methodologies compared to previous studies and found that companies with high exchange rate exposures engage in more significant transactions of currency derivatives. However, 2SLS regression analyses revealed that Korean companies' increased usage of currency derivatives did not lower business risk. In fact, the higher number of sell transactions of currency derivatives was associated with higher company risk.

Regarding the impact of currency derivatives on company performance, the study found that higher currency derivatives transactions were associated with higher market-based performance but had little effect on accounting-based profitability measures. The use of currency derivatives by companies with high exposures was linked to lower asset values and lower company risk. Still, the reduction in risk was not materialized into higher asset value. These findings imply that proper management of currency derivatives hedging strategies is essential, as mismanagement of hedging strategies or excessive costs

associated with hedging can lead to ineffective hedging. The results highlight the importance of optimal hedging implementation, and cost-benefit analysis of currency derivatives use.

4.2.2 The impact of Derivative Hedging on Fair Valuation

Barton (2001) shows that the two methods of smoothing earnings—an "artificial smoothing" through abnormal accruals and a "real smoothing" through derivatives hedging—were partial substitutes for Fortune 500 firms during 1994–1996. Pincus and Rajgopal (2002) also showed that oil and gas firms appeared to manage earnings volatility by sequentially trading off derivative hedging and abnormal accruals to smooth income for 1993–1996. However, implementing FAS 133 in June 2000 introduced new uncertainty into the equation. FAS 133 mandated the fair market valuation of derivatives, requiring firms to examine the extent to which derivatives are effective at hedging. It also mandated an immediate recognition of the ineffective portions of cash flow hedges. This led to the practitioner's concerns that derivative hedging might have become less effective as a tool of income smoothing, implying that volatility of reported earnings may have increased post-FAS 133.

Choi, J. J., Mao, C. X., & Upadhyay (2015) conducted research using detailed data on financial derivatives for nonfinancial firms in the S&P 500 index for the period from 1996 to 2006. Authors found that derivatives and accruals were substitutes in the pre-FAS 133 periods, but this relation weakened after implementing FAS 133. The authors found a complementary connection between derivative hedging and discretionary accruals in the post-FAS 133 periods. The results are robust to using alternative derivatives and accrual management measures. Additional analyses indicate that the findings are not driven by contemporary events, including SOX, changes in accounting quality, the dot-com bubble and bust around 2000, and macroeconomic shocks in interest rates and foreign exchange rates during the sample period. Additionally, it is documented that the FAS 133 standard correlates with an increase in earnings volatility linked to the usage of

derivatives. However, this correlation is only observed in companies with relatively low accrual management levels.

4.2.3 Does Currency Hedging contribute to the continues value creation?

The study made by Durán Santomil, Pablo, Fernández López, Sara, Otero González, Luis, et al. (2015) analyzed the impact of currency hedging on firm value in the Spanish market. The sample consists of 100 companies over the years between 2004–2007 and analyzed value creation through currency hedging. The authors applied a dynamic panel methodology using GMM to control for unobservable heterogeneity and endogeneity problems. The results showed that hedging with derivatives and foreign currency debt positively affects firm value. Specifically, the authors found that hedging with derivatives generated an average premium of 1.53% with respect to firm value approximated by Tobin's Q, while foreign currency debt generated a premium of 7.52%.

The study also demonstrated that the contribution of currency hedging to company value varies depending on the volume of hedging with these financial instruments. The authors argue that using dummy variables to study the decision to hedge can result in biased results because it assumes a homogenous treatment of firms regardless of hedging volumes. The authors found that their results are robust to the use of control variables, to the use of an alternative measure of Tobin's Q, and to the effect of outliers.

The authors acknowledge the limitations of this paper, mainly associated with the availability of information. They propose that future research should focus on gathering qualitative data on other firms' internal hedging practices and improving the quantitative data available. The authors believe that the results of this study can be extended to other countries with open economies, as the Spanish market can be considered well-industrialized and open, and financial decisions by firms are likely to reflect financial criteria rather than governmental controls.

5 Data and Methodology

This study examines the use of currency derivatives as a hedging tool in the Finnish stock market, focusing on Finnish and certain Swedish companies listed on Nasdaq Helsinki. While previous research, such as Brunzell et al. (2011), has examined derivative usage in the broader Nordic region, studies targeting the Finnish public market as a whole, from the most prominent companies to the most minor in the First North list, are quite limited. Furthermore, earlier research often considers various types of derivatives, whereas this study narrows the scope to currency derivatives only. This section outlines the characteristics of the data, detailing the inclusion criteria, limitations, and motivations behind the selection of variables. It also provides descriptive statistics, followed by a discussion of correlation coefficients, research methodologies, and regression models.

5.1 Data

The dataset consists of companies listed on Nasdaq Helsinki from 2019 to 2023, including Finnish companies as well as Swedish firms such as Ericsson, SSAB, and Telia Company, which are publicly listed on the Finnish stock market. The financial data for the companies are obtained from the London Stock Exchange Group (LSEG) database. Information on their currency hedging activities is manually discovered from the companies' annual reports and financial statements. Under IFRS 7 regulations and the Finnish Corporate Governance Code, companies are required to disclose their use of financial instruments and risk management practices, making this data available in their reports.

The selection of companies was based on the following criteria:

1. The company was listed on the Nasdaq Helsinki stock exchange between 2019 and 2023.
2. The company's headquarters was in Finland, or the company was an entity listed on the Finnish stock market.
3. The company operated in a non-financial sector.

Companies in the financial sector were excluded to avoid potential biases, as financial firms tend to engage in speculative derivative trading, which differs from the risk management motives of non-financial firms. This exclusion helps maintain consistency with the approach used in prior research. In addition, if a company has multiple shares listed under different tickers, such as Company A and Company B, the most liquid listing has been chosen to represent the company.

After applying these criteria, the final sample includes 160 companies across all the sectors. Of these companies, 73 companies are determined as currency hedgers, while the remaining firms do not actively engage in currency hedging. This distribution provides a balanced comparison between hedgers and non-hedgers, with many firms also involved in hedging other financial risks, such as interest rate risk. Some companies also had the possibility and board of directors' permission to hedge if necessary, but their positions were historically zero, so they were not counted as hedgers in this analysis. Further analysis of other hedging activities will be discussed later in the thesis.

5.1.1 Regression variables

In all regressions, Tobin's Q acts as the dependent variable, consistent with most studies investigating firm value. Currency derivative use is the test variable in all regressions. Tobin's Q is a well-established proxy for a firm's market value, as it allows for comparison across firms of different sizes based on the actual numbers not affected by size or other factors. It is defined as the ratio between the market value of a firm's total assets and the replacement cost of those assets (Equation 2). The market value of total assets is calculated as the total market value of the total company at the end of the fiscal year. The replacement cost of total assets refers to the book value of the firm's total assets (Allayannis & Weston, 2001; Belghitar et al., 2013).

$$(2)\ \text{Tobin's Q} = \frac{market\ value\ of\ total\ asset}{replacement\ cost\ of\ total\ asset}$$

A set of control variables is included in the regressions to control for other factors that could influence the company's market value during hedging. These variables are chosen based on data availability and follow the precedent set by Allayannis and Weston (2001), who found these factors to affect firm market value. Allayannis and Weston's paper has served as a base for future research on the impact of currency derivatives on firm value. Bartram et Al. (2011) and Brunzell (2011) also adopted a similar approach for the more recent studies, while Bae et Al. (2017) also used the study as a baseline, adding a few additional elements to make more accurate findings on different types of derivatives.

By containing these control variables, the study tries to isolate the effect of currency derivatives on Tobin's Q while accounting for other influences. The chosen control variables include total market capitalization, net sales, book value per share, return on assets, dividend yield, leverage, capital expenditures per total sales, research and development to total assets, foreign sales to total sales ratio, and a currency derivatives dummy.

Total market capitalization and net sales are used to measure firm size. Larger firms are more likely to engage in hedging with derivatives due to the scalable benefits and higher exposure to exchange rates. Prior research suggests that firm size, alongside derivatives usage, can impact firm value (Allayannis & Weston, 2001). The total market cap and the firm's yearly revenue are employed to control for firm size.

Return on Assets (ROA) is a performance indicator reflecting profitability. More profitable companies are expected to have higher Tobin's Q values, as they are generally considered more valuable. ROA is calculated by dividing net income by total assets, providing a standardized comparison across companies (Allayannis & Weston, 2001).

Leverage, measured as the ratio of long-term debt to common equity, is included to account for the firm's capital structure. The market generally views high levels of debt financing negatively, as they increase the risk of default. Firms with higher leverage are expected to have lower firm values, so leverage is predicted to negatively influence Tobin's Q (Allayannis & Weston, 2001).

Research and Development (R&D) to Total Assets Ratio is calculated by dividing R&D expenses by the total asset value. This variable captures the firm's investment in innovation and growth opportunities. Companies with higher R&D expenditures are expected to have higher growth potential, which could translate into a higher market value (Géczy et al., 1997).

The foreign sales to Total Sales Ratio measure a firm's geographical diversification. Diversification can increase firm value by mitigating risks related to currency fluctuations, supply chains, and market volatility. A higher ratio is associated with a greater ability to manage exchange rate risks and local market challenges, contributing positively to Tobin's Q (Bodnar et al., 1997). However, a higher ratio also means the total exposure to foreign exchange risk is more significant.

Dividend Yield is calculated by dividing the total dividend payout by the total market capitalization at the end of the fiscal year. Dividend payments are often associated with financial stability, and firms paying dividends are likely to have lower Tobin's Q, as part of their earnings is distributed rather than reinvested for growth opportunities (Allayannis & Weston, 2001).

Currency Derivatives Dummy divides firms into hedgers and non-hedgers. This information is manually collected from annual reports and financial statements by analyzing every company's reports individually and collecting the data accordingly. If a firm has open currency derivative positions during the observation period, it is assigned a value of one, and if it does not, it is assigned a value of zero.

Table 1. Variable list including number of observations and timeline

Variable	No. obs.	Year
MARKET CAPITALIZATION	725	2019-2023
NET SALES OR REVENUES	727	2019-2023
BOOK VALUE-OUT SHARES-FISCAL	722	2019-2023
RETURN ON ASSETS	718	2019-2023
DIVIDEND YIELD	725	2019-2023
TOTAL DEBT % COMMON EQUITY	725	2019-2023
TOTAL DEBT % TOTAL CAPITAL/STD	725	2019-2023
CAPITAL EXPENDT % TOTAL SALES	706	2019-2023
FOREIGN SALES % TOTAL SALES	508	2019-2023
R&D % TOTAL ASSETS	317	2019-2023
Tobin's Q	727	2019-2023

5.1.2 The use of currency derivatives

Based on the data collected, slightly less than half of the companies listed on the Helsinki Stock Exchange (selected data explained earlier) use currency hedging in their business activities. In 2023, approximately 45,63% of the firms in the sample engaged in hedging activities, the highest percentage during the observation period being 50,79% in 2019. Findings reflect the steady use of such financial instruments. This proportion is slightly higher than what Allayannis and Weston (2001) found in their study of U.S. firms. Their observation period, between 1990 and 1995, may account for the lower percentage, as the use of derivatives has increased significantly since the 1990s (Bartram et al., 2011). Another factor that may have a high impact is that in the study by Allayannis and Weston, the sample data had a lower percentage of foreign sales.

Despite the high percentage of firms using currency derivatives, about another half of the sample firms have opted to refrain from hedging against foreign currency risk. The most straightforward explanation is that these firms may not be exposed to foreign currency risk due to the nature of their operations or market focus. However, an interesting finding is that over one-third of companies with foreign sales still do not hedge against the currency risk, the portion being 35,96% in 2023. This could be explained by the fact that many of these firms conduct business within Europe, particularly within the Eurozone, where the common currency mitigates currency risk. Nevertheless, several companies also mentioned in their annual report that they have the possibility to consider different hedging options as the risk increases.

Another notable observation is that a small number of firms without any foreign sales or business activities are still using currency derivatives. This may be due to competitive pressures from international markets, even for firms operating exclusively on the domestic market. International competition may lead these firms to hedge against possible exchange rate fluctuations. Another explanatory factor may be that even if trade is carried out in the domestic currency, it is still possible that, for example, a significant proportion of raw materials is in another currency, exposed to currency fluctuations. However, the vast majority of companies without foreign sales are categorized as non-hedgers, indicating that currency risk management through derivatives is primarily a concern for firms with international operations.

Overall, the findings suggest that firms with foreign sales are more likely to use currency derivatives to hedge against risks than not to use them. Although almost 90% of the companies in the sample recorded foreign sales, only two-thirds hedged their foreign exchange exposure even among these companies, while the remaining third did not. By contrast, companies with no international operations are generally quite likely to refrain from such practices.

Table 2. Summary of the currency derivatives usage in sample firms.

	2019	**2020**	**2021**	**2022**	**2023**
Number of firms	**126**	**129**	**152**	**160**	**160**
Using hedging	64	65	71	73	73
	50,79 %	*50,39 %*	*46,71 %*	*45,63 %*	*45,63 %*
Not using hedging	62	64	81	87	87
	49,21 %	*49,61 %*	*53,29 %*	*54,38 %*	*54,38 %*
Number of firms with foreign sales dataa	**89**	**92**	**104**	**110**	**114**
Have foreign sales	72	75	87	96	102
	80,90 %	*81,52 %*	*83,65 %*	*87,27 %*	*89,47 %*
Do not have foreign sales	17	17	17	14	12
	19,10 %	*18,48 %*	*16,35 %*	*12,73 %*	*10,53 %*
Hedgers with foreign sales	53	57	59	58	61
	59,55 %	*61,96 %*	*56,73 %*	*52,73 %*	*53,51 %*
Hedgers without foreign sales	3	3	3	3	2
	3,37 %	*3,26 %*	*2,88 %*	*2,73 %*	*1,75 %*
Non hedgers with foreign sales	21	23	30	38	41
	23,60 %	*25,00 %*	*28,85 %*	*34,55 %*	*35,96 %*
Non hedgers without foreign sales	14	14	14	11	10
	15,73 %	*15,22 %*	*13,46 %*	*10,00 %*	*8,77 %*

5.1.3 Descriptive statistics

Table 3 summarizes the descriptive statistics for the regression variables, divided into three categories: the total sample, including all the companies, and more tables consisting of currency hedgers and non-hedgers. This structure allows for a straightforward comparison between hedgers and non-hedgers, using the total sample as a reference.

Firms that actively use currency hedging are typically larger, having over ten times higher revenue and market capitalization on average than those not performing hedging activities. Dividend yields are notably higher among hedgers, indicating that these firms tend to pay out more dividends relative to their stock price. However, the most notable difference in terms of performance stability comes in return on assets %. Companies engaging in currency hedging had a return on average of 6,15% while non-hedgers had -5,07%. However, this is partly explained by the huge variance between each group since the median performance was 5,49% for hedgers and 2,27% for non-hedgers. Overall, firms that engage in currency hedging are typically more sizeable and can be seen as more mature and stable companies.

One of the most significant differences is in foreign sales, as hedging firms are much more likely to engage in international operations. The average foreign sales figure is almost double for hedgers, and the median difference is even three times higher than for those not hedging. Hedgers also show a higher debt-to-equity ratio, while debt-to-total capital ratios are relatively similar. Moreover, hedging firms tend to have a lower focus on average to CAPEX and R&D than those not hedging. This can be explained by the fact that non-hedging companies are smaller and, in some cases, are still in the process of commercializing their innovations. This future potential is also strongly reflected in company valuations. Especially when using Tobin's Q as a measure, as those not using hedging had significantly higher Tobin'sQ on average 2,17 versus 1,19 for hedgers. However, it is important for the study to clarify how much of this can be explained purely by using currency hedging.

Overall, Table 3 suggests that currency hedging firms are larger in terms of asset size, have more foreign sales, and demonstrate higher debt-to-equity ratios. On the other hand, those not hedging have a higher focus on CAPEX and R&D investments.

Table 3. Describtive statisics

Describtive statisics All

Variable	No. obs.	Mean	Std. Dev.	Median	Minimum	Maximum
MARKET CAPITALIZATION ('000€)	725	2 972 214	12 729 809	146 474	1 298	165 535 395
NET SALES OR REVENUES ('000€)	727	2 710 568	12 177 066	150 547	0	128 745 000
BOOK VALUE-OUT SHARES-FISCAL	722	5,32	7,19	3,22	-5,55	71,35
RETURN ON ASSETS %	718	0,27	23,85	3,94	-265,15	179,41
DIVIDEND YIELD %	725	2,22	2,52	1,67	0,00	20,16
TOTAL DEBT % COMMON EQUITY	725	50,59	343,64	54,24	-7 533,18	1 555,47
TOTAL DEBT % TOTAL CAPITAL/STD	725	38,93	76,95	36,62	-1 079,14	1 179,77
CAPITAL EXPENDT % TOTAL SALES	706	37,48	604,43	2,57	0,00	15 967,89
FOREIGN SALES % TOTAL SALES	508	53,02	37,52	56,63	0,00	139,26
R&D % TOTAL ASSETS	317	6,12	19,70	1,38	0,00	190,23
Tobin's Q	725	1,70	2,68	0,91	0,01	28,58

Describtive statisics Hedgers

Variable	No. obs.	Mean	Std. Dev.	Median	Minimum	Maximum
MARKET CAPITALIZATION ('000€)	346	5 943 247	17 962 779	541 824	11 836	165 535 395
NET SALES OR REVENUES ('000€)	346	5 542 603	17 223 042	713 400	17 227	128 745 000
BOOK VALUE-OUT SHARES-FISCAL	341	7,32	9,10	4,20	-2,24	71,35
RETURN ON ASSETS %	342	6,15	12,37	5,49	-23,27	179,41
DIVIDEND YIELD %	346	2,90	2,45	2,76	0,00	12,19
TOTAL DEBT % COMMON EQUITY	346	81,26	197,60	58,29	-1 859,67	1 555,47
TOTAL DEBT % TOTAL CAPITAL/STD	346	38,00	19,48	36,86	0,00	106,16
CAPITAL EXPENDT % TOTAL SALES	343	5,15	8,20	2,96	0,01	75,80
FOREIGN SALES % TOTAL SALES	293	66,84	31,40	69,66	0,00	139,26

R&D % TOTAL ASSETS	208	3,43	4,53	1,34	0,00	24,09
Tobin's Q	346	1,19	1,34	0,75	0,06	11,04

Describtive statisics Non-hedgers

Variable	No. obs.	Mean	Std. Dev.	Median	Minimum	Maximum
MARKET CAPITALIZATION ('000€)	379	259 873	655 062	67 320	1 298	5 249 347
NET SALES OR REVENUES ('000€)	381	138 693	219 413	49 474	0	1 286 400
BOOK VALUE-OUT SHARES-FISCAL	381	3,53	4,15	2,36	-5,55	29,12
RETURN ON ASSETS %	376	-5,07	29,80	2,27	-265,15	31,21
DIVIDEND YIELD %	379	1,60	2,43	0,00	0,00	20,16
TOTAL DEBT % COMMON EQUITY	379	22,60	434,62	49,79	-7 533,18	565,57
TOTAL DEBT % TOTAL CAPITAL/STD	379	39,79	104,85	36,08	-1 079,14	1 179,77
CAPITAL EXPENDT % TOTAL SALES	363	68,03	842,33	1,98	0,00	15 967,89
FOREIGN SALES % TOTAL SALES	215	34,18	37,05	20,34	0,00	100,01
R&D % TOTAL ASSETS	109	11,25	32,49	2,07	0,00	190,23
Tobin's Q	379	2,17	3,42	1,05	0,01	28,58

5.2 Methodology

The study first analyzes the relationship between Tobin's Q and the use of currency derivatives using a one-variable model. This approach is known as univariate analysis, focusing exclusively on explaining one variable's effects. In this case, the method explains the impact of using foreign currency derivatives without considering other factors that may influence firm valuation. Additional variables that could impact the company's market value are not part of this first analysis, but they will be incorporated in the further stage of the study to conclude the more comprehensive analysis.

Since foreign currency derivatives are not by far the only determinant of firm market value, the subsequent regression model introduces a more comprehensive list of selected factors mentioned in the regression variables section. These factors are likely to significantly impact firm valuation more than using currency derivatives alone. The analysis that includes these extra variables is known as a multivariate analysis.

It is also important to acknowledge that there might be other factors that may influence firm values that are not covered in the study. The approach used here follows the methodology performed by Allayannis & Weston (2001), whose techniques have been widely adopted in subsequent research, such as the study by Bartram et al. (2011). However, the methodology has been slightly modified to find the most reliable results possible.

5.2.1 Univariate analysis

The univariate analysis examines the differences in Tobin's Q values between companies that use currency hedging and those that do not. This comparison is based on analyzing the mean and median values of Tobin's Q. The results are further divided into separate groups according to the availability and the portion of the foreign sales data. A company is classified as having foreign operations if its international sales account for more than 1% of total sales over the observation period. This might seem a bit low, but a large number of companies in the dataset have only domestic sales, so the limit is logical. Conversely, it is considered to operate without foreign activities if international sales are below the threshold.

This simplified single-variable analysis focuses solely on highlighting the differences between firms that use currency derivatives and those that do not. The model assumes only one independent variable that might impact the dependent variable. The regression model used for this univariate analysis is detailed in Equation 3, with the results presented in Table 5.

(3) $\ln(Q) = \beta_o + \beta_1 FCD + u$

where:

- $\ln(Q)$ = natural logarithm of Tobin's Q
- β_o = the intercept
- β_1 = the coefficient for foreign currency derivative use

- FCD = foreign currency derivative
- u = the error term

5.2.2 Multivariate Analysis

In order to thoroughly understand the factors affecting firm value, the study extends to a multivariate analysis incorporating multiple control variables. This approach builds on the univariate analysis by adding to the model variables such as firm size, profitability, dividend payout, leverage, investments to both capex and R&D, foreign sales, and a dummy variable for currency derivative use. In this context, β_o represents the intercept, while *u* is the error term in Equation 3:

(3) $\ln(Q) = \beta_o + \beta_1 FCD + \beta_2 \log(\text{firm size}) + \beta_3(\text{profitability}) + \beta_4(\text{dividend}) + \beta_4(\text{leverage}) + \beta_5(\text{investment}) + \beta_6(R\&D) + \beta_7(\text{foreign sales}) + u$

The multivariate model is in the first model applied to the entire sample of companies, then separately to companies with foreign sales and those with only domestic operations. Two different methodologies are utilized for the multivariate regression analysis: the Pooled Ordinary Least Squares (OLS) model and the fixed effects regression. The latter addresses potential biases caused by omitted variables, which could affect the results if key variables are missing from the model (Wooldridge 2020: 484).

A correlation value of 1 indicates a perfect linear relationship, where a change in one variable results in a perfectly similar change in the other variable. Correlation can be either positive or negative, with a positive correlation suggesting that variables move together and a negative correlation indicating they move in opposite directions. The further the value gets from 0, the more correlated the variables are with each other. The correlations among the variables are shown in Table 4, ranging from -0.835 to 0.831; however, apart from these few exceptions, correlations are generally between +/-0.3, indicating generally low correlations.

Tobin's Q has the highest positive correlation with R&D activities, with the value being 0.783. Other positive correlations are foreign sales % (0.171) and capital expenditures (0.025). This suggests that all the different variables correlate negatively with Tobin's Q. Surprisingly, The highest negative correlation is the return on the asset being -0,269. However, this might be because R&D% has the highest correlation with Tobin's Q and the highest negative correlation (-0.835) with the return on asset, suggesting that the return on asset could negatively affect Tobin's Q. Also, dividend yield (-0.209) and use of currency derivatives (-0.182) are worth mentioning.

The highest positive correlation in Table 4 is 0.831, reflecting that market capitalization and net sales have close to perfect linear correlation between the two categories, which is quite logical since both variables are estimates of the company size. No other significant values in the table suggest that the risk of multicollinearity is minimized when analyzing the complete sample. Foreign sales also had a relatively high correlation (0.430) with the use of currency derivates, which supports the assumption that companies with foreign sales are more tend to hedge the exchange rate risk.

Table 4: Correlation coefficients for multivariate regression variable.

	BOOK VALUE-OUT SHARES-FISCAL	*RETURN ON ASSETS*	*DIVIDEND YIELD*	*TOTAL DEBT % TOTAL CAPITAL/STD*	*CAPITAL EXPENDT % TOTAL SALES*	*FOREIGN SALES % TOTAL SALES*	*R&D / total assets*	*Does the company use FCD?*	*MARKET CAPITALIZATION*	*NET SALES OR REVENUES*	*Tobin's Q*
BOOK VALUE-OUT SHARES-FISCAL	1,000***										
RETURN ON ASSETS	0,119***	1,000***									
DIVIDEND YIELD	0,307***	0,168***	1,000***								
TOTAL DEBT % TOTAL CAPITAL/STD	-0,060	-0,080**	-0,041	1,000***							
CAPITAL EXPENDT % TOTAL SALES	-0,023	-0,127***	-0,047	-0,020	1,000***						
FOREIGN SALES % TOTAL SALES	0,150***	0,080**	-0,070*	-0,153***	-0,024	1,000***					
R&D / total assets	-0,187***	-0,835***	-0,225***	0,104***	-0,036	0,152***	1,000***				
Does the company use currency derivates?	0,263***	0,235***	0,258***	-0,012	-0,052	0,430***	-0,189***	1,000***			
MARKET CAPITALIZATION	0,435***	0,042	0,228***	-0,007	-0,009	0,136***	-0,063	0,223***	1,000***		
NET SALES OR REVENUES	0,610***	0,031	0,238***	-0,008	-0,011	0,154***	-0,064	0,222***	0,831***	1,000***	
Tobin's Q	-0,151***	-0,269***	-0,209***	-0,078**	0,025	0,171***	0,783***	-0,182***	-0,035	-0,076**	1,000***

***, **, and * indicate statistical significance at the 1%, 5% and 10% levels

6 Empirical results

This section focuses on the empirical results from both univariate and multivariate tests. It begins with a presentation and discussion of the univariate results obtained using the Univariate pooled OLS regression, discussing solely the effects of the use of currency hedging derivates. In the table 5. we will find the Univariate pooled OLS regression results.

In the second part, we will be focusing on a more comprehensive analysis of all the different variables affecting the firm valuation. Firstly, we will focus on Multivariate pooled OLS regression, which uses Tobin's Q as a dependent variable with multiple independent variables explaining the different values of Tobin's Q. After that, we will prepare a fixed effects model focusing more on analyzing the data time-constant factors that may have effects on the dependent variable. From the table 6. we will find the results of pooled OLS regression results with Tobin's Q's natural logarithm as the dependent variable and table 7. demonstrates the results of the fixed effects regression.

6.1 Univariate analysis results

Table 5: Univariate pooled OLS regression results.

	Constant	**FCD dummy**	**R^2**	**Observations**
ln (Tobin's Q)				
Firms with foreign sales	2,19392***	-0,98310***	0,040567	432
	0,000	0,000		
Firms without foreign sales	1,09915***	-0,450796	0,017616	77
	0,000	0,250		
All firms with foreing sales data	1,88043***	-0,69649***	0,024016	509
	0,000	0,000		
All firms	2,16595***	-0,97646***	0,033215	727
	0,000	0,000		

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

Table 5 shows the results of univariate pooled OLS regression, which analyses only the effecs of the use of currency derivatives on the company value. The regression states that in all the data samples FCD dummy had highly negative effects on the company value. The results are a bit surprising, since most of the major publications on the topic (e.g. Allayannis & Weston 2001; Bartram et al. 2011; Belghitar et al. 2013) suggest that hedging does affect positively on company value. However, the more recent studies (Bae et al. 2017; Bartram et al. 2019) show, that value creation by hedging activities might not be so significant.

All in all, such a significant negative impact is quite unprecedented. It is also good to notice that the specific nature of the Finnish market and the fact that the study includes a cross-section of the entire stock market, from the largest to the smallest companies, may contribute to the results. It is also worth mentioning that although the P-value significance levels are high in the regression results, the R^2 values are low. This means that the model explains only a tiny fraction of all the factors influencing the valuation effect, in this case, Tobin's Q. (Wooldridge 2020.)

6.2 Multivariate analysis results

Table 6: Pooled OLS regression results with Tobin's Q's natural logarithm as the dependent variable.

ln (Tobin's Q)	All firms			
	Coefficient	**Std.Error**	**t-Statistic**	**Prob.**
Constant	-0,052857	0,185266	-0,285304	0,776
ln (MARKET CAPITALIZATION)	0,638591***	0,021335	29,93204	0,000
ln (REVENUE)	-0,638191***	0,024644	-25,89633	0,000
RETURN ON ASSETS	0,007116***	0,001655	4,298701	0,000
DIVIDEND YIELD	-0,022413**	0,011268	-1,989089	0,048
TOTAL DEBT %	-0,005212***	0,001042	-5,002378	0,000
CAPITAL EXPENDT %	-0,002973***	0,000388	-7,659058	0,000

FOREIGN SALES %	0,001967**	0,000777	2,533431	0,012
R&D %	1,572099***	0,504748	3,11462	0,002
The use of FCD	-0,050551	0,061025	-0,828367	0,408
Observations	727			
Adjusted R^2	0,850087			

***, **, and * indicate statistical significance at the 1%, 5% and 10% levels

Table 6 shows the outcomes of the pooled OLS regression using the natural logarithm of Tobin's Q as the dependent variable. The analysis includes all 160 companies from the period between 2019 - 2023. It provides a detailed analysis of the relationship between selected variables and the value of Tobin's Q. The results were obtained by removing a set of observations when insufficient essential information was available. The total sample is 727 observations.

The results indicate that firm size, represented by the natural logarithm of market capitalization, has a positive and highly significant effect (0.6386, $p < 0.001$) on Tobin's Q, suggesting that larger firms are generally associated with higher market valuations. However, conversely, revenue shows a significant negative relationship (-0.6382, $p < 0.001$), stating that higher revenue and net sales would negatively affect valuation in terms of stock markets.

Profitability, measured by return on assets, positively affects Tobin's Q (0.0071, $p < 0.001$), indicating that more profitable firms tend to have higher valuations. However, dividend yield has a slight negative correlation (-0.0224, $p = 0.048$), implying that higher dividend payments might adversely affect market valuations. This might be the case because investors see that dividend yields could be used to strengthen competitiveness or, for example, to develop the existing product portfolio.

Debt levels (total debt as a percentage of assets) and capital expenditure percentages both show a significant negative relationship with Tobin's Q, with coefficients of -0.0052 ($p < 0.001$) and -0.0030 ($p < 0.001$). This suggests that higher debt and capital

expenditures might be associated with lower firm valuations. However, the percentage of foreign sales shows a positive relationship (0.0020, p = 0.012), highlighting the potential value and greater market and growth potential of international activities.

The amount of research and development (R&D) expenditures positively affects Tobin's Q (1.5721, p = 0.002). This is particularly explained by the importance of new innovations for market value and future business. This is also the highest value in the table, suggesting that higher pursuit of R&D activities should have greater effects on valuation. However, it may also be partly influenced by the fact that the valuation measure used in the model is Tobin's Q, which may give a slightly distorted valuation for companies with a lower balance sheet value. Similarly, for companies with a lower balance sheet value, especially if they are still in the stage of product development, the R&D in relation to the balance sheet size may be relatively high.

Meanwhile, foreign currency derivatives (FCD) have a negative but not statistically significant effect (-0.0506, p = 0.408) on firm value. P-value being that high means that we cannot, without a doubt, state it negatively affecting the valuation. Nevertheless, we believe the effect is negative, although it may be the effect of random walk that turns negative in this sample.

The model's adjusted R^2 value of 0.850 is remarkably high, meaning that the variables in the model can explain a significant proportion of the variation in Tobin's Q, making this model relatively robust to help understand the factors affecting firm valuation.

When comparing findings to previous literature, we can see that the studies by Allayannis & Weston (2001), Brunzell et al. (2011), Durán Santomil et al. (2015), and Bartram (2019) all state that the use of currency derivatives has positive effects on firm valuation. However, one of the most recent studies in the field by Bae et. Al (2018) states the opposite, supposing that it actually has a slight negative effect, as the findings of this paper also suggest. However, one reason behind the different findings of each study

might also be the effects of different markets and dissimilar sample companies. The findings of this paper also included the spectrum of the whole Finnish public market, from the smallest local public companies to large multinational global operators.

Table 7: Fixed effects regression results with Tobin's Q's natural logarithm as the dependent variable.

ln (Tobin's Q)	All firms			
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
Constant	-0,0170	0,1860	-0,0911	0,928
ln (MARKET CAPITALIZATION)	0,6302***	0,0217	29,0771	0,000
ln (REVENUE)	-0,6341***	0,0247	-25,6609	0,000
RETURN ON ASSETS	0,0071***	0,0017	4,2722	0,000
DIVIDEND YIELD	-0,0167	0,0117	-1,4321	0,153
TOTAL DEBT %	-0,0053***	0,0010	-5,0814	0,000
CAPITAL EXPENDT %	-0,0029***	0,0004	-7,3050	0,000
FOREIGN SALES %	0,0021***	0,0008	2,6690	0,008
R&D %	1,7369***	0,5102	3,4045	0,001
The use of FCD	-0,0584	0,0610	-0,9561	0,340
Observations	727			
Adjusted R^2	0,850601			

***, **, and * indicate statistical significance at the 1%, 5% and 10% levels

Looking at Table 7. we have a fixed effects model. Fixed effects regression is used to make the results more correct and to validate the results of the pooled OLS regression, which in some cases may be biased. The sample of the table is the same as in the previous table, and the total number of observations is 727. Also, the variables are the same, and the natural logarithm of Tobin's Q remains a dependent variable. The only thing that changes is that the table now has fixed effects regression with panel data controlling the yearly effects.

Since the adjusted R^2 was already in the pooled OLS regression results relatively high, explaining most of the observations, there can not be seen large differences between

the pooled OLS regression and fixed effects regression results. The adjusted R^2 was raised only by a few minor decimals (0,850601 vs. 0,850087), making no meaningful difference between the two sets of results.

However, the most notable changes happened in some of the independent variables. In the fixed model results, all other observations are significant, with 1% stating that p-values are under 0,01 except dividend yield, FCD dummy, and error term. However, the p-value decreased slightly from 0,408 to 0,340, making it slightly more significant. According to the results, using currency derivatives would negatively affect Tobin's Q by -0,058. Overall, the p-value is still remarkably high, and therefore, we cannot state for sure that it is a current estimation. According to the results in the table, the actual effects of the use of hedging would be only random walk, making it slightly more likely to affect negatively rather than positively.

7 Conclusions

The earlier studies reviewed highlight the complicated relationship between derivatives, risk management strategies and firm valuation. It is common knowledge that derivatives are valuable tools for stabilizing volatility and uncertainty, reducing risk and by that, increasing the firm's predictability. However, their effectiveness in achieving these objectives is influenced by a number of factors, including regulatory changes, firm-specific characteristics and the implementation of sound hedging strategies. One would assume that this also has a positive impact on company value.

However, the current study of publicly listed Finnish companies in the timeframe between 2019 and 2023 states that this might not be the case. Results indicate that currency hedging among other related things might even have negative effects on the valuation for external investors. When comparing the list of public companies, those who actively used currency hedging have lower valuations in terms of Tobin’s Q than those who did not participate in such activities. After all, it has to be mentioned that these effects were not statistically significant, and moreover, it seems that there are no actual measurable differences between the hedgers and non-hedgers, and the impact of using currency derivatives is a solely random walk, which turned out to be negative in the study.

For the future, further research will be highly beneficial since the understanding of the effects of currency hedging practices will provide valuable insight not only for internal shareholder, but also external stakeholders such as regulators and policy makers. Further research will be needed to have a better understanding and more practical general results in terms of different sectors, economies, and regulatory frameworks. It would also be beneficial to have better understanding of the actual long terms effects of hedging practices on firm valuation, for example in the time period of 10 or even 20 years. One could assume, that companies with longer history on stabilizing cash flows and making them more predictable, would see positive effects on terms of market valuation.

Overall, these studies provide valuable insights into the complex relationship between derivatives, risk management strategies and firm performance. The knowledge from the studies can help decision-making processes to find optimal strategy, inform regulatory policy to serve the best interests of businesses and also inspire future research on dive deeper into the world of the effects of risk management.

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APPENDIX

Appendix 1. List of Finnish Public companies included in the data

Company			
AALLON GROU	FINNAIR OYJ	MERIAURA GROUP OYJ	SAGA FURS OYJ
ADMICOM OYJ	FISKARS OYJ	MERUS POWER OYJ	SAMPO OYJ
ADMINISTER OY	FODELIA OYJ	METSA BOARD OYJ	SANOMA OYJ
AFARAK GROUP SE	FONDIA OYJ	METSO OYJ	SCANFIL PLC
AIFORIA TECHNOLOGIES	FORTUM OYJ	MODULIGHT OYJ	SIILI SOLUTIONS OYJ
ALMA MEDIA OYJ	GLASTON CORPORATION	MUSTI GROUP	SITOWISE GROUP OYJ
ANORA GROUP OYJ	GOFORE OYJ	NANOFORM FINLAND	SOLTEQ OYJ
APETIT OYJ	HARVIA OYJ	NESTE OYJ	SOLWERS OY
ASPO OYJ	HEEROS OYJ	NETUM GROUP OYJ	SOTKAMO SILVER AB
ASPOCOMP GROUP OYJ	HERANTIS PHARMA	NEXSTIM OYJ	SPINNOVA OYJ
ATRIA PLC	HKFOODS	NIGHTINGALE HE	SRV GROUP PLC
BBS BIOACTIVE BON	HONKARAKENNE OYJ	NOHO PARTNERS OYJ	SSAB SVENSKT STAL AB
BETOLAR	HUHTAMAKI OYJ	NOKIA OYJ	SSH COMM
BIOHIT OYJ	ILKKA OYJ	NOKIAN TYRES PLC	STORA ENSO OYJ
BIORETEC OY	INCAP OYJ	NURMINEN LOGISTICS	SUOMINEN OYJ
BITTIUM OYJ	INDERES OYJ	OLVI OYJ	TALENOM OYJ
BOREO OYJ	INNOFACTOR PLC	OPTOMED	TAMTRON GROUP OYJ
CARGOTEC CORP	INVESTORS HOUSE OYJ	ORIOLA OYJ	TECNOTREE OYJ
CITYCON OYJ	KAMUX OYJ	ORION O	TELESTE OYJ
COMPONENTA	KEMIRA OYJ	ORTHEX OYJ	TELIA COMPANY AB
CONSTI OYJ	KEMPOWER	OUTOKUMPU OYJ	TERVEYSTALO OYJ
DETECTION TECH	KESKISUOMALAINEN OYJ	PALLAS AIR OYJ	TIETOEVRY
DIGIA PLC	KESKO OYJ	PARTNERA OYJ	TOIVO GROUP OYJ
DIGITAL WORKFORCE SE	KESLA OYJ	PIHLAJALINNA OYJ	TOKMANNI GROUP
DIGITALIST GROUP OYJ	KH GROUP	PIIPPO	TRAINERS HOUSE
DOVRE GROUP	KOJAMO OY	PONSSE OYJ	TULIKIVI OYJ
DUELL OYJ	KONE CORPORATION	PURMO	UPM-KYMMENE OYJ
EAGLE FILTERS	KONECRANES ABP	PUUILO OYJ	VAISALA OYJ
ECOUP OYJ	KOSKISEN OYJ	QPR SOFTWARE OYJ	VALMET OYJ
EEZY	KREATE GROUP OYJ	QT GROUP OYJ	VALOE OYJ
ELECSTER OYJ	LAMOR CORPORATION OY	RAISIO OYJ	VERKKOKA
ELISA CORP	LAPWALL OYJ	RAPALA VMC	VIAFIN SERVICE OYJ
ENDOMINES FINLAND OY	LASSILA & TIKANOJA	RAUTE OYJ	VIKING LINE ABP
ENENTO GR	LEADDESK	REBL GROUP OYJ	VINCIT OYJ
ENERSENSE INTER	LEHTO GROUP	REKA INDUSTRIAL OYJ	WARTSILA OYJ
ETTEPLAN OYJ	LEMONSOFT OYJ	RELAIS GROUP OYJ	WETTERI OYJ
EXEL COMPOSITES OYJ	LINDEX GROUP OYJ	REMEDY	WITHSECURE OYJ
F-SECURE OYJ	LOIHDE OYJ	REVENIO GROUP OYJ	WITTED MEGACORP OYJ
FARON PHARMA	MARIMEKKO OYJ	ROBIT OYJ	WULFF YHTIOT OYJ
FIFAX ABP	MARTELA OYJ	RUSH FACT	YIT OYJ