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THE IMPACT OF CURRENCY HEDGING POLICIES ON THE PROFITABILITY OF AN INTERNATIONAL COMPANY

Bachelor's thesis

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I hereby declare that I have compiled the thesis independently
and all works, important standpoints and data by other authors
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The document length is …8409... words from the introduction to the end of the conclusion.

Bea Kallio ……

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TABLE OF CONTENTS

ABSTRACT

The aim of this study is to evaluate the impact of different hedging policies which are forward contracts, option collar structures and the decision of not hedging for an international company for the past four years (2019-2022). The data is from the company's database and from the main bank with which they are collaborating with. The invoiced amounts are calculated with the forward rates and with the option collar structure rates and those results are compared to the actual invoiced amounts in each month and each year as a whole. The thesis investigates the years separately and combined. Scenario analysis is made between forwards and option collar structures and the research method used in this thesis is quantitative. The study gives interesting and useful insight to the company since they earn 40% of their revenues from USA and are by that very exposed to the currency risk between EUR/USD. The thesis provides also insight of EUR/USD exchange rate changes from 2010 to 2012. The current hedging activities of the company are presented with examples and graphs. The base reasons for the thesis are the big volumes that the company sells to the USA and that their current hedging activities are not so precise. The results shows that the most optimal hedging strategy for the company overall during 2019-2022 would have been the option of not hedging but the years separately vary. Almost each year the option collar structure would have been more efficient option compared to forwards but in 2021 both would have been as efficient. Only the year of 2022 gives negative results if the company would have used collar structures or forwards to hedge and this can be explained by the record breaking profit that the company made in 2022 and the favorable exchange rate movements.

Keywords: Currency risk, hedging, profitability, exchange rate

INTRODUCTION

Reducing corporate risks by using hedging strategies has been growingly popular corporate activity for the last decades. The financial environment is constantly changing and the activation of companies in today's globalized markets makes it even more necessary to identify and manage at the management level companies' exposure to various financial risks, such as exchange rates, interest rates, commodities and stock prices (Mburugu, 2014, p. 1). Companies use currency hedging for many different purposes from guaranteeing that a foreign subsidiary's income will not take a loss in the home currency because of a significant currency move, to ensuring that various receivables or payables do not veer far from projections, and significantly disrupt cash flows, expenses, or revenues. In general, companies should not manage currency risk just for the sake of lowering cash-flow volatility or getting better share price. In the long term, currency fluctuations tend to be offset by price changes, by that means reducing currency risk in real terms. Academic researches show that investors therefore do not require a risk premium for bearing currency risk and companies with lower currency risk will not encounter a lower cost of capital (Goedhart et al., 2015).

Finding the optimal way to use hedging may be crucial for businesses in terms of risk (Alarova, 2017). Since the market turbulence and volatility has grown into a point where the global economic environment creates challenges for companies to be able to forecast their business and earnings against backdrop of riskiness. A direct consequence of these challenges in the methods of organizations utilize financial instruments to compensate for possible unexpected financial risks (Mburugu, 2014, p. 1). Hedging is one way of off setting these risks in order to enhance company's value.

In today's financial markets derivatives are an extremely important part of the arsenal for financial market speculators (Loo, 2023). The aim of this study is to evaluate the impact of different hedging policies which are forward contracts, option collar structures and the decision of not hedging for an international company for the past four years (2019-2022). The company currently aims to hedge about 50% of their order base and they wanted to get more specific information from this

study to improve their profitability with hedging. The 50% hedging ratio has been stated in the board of the company and has been working well for the past years. The company sells its products to more than 50 countries all over the world, but about 40% of their sales are going to USA. This gives this research a base reason to investigate the currency risks since the volumes to USA are so big and by that affects the company considerably. By comparing the impact of different hedging tools to profit, this study provides information for the company for the future actions. The outcome can be that there is no significant difference if the company hedges or not, but it is important to view the years separately because one year can be big part of the company's cash flow if wrong hedging strategies are used. The study also explains the company's previous and current hedging activities with examples.

Because international transactions always involve different risks from those in domestic sales it is very important to be up to date with the risk management tools. International risks are currency risks, political risks, quarantine, legal risks, local legal issues, and standard regulation. Many export considering risks are country specific. This thesis will discuss and analyze the concept of currency risk more deeply (Backlund, 2011, p. 9).

For comparing the outcomes of the selected hedging tools the forward rates and option obligation and protection levels are gathered from the review period. Comparing the outcomes of using forward contracts and options (which are the tools the company wanted information from) to the decision of not hedging in each month during the past four years will provide the information needed. The phrase of not hedging in this context means the invoiced amounts and profits if the company would have not hedged during the past four years. A scenario analysis of the choices will be provided after calculating the impacts.

This thesis seeks to answer to the following research questions:

1. Why international companies should consider hedging activities?
2. How open the company is for exchange rate risk?
3. How can or should the company manage the risk?
4. What is the likely impact of the chosen hedging strategies to the company's profit for the period of 2019-2022?

The thesis will not mention the name of the company or actual company related figures because of sensitive information. This thesis is divided into three main chapters. Chapter one will provide

an overview of currency risk and its exposures and hedging policies. In chapter two the methodology and data of the thesis are introduced as well as the company for which this research is made including their current hedging activities. Chapter three will provide the results and analysis of the findings.

1. THEORETICAL FRAMEWORK OF CURRENCY RISK AND HEDGING POLICIES

This chapter explains the currency risk and it's exposures. After that the hedging policies are introduced as well as the most common internal and external hedging tools.

1.1 Currency risk and it's exposures

Currency risk is a matter for an international company to take seriously if the company wants to succeed. Many companies are aware of the importance of currency risk but fail to manage their currency risk effectively. Currency risk is not only a problem of financial operations, but it is a factor affecting the entire organization, which must be considered in several different situations, for example in investment planning and when making a budget. Operations denominated in foreign currency usually cause the company both currency and interest rate risks (Nevalainen, 2013). Company's foreign sale value measured in domestic currency changes when exchange rates change. The same company can also acquire factors of production from abroad, in which case it increases or decreases its currency risk depending on whether exports and imports are quoted in the same currency (Tapola, 2008).

Changes in exchange rates have an impact on the company's profitability, market value, cash flows and the company's position in the market. All unexpected changes in exchange rates can affect, for example, the company's ability to operate abroad, increase the cost of raw material obtained from abroad and also change the company's competitiveness at home country or domestic countries (Bragge, 2019).

A company's currency risk is very multidimensional and therefore it is usually divided into parts to identify the risk position and facilitate risk management. It is easier to deal with it in smaller parts to get the whole picture. Currency risk can be divided into two categories, transaction risks

and business risks. Transaction risk is caused by changes in the exchange rate of the currency denominated contract. General business risk focuses on the financial result to be achieved in the future. (Nevalainen, 2013, p. 11).

For risk management there are procedures that can be considered. Acceptance of the risk, this can be because of ignorance or because of the risks are so small. Also, the company could expect the exchange rates to be favorable at the time the currency positions mature. Risk avoidance, full hedging, the company hedges and covers all its foreign currency debts systematically for example using forwards. Maximizing exchange rate profit, selective hedging, the company hedges against exchange rate risks selectively and gradually based on its perception of the exchange rate development of currencies (Nevalainen, 2013, p. 12).

Some might think that selling in your own currency eliminates the currency risk, but this is not the case. This only applies for contractual items of the transaction position. When the company sells to foreign customers in its own currency, the amount purchased by the customer may be smaller, because the change in the exchange rate is visible to the customer as a price change. Usually, customers want to buy in their own currency and that may lead to the customer being given a discount on the sales price or the delivery term being changed to be more favorable to the customer. In this situation companies should sell in the byer's currency and hedge the currency risk in order to achieve a better result. Instead of selling in their own currency, they should also consider trading in the buyer's currency and with profitable hedging (Nevalainen, 2013, p. 23).

Foreign exchange exposure is divided into three categories, translation, transaction, and economic exposure. Transaction exposure is dealing with actual foreign currency transactions whereas translation exposure deals with the accounting representation, and economic exposure deals with little macro-level exposure. Foreign exchange exposures exist for a business or a company when the value of its future cash flows is dependent on the value of foreign currency. If a Finnish company sells products to a US company, the cash inflow of the Finnish company is exposed to foreign exchange. In this case of the US based company, cash outflow exposes to foreign exchange. Transaction exposure occurs normally due to foreign currency debtors of sale, payment for imported goods or services, receipt/payment of dividend, payment towards the EMIs of debts, etc. (Borad, 2022).

Transaction exposure is the most superficial of the three and can be considered as the easiest to understand. Usually when companies explain about currency risk they are referring to transaction exposure (Tyrväinen). This exposure pertains to the exposure due to an actual transaction taking place in business involving foreign currency. All monetary transactions aim for profits as their end results in a business. If a person bought goods from a foreign country and payables are in foreign currency payable after three months. Then, the person may end up paying much higher on the due date as currency value may increase. This will increase the purchase price. Therefore, the overall cost of the product compels the profit percentage to go down or even convert loss (Borad, 2022).

Translation exposure can also be called as accounting exposure. The reason behind this is due to the translation of books of accounts into the home currency. Translation activity is carried out on account of reporting the books to the shareholders of legal bodies. This also makes sense as the translated financial statements show the company's position as a date in its home currency (Borad, 2022).

Economic exposures importance and impact is higher than the other two mentioned above. This exposure directly impacts the value of the company. In other words, foreign exchange influences the value of the company. The value of the company is the function of operating cash flows and its assets. The economic exposure can have bearings on assets and operating cash flows. It is quite difficult task to measure this exposure. Although the asset exposure is still measurable and visible in books, the operating exposure has links to various factors such as competitiveness and entry barriers (Borad, 2022).

Table 1. Types of foreign exchange exposures

Transaction	Translation	Economic
Simplest kind of exchange exposure.	Also known as accounting exposure.	Directly impacts the value of the company.
Pertains to actual transactions taking place in business involving foreign currency.	Carried out on account of reporting the shareholders.	Can have bearings on assets as well as operating cash flows.
Typically occurs due foreign currency deports of sale, payment for imported goods or services, receipt/payment of dividend, or payment toward the EMIs of debt.	Can even get reversed in the next year translation if currency market moves in the favorable direction.	-

Source: (Borad, 2022)

Exchange rates are needed when one is buying or selling currencies. The exchange rates of different currencies are quoted separately every day for banknotes and account currency. Money is exchanged in a way that foreign currency is exchanged according to the domestic buying rate and domestic currency is exchanged for foreign currency according to the selling rate. The buying rate is lower than the selling rate (Nevalainen, 2013, p. 9).

The exchange rate system refers to the regulations and principles that determine exchange rates. They are:

- Fixed exchange rates
- Floating exchange rates
- Regulated exchange rates.

(Nevalainen, 2013, p. 9)

As a simple example of what are exchange rates the next example is provided. An exchange rate is the rate at which one currency is exchanged for another currency. €1 could be exchanged for $1.12 and this rate is constantly changing on global foreign exchange markets. In this market all kinds of currencies are traded, and euro is one of the most traded currencies with US dollar, Japanese yen, and pound sterling (European Central Bank, 2016).

1.2 Hedging policies

Hedging is a deterrent strategy used by companies or individuals to protect their portfolio from adverse currency, price or interest rate movements. The aim of the hedge is to specifically reduce uncertainty in the market. The hedge ratio is a percentage of the position in an asset that is hedged using financial derivatives (Hsueh Liu, 2007)

Hedging can be assumed to balance the company's currency risk realization. This also mean that the income will not fluctuate as strongly as in a situation where hedging would not be used. Therefore, hedging also has a connection with the company's bankruptcy costs, as a less variable result is considered better than a much more variable one (Ahonen, 2006).

Most of the international companies utilize various hedging strategies to stabilize financial earnings of company value especially when there are obvious inconsistencies in global exchange movements. Hedging decreases the variability of expected cash flows about the mean of the distribution with reduction of risk as a result. For a single company this is a positive thing since the higher prediction of future cash flow improves the planning capability of the company and the company may be able to undertake activities of specific investments that in other respects might not have been considered (Mburugu, 2014, p. 2).

Using hedging firms can off-set risk to improve its value. In case if the market would be perfect, hedging would have no value (hedging is usually considered as negative NPV activity). The real-world financial market is imperfect. Hedging can directly affect the cash flow of the firm and in the long run hedging itself is not negative cash flow, there are costs related to hedging e.g., expected value of hedging. (Mburugu, 2014, p. 2). However, hedging can only have a minor impact on a company's volatility and value, says Mburugu. Hedging strategies can be divided in to two main categories which are internal and external hedging. Internal hedging can be recognized also using the name passive hedging and external hedging using the name active hedging. The difference between internal and external hedging strategies is that external hedging usually involves a third party while internal hedging strategies includes strategies that companies adopt using resources which are available to them within their business. (Bound, 2021)

In external hedging financial derivatives are factors that gets its value from the price of some other variable. The value of the agreement comes from the "other variable", and it's based on predetermined and current price of the variable. There are four main varieties of financial derivatives: Forward contracts, Future contracts, Option contracts and swaps (Misamore, 2017).

1.2.1 Financial derivatives and currency risk management tools

The best tools to manage currency risk are financial derivatives. Most common tools are forward contracts, future contracts, option contracts and swaps. All these hedging tools serve the same purpose; currency management instruments enable the company to take a short or long position to minimize risks. If the exchange of currency is made right now with the current currency rate, it is called the spot exchange rate or spot market (Backlund, 2011, p. 17). Hedging stabilizes and reduces the risk of currency fluctuations. Most multinational companies use financial derivatives such as option, forward contracts, and swap contracts (Mburugu, 2014, p. 7).

By signing the option contract, the company will have the right but not the obligation, to buy or sell something at a predetermined price. This is called a "call option". Instead of purchase there are options to sell at a specific price and this is called a "put option". Put options provide profit when price of the underlying asset falls below the agreed upon price. This allows the option holder to exercise it and sell at higher price than it would be in the market (Misamore, 2017). All options come with strike price and volume. Strike price is the price of the underlying asset at which the option holder can exercise their option or sell certain amount of the underlying asset. The amount of the underlying shares to be traded on the exercise of the option are called the volume (Misamore, 2017). Options can also be either European or American options. The names are not related to the location of the option. An American option is exercisable before and up to its expiry. European option can only be exercised to its expiry (Misamore, 2017).

There are four types of options:

1. Bought Call (you have bought the right to buy at a certain price).
2. Sold Call (you have sold the right to buy at a certain price).
3. Bought Put (you have bought the right to sell at a certain price).
4. Sold Put (you have sold the right to sell at a certain price).

(Backlund, 2011, p. 21).

If one wants to reduce both negative and positive returns of an underlying asset one can use a collar option strategy. This strategy is also known as a hedge wrapper or collar. The collar option strategy limits the return of the portfolio to a specified range and can hedge a position against potential volatility of the underlying asset. Usually, the collar position is created through the usage of a protective put and covered call option. In a more specific way, it is created by holding an underlying stock, buying an out of the money put option, and selling an out of the money call option. It involves a long position on an underlying stock, a long position on the out of the money put option, and a short position on the out of the money call option. Normally, the stock price will be between the two strike prices since the option trader limits the range of their returns by taking a long position in the underlying stock, buying a lower strike put, and selling a higher strike call (Zaccardi, 2022).

$$\textit{Collar position} = \textit{Long underlying asset} + \textit{long put option} + \textit{short call option} \quad (1)$$

Swap agreements are interest rate or currency exchange agreements and banks are usually brokers of swap contracts. For example, in an interest rate swap the future interest payments are exchanged. Swaps enable to convert a variable rate loan into a fixed rate loan. A pure interest rate swap does not involve an agreement to exchange the capital of the loans, but the interest flows of the loans are exchanged. According to the interest rate swap agreement the party paying higher interest pays the difference of the other party at the predetermined time in accordance with the netting principle (Nevalainen, 2013, p. 20).

Forward contract is an agreement between two parties to sell or buy an asset at a predetermined price on a future date. When the contract is negotiated, both of the parties will agree about the price, quantity and the date that the asset has to be delivered (Team, 2023). Forward contracts are over-the-counter products and this means that they are not regulated and they are not bound by specific trading regulations and rules (Loo, 2023). The main difference between forward contract and option contract is that forward contracts bind both the buyer and the seller. A forward contract does not require a separate cash payment and forward transactions are usually made on non-standard terms with banks and bankers. In these cases, the target asset or the length of the contract is not precisely limited in advance (Nevalainen, 2013, p. 18). An example of a forward contract can be the following, in first of June 2022 a financial specialist in an US corporation must pay a

bill of 1 million EUR in 6 months (i.e., first of December 2022) and wants to hedge against the exchange rate moves and by doing that minimize the risk of losing on the payment. The financial specialist can agree to buy €1 million in a 6-month forward contract at an exchange rate of 0,950 (EUR/USD). The corporation has then a long forward contract on EUR. It has agreed that on December the first 2022, they will buy € 1 million from the other party (usually a bank of financial institution) for $ 0,950 million. The other party has a short forward contract on EUR; it has agreed that on the same date it will sell € 1 million for a price of $ 0,950 million. Both sides have made a binding commitment (Backlund, 2011, p. 18).

How to know if the corporation managed to hedge the risk? If the exchange rate fell to 0,802 at the end of six months, the forward contract would have a negative value to the business since the market price then would be $ 802 000 for 1 million EUR, which means that the corporation would have paid 148 000 $ more than EUR would have been worth ($ 802 000 – 950 000), a total loss of 148 000 US dollar. In the scenario of the rate going up, to 1,000 EUR/USD at the end of the 6 months period, the forward contract would have a positive 50 000 US dollar ($ 1 000 000 – 950 000). A total profit of 50 000 would be made, because it costs nothing to enter a forward contract so the payoff from the contract is the traders total profit (gain) or loss (Backlund, 2011).

Futures contracts are traded in the exchange market, and they are standardized contracts. They allow the holder of the contract to buy or sell the respective underlying asset at a predetermined price on a specific date. The parties of the future contract not only have the right but also the obligation to carry out the contract as they have agreed. Future contracts tend to be highly liquid considering the exchange (Loo, 2023). The advantages of futures are their cost efficiency and that they provide continuous market information. The futures contract also includes a guarantee that the contract can be bought or sold back at the market price before the expiration date (Nevalainen, 2013, p. 19). A big proportion of futures contracts that are made, do not lead to delivery on the maturity date. Future contracts are standardized, and they are routinely reported on the financial pages in the press (Backlund, 2011).

Table 2. Comparison of futures and forwards

Futures	Forwards
Traded on an exchange	Private contract between two parties
Contract is standardized	Contract is not standardized
Range of delivery dates	Normally one specified delivery date
Settled daily	Settled at the end of the contract
Contract is normally closed out prior to maturity	Delivery or final cash settlement normally takes place
Virtually no credit risk	Could be some credit risk

Source: (Backlund, 2011, p. 20)

A flexible hedging structure is also possible to arrange. Flexible hedging strategy is hedging of future cash flows which result from contractually binding transactions. This happens even though the corresponding receivables or payables would not have been created. Flexible hedging strategies call for constant vigilance, as new orders keep coming. Their effective implementation is carried out with the help of currency management's automation solutions, which offer end-to-end automation. On the opposite side of the spectrum, static hedging, where a large hedge is taken at the beginning of a period and only becomes active at the end of that period is executed once (Kantox, 2023).

1.2.2 Internal methods

Internal hedging methods minimizes the currency risk within the company itself. Internal hedging methods modify business and are effortless in operations. A company can internal hedge exposure and supplement the remaining one with derivatives (Tiwari, 2019). Internal hedging includes strategies that companies adopt using resources which are available to them within their business. The main internal hedging methods are invoicing in domestic currency, entering a risk sharing agreement, leading and lagging, currency diversification and doing nothing (Bound, 2021).

Invoicing in domestic currency is simple and obvious method with which exporters can hedge. This is done by invoicing their customers in their own currency. By doing this it removes all the risks that the company could face if they would trade in their customer's currency. Nevertheless, this shifts the risk to the company's customer and by that they could lose lot of potential sales because the customer is unwilling to take that risk either (Bound, 2021).

Entering a risk sharing agreement is a strategy in which a company can enter into a risk-sharing agreement together with a company with which it would like to trade, and this company has to be located in a foreign currency zone. They can negotiate how they would like to split the risk but usually the companies agree to have an equal share. (Bound, 2021)

The “lead and lag” technique reduce both operating and transaction exposure by leading or advancing payables and lagging or postponing receivables in “strong” currencies. Conversely, leading receivables and lagging payables in “soft” currencies. Matching is a method where companies can stipulate terms in the invoice contract to match the home currency in where they have their expenses, when selling abroad (Säterborg, 2010). Delay in payments or acceleration can be beneficial due to expected exchange rate or interest rate changes. For example exporters can slow down the collection or exchange of foreign exchange earnings and importers accelerate the payment of debts due to depreciation and devaluation expectations of one’s own currency (Helenius, 2011).

Company can diversify its foreign-currency portfolio with currencies whose exchange rates are not highly or considerably positively correlated. Given that the firm has payables in foreign currency. Diversification could be implemented by using a basket of currencies or a composite currency, for example special drawing rights (SDRS) (Bash et al., 2018).

If the company decides to do nothing the company would win or lose. This could be a good method in the long run, since theories suggests that the gains and losses net off to leave a similar result to that if the company would not hedge. On the other hand, in short-run, losses could be significant and for smaller companies that decision could be disastrous.

2. METHODOLOGY AND DATA

The purpose of the empirical study is to find out what would have been the impact of option collar structures and forwards to the company's profit between 2019 and 2022, and which would have been the optimal hedging strategy for the company for that time period. The comparison is made to the profit which includes no hedging activities, so in other words to the option where the company would not have hedged at all between 2019 and 2022. The chapter includes information about the company and it provides calculations of the years separately and as an overview of them all. The next chapter also provides calculations of exchange rate movements from the past 12 years.

2.1. About the company

The company for which the thesis is made for is a Finnish company which manufacturers steel structures. The company sells its products over 50 countries all over the world. They have been operating in the business over 50 years and they have achieved a stable position in its field of activity. The year of 2022 was a record-breaking year in many aspects for the company. They made historical profit. The company sells about 40% of their products to USA and it is the most important country that they are collaborating with.

The company is exposed to several financial risks in its business: currency, interest, financing, and liquidity risk, as well as credit risk. The goal of financial risk management is to protect the group from unfavourable changes in the financial market and therefore secure the company's profit development and equity capital and ensure sufficient liquidity in cost-effective manner. Financial risk management is centralized in the company's financial management, whose task is to identify, assess and protect the group from financial risks. The finance department is also centrally responsible for the company's finances and provides management with information about the company's financial situation.

The company is exposed to the translation risk caused by exchange rate fluctuations when converting the balance sheet items of non-euro area subsidiaries to the reporting currency. In the financial statements the balance sheets of foreign subsidiaries are converted into euros using the rates on the balance sheet date which is announced by the European Central Bank. Then the income statements are monthly using the average rates of the month. The exchange rate changes arising from the conversion of the income statements and balance sheets of subsidiaries are reflected as translation differences in the income statement and in the translation differences of equity. The risk related to foreign subsidiaries is not hedged. The currency risk consists of the transaction risk of commercial transactions carried out in the foreign currency and the translation risk that arises from the conversion of currency denominated items in the balance sheet to the reporting currency. The company has a foreign exchange risk management policy which is approved by the board, which defines the reference framework for hedging exchange rate risks (Company, 2023).

2.2. Methods and data

The research is completed using quantitative analysis. The answers looked for are computational and directive, meaning that the data from the company's data base do not include the actions of previous hedging. The study compares the prices of two different hedging tools that the company uses, which are forwards and option collar structures. After getting the results of how the forward contracts and option collar structures would have impacted the profit, will those results be compared to the option where the company would not hedge at all. Scenario analysis is the method with which the analysis is based on.

The data is collected from the company's data base. It includes the sales to USA in Euros and in Dollars, % margin and profit in Euros and in Dollars from January 2019 to December 2022. The rates of the hedging tools (forward contracts & option collar structures) are from the bank with which the company is collaborating with. The data which contains the hedging tool rate data is from 2019 to 2022 having the spot and forward points of each day during this time period. The forward rate is calculated by dividing the 3 moths forward point by 10 000 and the adding the spot price to it. The option data contains the risk/collar structure levels along the years through 2019 to 2022. The whole-time protection, i.e., the purchased EUR call, has been calculated at a rate level 2,90% lower than the futures. Then, depending on the volatility and price bias, the lower leg, i.e.,

the sold EUR put leg, has been closer or further away from the forward. The option collar structure results are calculated by getting the EUR/USD exchange rates from 2019 to 2022 from Suomen Pankki and then looking the obligation and protection levels to see which rate would have been used in each month. For example, if in December 2022 the EUR/USD rate was 1.0201 and the option protection level was 1.0781 and obligation level 1.0125 the EUR/USD rate is between the obligation and protection level and then the EUR/USD rate is used. If the EUR/USD rate is worse than the protection level (bigger in this case) the protection level is used. And if the EUR/USD rate is below the obligation level half are calculated with the obligation level and half with EUR/USD rate (100/50 structure). Or the other option is to calculate 100% with the obligation level and half with the EUR/USD rate.

After the forward rates and option collar structure rates have been clarified the rates are multiplied with each months invoiced dollar amounts to get what would have been the invoiced euro amounts using each hedging method. Then the results are compared to the actual invoiced amount from each month and the difference is calculated by subtracting the invoiced amount using the hedging method from the actual invoiced euro amount. This is done by each year separately and combined. The difference is divided with the euro profit to get the percentage impacts to profit.

The company has an order base which is booked for an average three months forward. The company does not have currency risk considering the moment of invoicing because the bank with which they are collaborating with is financing the invoicing amounts for the company, and by doing so they are taking the currency risk on behalf of the company. If the invoice is sent out to the customer today the bank is paying the invoice amount to the company latest the next day, so due to this the changes in currency rates are not affecting the company at this point. Hedging is a needed tool to manage the risk when considering the order base. Since they have order base, which is booked for three months forward, they have a significant openness to exchange rate risk. If the order is being placed today for their system and it is going to be dispatched after three months, there is a three-month time window to the EUR/USD to change.

As mentioned, the company's aim is to hedge 50% of the open currency position unless the board has decided otherwise. The goal is that the open currency position is protected on a rolling basis for three months ahead. Hedging instruments are either futures or option collar structures. Currency-denominated balances in bank accounts are sold in euros without delay (Company, 2023).

2.3 Company's current hedging activities

This sub chapter will provide examples of the company's current hedging activities. The next example is describing a collar structure (100/50) to secure the company's strategic goals.

The company have 100% protection against unfavorable exchange rate movements at the level of 1.1000 EUR/USD. The difference to the forward is about 0.025, which means the difference to the forward is considered the same as in the traditional collar structure. There is a possibility to fully benefit from the favorable exchange rate movement up to the obligation level of 1.0720. After this level, half of the hedged USD capital will continue to fully benefit from better exchange rates. When the rate ends below the 1.0760 level, the flexible structure gives a better outcome than the forward or a lower negative market value than the forward, also because the obligation capital is 50%.

Example of the collar structure from February 2023:

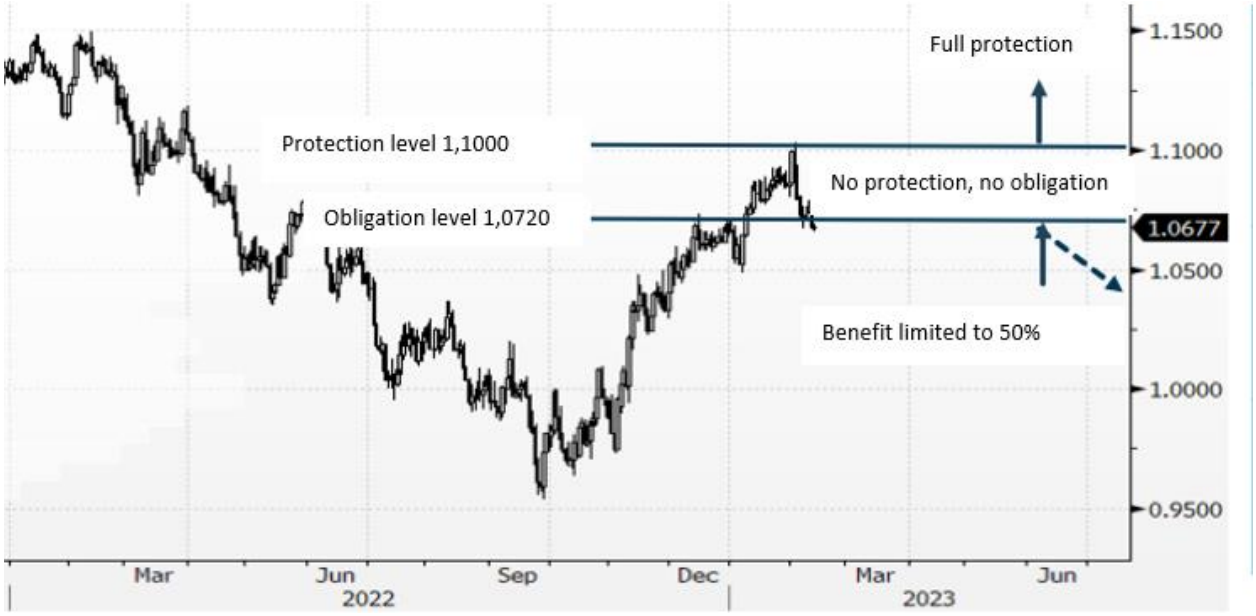

Figure 1. EUR/USD Currency daily, 13-Feb-2023
Source: (Bloomberg Finance L.P., 2023)

Protection time: 2 months (forward 1,0760)

Protection level: 1,1000

Obligation level: 1,0720

The company buys EUR call USD put @1,1000 = right to sell USD.

The company sells EUR put USD call @1,0720 50% = obligation to sell half of the protected USD amount.

Table 3. Collar hedge example from February 2023

Spot when it expires (collar hedge)	Result
Spot > 1,1000	The worst possible USD exchange rate at which the value of the receivable is recorded in the accounting (or the protection matures in money = the difference in EUR is credited).
Spot between 1,0720-1,1000	USD can be sold at the prevailing market rate, or a new hedging forward/flexible can be made if the cash flow has not yet happened (or the protection expires worthless = no cash flow in EUR).
Spot < 1,0720	Half of the protected USD capital is sold at the obligation level and the accounting value is corrected to a better value (or the protection matures in the debt = the difference in EUR is charged against half of the protected capital).

Source: (Company, 2023)

Another example of the company's collar structure to describe the turbulence from February 2023:

100% protections against unfavorable exchange rate movement at the level of 1.000, with which the worst possible dollar receivable value is secured. The difference to the forward is about 0.024 EURUSD. The possibility to fully benefit from the favourable exchange rate movement is up to the obligation level of 1.0500. The obligation level is the best possible USD selling rate, i.e., the best possible value of the receivable in euros. The difference to the forward is 0.026 EURUSD; the benefit is almost as large as what you must pay for flexibility (0.024 vs 0.026). When the rate

ends below the 1.0760 level, the flexible structure gives a better outcome than the forward or a lower negative market value than the forward (Danske Bank, 2023).

2.4 The changes between EUR/USD exchange rates

The monthly average changes between EUR/USD during the past 14 years have been quite variable. The below graph shows the exchange rates movements between 2010 and 2022, viewing the first month of the year. And, in 2022 viewing the last months rate. The lowest rate was in 2022/12 at 1.07 and the highest rate was in 2010/01 at 1.43. But in August 2022 the rate was at the lowest that it has been between this time period at 0.98. When looking at the years 2019 to 2022 the exchange rate has moved quite moderately. The change has been between 1.07 to 1.24 which is 0.17 and as percentage the movement was 13,7%. The biggest change was between December 2022 and January 2021. For the company the downward going trend is a good thing, since the closer the EUR/USD exchange rate gets to 1.00 the better. Then, the company receives more euros with less dollars.

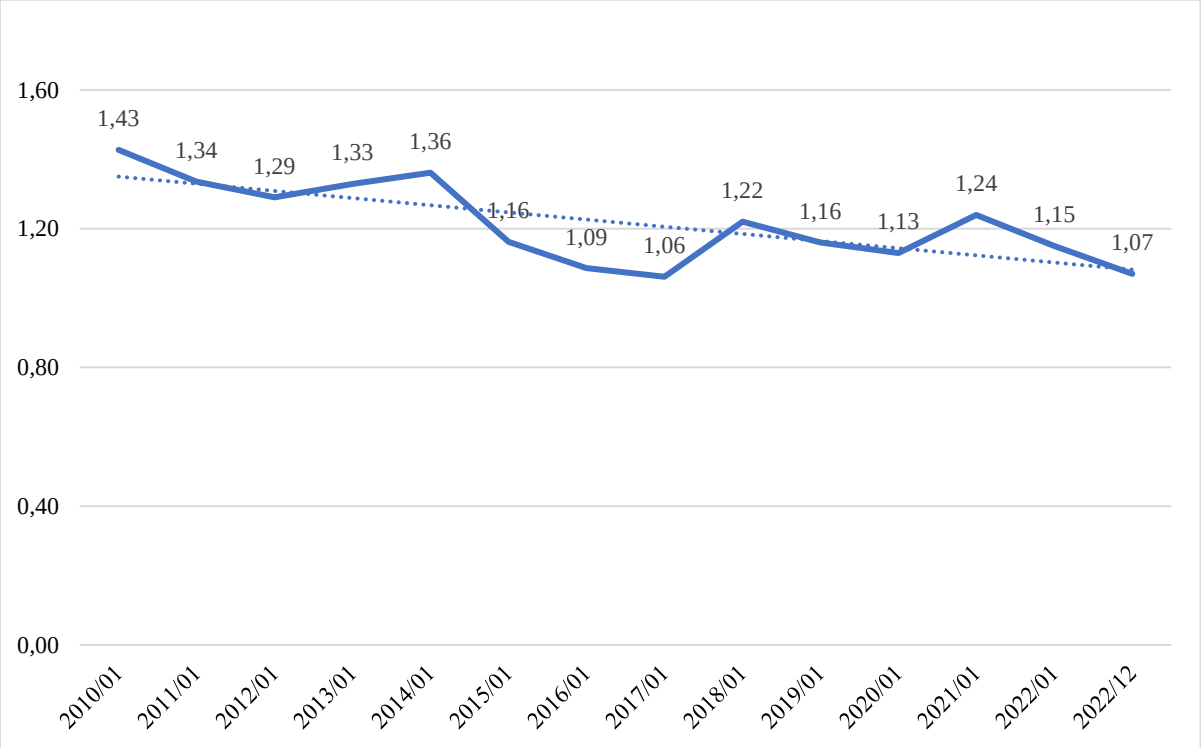

Figure 2. Changes between EUR/USD exchange rates between 2010 and 2022
Source: Suomen Pankki

When looking at the answer to the research question number 1 (How open the company is for exchange rate risk?) the next measures have been made. The company was interested to know what a 5% decrease and increase in the EUR/USD exchange rate could have done to the company's profit or loss between 2019 and 2022. The data table include the invoiced amounts from 2019-2022 in each month in euros and in dollars. By dividing the USD amounts by EUR amounts we can get the exchange rate between EUR/USD. The exchange rate in January 2019 was 1,16 EUR/USD. The risk is measured by increasing and decreasing the exchange rate by 5% and analyzing how much the movements affect the actual invoiced amounts. The EUR/USD exchange rate in these past four years has been 0,99 at the lowest in October 2022 and 1.23 at the highest in May 2022. The difference is 0.238. The 5% decrease at the rate would have caused the -30% impact to the profit in May 2022. And if the rate would have increased, they would have the same 30% but as a positive impact.

3. RESULTS

This chapter will provide the results of the calculations. First the chapter explains the currency hedging practices and it's impact on company performance. After that the chapter provides the difference that hedging with forwards and option collar structures would have had to the option of not hedging. The chapter also contains the scenario analysis between option collar structures and forward contracts.

3.1 Currency hedging practices and impact on company performance

Managing the currency risk is important for reducing company's vulnerabilities from major exchange rate movements, which could adversely affect the value of assets and profit margins (Tiwari, 2019).

Corporate risk management can reduce fluctuations in pre-tax income and by that lower the tax burden of companies if corporate income is subject to a convex tax schedule. The convexity of tax schedules implements from progressively increasing marginal tax rates or limitations of various special tax preference items (Aretz, 2007) . Most of the international companies utilize various hedging strategies to stabilize financial earnings of company value especially when there are obvious inconsistencies in global exchange movements.

Currency markets are more volatile than they have been in many years. The U.S. dollar is at a 20-year high and there is enormous geopolitical and economic uncertainty. Hence, companies of all sizes need to revaluate their foreign exchange (forex) risk and hedging policies. The important aspect of hedging policies is that they must fit the goals of business by keeping currency volatility within a predictable, tolerable range so companies can run their business with more operational certainty. Once company begins to expand operations abroad, complexities quickly snowball, making it harder and harder to understand the scope of the risk and mitigate it. Therefore, it is critical to conduct a data-driven analysis regularly to understand how certain currency movements over next six, 12, and even 24 months would impact the company's balance sheet exposure, forecasted cash flows, or a specific event such as planned acquisition. The science and art of designing a hedging strategy is determining the minimal amount of hedging necessary to achieve a target risk level, while keeping costs down and reducing operational complexity, and

understanding the trade-off between targeted risk level and the cost and complexity of hedging (Merlis, 2022).

3.2 The impacts of the hedging policies to the company's profit

This sub chapter introduces the percentage impacts that option collar structures and forwards would have had to the company's profit in each year and the years combined. It also includes the scenario analysis graph which shows the times when option collar structures or forwards should have been the more efficient tool to use.

The scenarios which are under observation are:

1. The company would have used option collar structures to hedge between 2019 and 2022.
2. The company would have hedged with forwards between 2019 and 2022

Table 4. Hedging tools percentage impacts to profit

Year	Impact to profit (if hedged with option collar structures)	Impact to profit (if hedged with forwards)
2019	3%	1%
2020	17%	11%
2021	1%	1%
2022	-7%	-13%
2019-2022	-4%	-5%

Source: Author's calculations

The impacts are compared to the actual profit from each year that the company earned. The profit is constructed with an assume that no hedging was made. Therefore, the impacts are compared to

the decision that the company would not have hedged at all during this period between 2019 to 2022.

When viewing the impacts that option collar structures would have had to the company's profit there would have been a lot of variation between 2019 to 2022. In 2019 the impact would have been positive 3% with option collar structures and it would have given little bit better result than forwards. The year of 2020 was a very strange year for many businesses because of the Covid-19 pandemic and this can be seen in the impacts also. The option collar structures would have given positive 17% impact to the profit when forwards would have given only 11% impact in 2020. In 2021 option collar structures and forwards would have given the same impact to the company's profit and it would have been positive 1%. In 2022 both hedging methods would have given negative impact to the profit. Collar structures would have given -7% and forwards -13%. Since the year of 2022 was very profitable for the company and they made historical sale result the year of 2022 makes the overall result negative. Overall, between 2019 and 2022 option collar structures would have given the -4% impact to the company's profit and forwards would have given -5% impact.

The negative aspect about using forward contracts in this case is the lack of flexibility. When the EUR/USD exchange rate is moving to the favourable direction considering the company (closer to 1.00) the forward contract is not beneficial option. And considering the volumes the company sells this is very big opportunity to gain more profit and of course at the same time a possibility to loss it. This is the reason why the company haven't used forward contract systematically anymore.

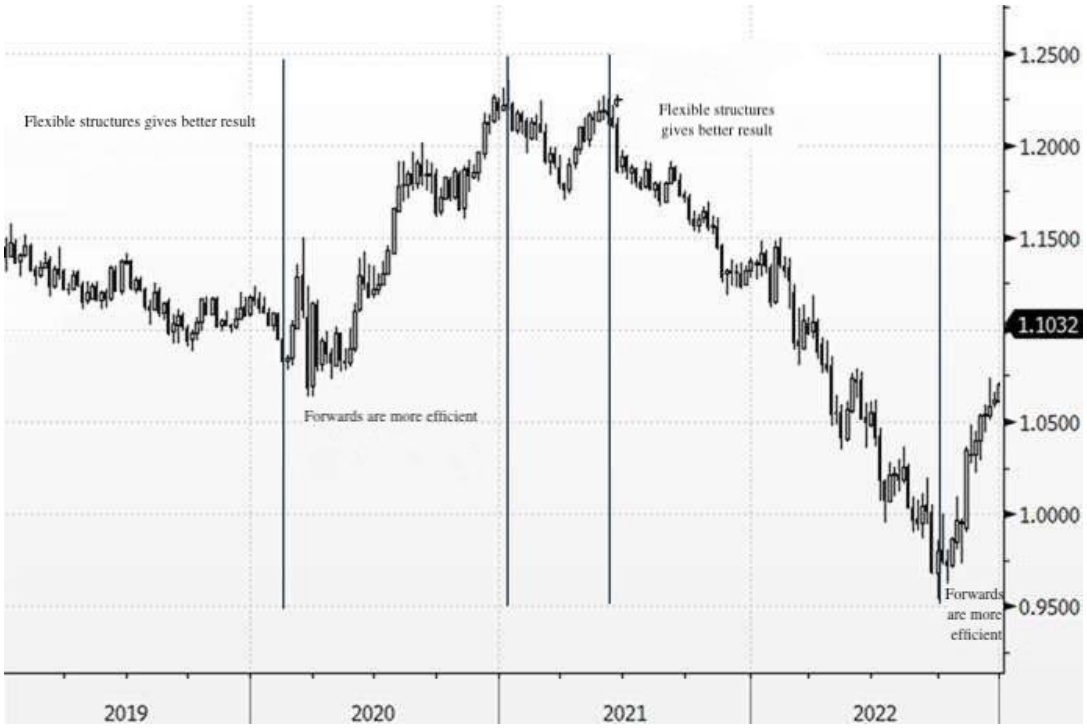

Figure 3. Scenario analysis between options & forwards between 2019 and 2022
Source: (Bloomberg Finance L.P., 2023)

The scenario analysis between option collar structures and forwards is made to render when if the optimal time to use them. The review period is 2019 to 2022 and the data points are EUR/USD rates from each day between the review period. The graph implements the EUR/USD exchange rate movements and shows when option collar structures and forwards should have been the most efficient hedging method. The previous table which shows the percentage impacts follows the graph quite well excluding the year 2020.

The graph shows that in 2020 forwards would have been the most efficient option but if the company would have used option collar structures in 2020 the impact would have been 6% better than if hedged with forwards. This can be explained by the unusual year of 2020. Especially the first quarter and the start of the second. Big market movements, especially downwards at the beginning of Covid-19, would mean that the option collar structure would have been the better option. By the end of quarter 2 the price bias of the collar structures melted down but when the price bias was at its strongest, the collar structure would have been better. Another thing that could improve the result of the collar structure is that the interest rate differential, i.e., the cost of hedging went to a minimum when central banks lowered their policy rates in order to revive the economy and support households. During that time even a small benefit from better market rate always

brought a better option than forwards. Even though the year of 2020 was the year of the rise of EURO and simplified, forwards would have been the better option, these parameters weighted more and made the option collar structures more efficient hedging tool.

Of course, hedging is not a free activity for the company. The prices of the mentioned hedging tools are not precisely known but since option collar structures give the company the option to benefit from the favorable exchange rate movements, those are more expensive than forwards. The prices vary for the market situation but for the company still the option collar structures are more profitable option compared to forwards.

CONCLUSION

The thesis sought the answer to the question of "Why international companies should consider hedging activities?" and the answer is following: by hedging companies stabilizes and reduces the risk of currency fluctuations. Using hedging firms can off-set risk to improve its value. Hedging decreases the variability of expected cash flows about the mean of the distribution with reduction of risk as a result. By finding the optimal hedging policy the company can rely that they will get at least the margin that they were planning on.

The company is exposed to the currency risk since the volumes that they sell to USA are so big. The exchange rate movements between euro and dollar are affecting the company's profit and that is why hedging activities needs to be considered and this also answers to the research question number 2. For managing the risk (research question number 3), the company should have used option collar structures in 2019 and 2020 since they give the possibility to benefit from the favorable exchange rate movements and the movements were favorable to use option collar structures between those years. In 2021 both option collar structures and forwards would have been equally efficient but the impact of them both would have been quite minor. However, in 2022 the company should have had managed the currency risk by deciding to not hedge since both option collar structures and forwards would have had negative impact to the company's profit.

As overall conclusion and answer to the research question 4 the optimal hedging policy for the company between 2019 and 2022 would have been that the company would not have hedged at all, however the years separately vary. It is important to know the possible impacts since one year can make a huge impact to a company cash flow even though in the bigger time window the impacts are minor. In this case the year of 2022 made a huge impact and made the overall results with options and forwards negative. This is because the EUR/USD rate went down, and the company made historical records in sales and for that reason the best option would have been that the company would not have hedged. It is hard to forecast the future and the coming exchange rate markets and that is not the company's focus either, since the main focus is to sell steel structures.

It has been stated in the board that for this sized company and for its activities it is optimal hedging ratio 50% of the order base and these results supports that ratio. Considering that the impacts to the profit overall are quite minor the 50% hedging ratio is enough and has worked well for them. One opportunity to evade the currency risk is to make agreements that the customer pays the orders in EUROS but this is not profitable for the customer and in sales businesses customer is the most important party. Looking the past four years the company has managed to grow and make its business more stable and all of these factors indicates that the current hedging activities are quite sufficient. The business is competitive and the markets change constantly and that is the reason why the company should also pay adequate attention to the separate years and also to the separate quarters when considering hedging activities.

Future studies could research other more volatile currencies. The company has a subsidiary in Poland. It has taken a loan in euros and the exchange rate at the time of the loan was 4,3 EUR/PLN and the rate is now 4,7 EUR/PLN. They are not practicing any hedging activities at the moment. If the operations in Poland are going to grow one could research the optimal hedging activities related to the growth. The losses could grow explosively if the volumes included to the business in Poland grow. This study also shows that even small changes in the exchange rates can affect the cash flow significantly. One could also think what the intangible value of hedging for this kind of companies is. For this company the 50% hedging ratio has been stated to be optimal for current activities. Even though the use of different hedging tools might sometimes be unfavourable, but the knowledge of the protection must have some value for the future operations.

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