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Téma práce: Řízení měnového rizika v rámci vybraného exportního podniku

Téma práce v anglickém jazyce: Currency risk management in selected exporting company

Zásady pro vypracování práce

Cíl práce (stručné vymezení zkoumaného problému): The goal of this thesis is to provide theoretical frame of currency risk management and apply this theoretical base for the analysis of current and hypothetical scenarios of currency hedging in Creditinfo Group hf.

Teoretická východiska: Creditinfo Group hf. is Icelandic company operating in many countries around the world thus the company is involved in currency risk management as its income flows across the border in different currencies. The purpose of this thesis is to make an analysis of current situation in the company and provide a proposal of currency risk hedging based on theoretical aspects of currency risk management and available data of the company.

Metody práce: Detailed analysis of currency risk management of the company based on available data sources followed by a proposal of hedging scenarios with their comparison.

Rámcová osnova:

1. Introduction
2. Internal and External Methods of Currency Hedging
3. Company Analysis
4. Currency Hedging Proposal with Discussion
5. Conclusion

Základní odborná literatura:

1. DURČÁKOVÁ, Jaroslava a Martin MANDEL. MANAGEMENT PRESS. *Mezinárodní finance*. 4., aktualiz. a dopl. vyd. Praha: Management Press, 2010, 494 s. ISBN 978-80-7261-221-5.
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I hereby declare that I have written this Master Thesis independently and that I have introduced all information sources I have used.

V Praze / In Prague, 6.1.2016

……..
podpis diplomanta / Signature

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Identifikační záznam / Bibliographical Record

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Abstrakt / Abstract in Czech language

Tato práce se zabývá řízením měnového rizika ve vybraném exportním podniku. Jde tedy především o určení jednotlivých druhů měnového rizika, která na danou společnost působí, vymezení teoretického rámce pro kvantifikaci jednotlivých druhů měnového rizika a způsobů jejich zajištění. Hlavní členění metod zajištění měnového rizika je na metody aktivní a pasivní, které jsou v práci detailně popsány. V případě aktivních metod se jedná o použití měnových derivátů jejichž použití je aplikované na reálný případ zajištění transakce vyplývající z obchodní činnosti daného podniku. Teoretický základ této práce vychází z definice měnového kurzu a jeho určení. Dále je popsán devizový trh, jeho charakteristika, jednotlivé subjekty a jejich dílčí role a v neposlední řadě také dostupné instrumenty s jejichž pomocí se může daný podnik zajistit.

Abstrakt v anglickém jazyce / Abstract

The analysis of management of foreign exchange exposure in the selected company is the objective of this work. The primary aim of this work is the determination of individual types of foreign exchange exposures and to provide the theoretical frame for their quantification together with particular methods for their hedging. There are two main methods for hedging of currency risk which are described in detail in this work. They are active and passive methods of currency risk management. In case of active methods the derivative instruments are applied for the real case of the operation of the given company. The theoretical base of this work arises from the definition of currency rate and methods of its determination. The foreign exchange market with its characteristics, individual subjects with their roles and ultimately also available derivative instruments for the hedging are described as well.

Klíčová slova / Key Words in Czech language

Zajištění měnového rizika, expozice měnového rizika, řízení měnového rizika, finanční deriváty, měnový kurz, vnitřní metody řízení měnového rizika, vnější metody řízení měnového rizika

Klíčová slova v anglickém jazyce / Key Words

Currency Hedging, Foreign exchange exposure, Currency Risk Management, Derivative Instruments, Currency Rate, Internal Methods of Currency Risk Management, External Methods of Currency Risk Management

Content

Preface

I selected the topic of currency hedging of selected exporting company because I believe that this topic is currently reflected in more and more companies due to the current technological advances that enable the entrance of these companies to the global market. The financial market has made huge advances as well and thus it can provide useful instruments for companies operating on global markets to hedge open positions to currency risk when doing their business. My motivation for the topic of this work is a close relation to one of the subjects on global market exposed to the currency risk. It is Creditinfo Group who owns Creditinfo Solutions where I am employed and which is the company analysed in the practical part of this work. The topic of foreign exchange exposure, its quantification and evaluation is a very broad topic for the scope of the master thesis but even then the work touches all these issues related to this topic with the exception for derivative instruments which are described in more detail and which are also supported by the practical evaluation. At the end this work should provide a useful framework for the currency risk management strategy for any company participating on the global market.

Introduction

The aim of this work is to provide a theoretical frame for management of foreign exchange exposure of the real company operating in the world of global business. The topic of currency hedging is being reflected in many companies around the world as the technical and technological development of the society in 21st century enables to overcome geographical market limits and simplifies the entrance of these companies to global markets of the world. There are various types of currency risks a company operating on global markets is exposed to. Each of the foreign exchange exposures needs a different tool and different approach for the management in order to be minimized.

The theoretical basis of currency rate and currency risks provides a useful insight for further determination and analysis of foreign exchange exposure and its management on example of a real company, Creditinfo Group, hf. (CI), the subject of foreign exchange exposure. Operations of the company take place across many countries in the world making thus the company exposed to currency risks of many different currencies inclusive the exotic ones. This fact bears a potential risk that cannot be neglected as these types of currencies are known for being very volatile and unstable.

According to the theoretical frame for the currency risk management there are three possible approaches how to deal with the foreign exchange exposure of the real company operating on a global market. These approaches includes active, passive and no foreign exchange exposure hedging.

- ✓ No Hedging
- ✓ Passive Hedging
- ✓ Active Hedging

All of the above mentioned approaches to currency hedging have some pros and cons which we will try to discuss in this work. Generally every company tries to find out equilibrium between level of risk minimization and cost spent for the hedging of foreign exchange exposure. In other words the company tries to expose to currency risk as less as possible for the lowest price possible. Given by the cost of the implementation of the

strategy for the currency risk management the approach to the currency hedging can be determined by the size of the company and its available resources. For instance a small family company will not invest large amounts into multiple types of foreign exchange derivative instruments to hedge a small portion of its transactions going across the border. On the other side a large corporation having subsidiaries, suppliers as well as customers abroad with assets and cash flows in many currencies totally in billions $ will not take a risk of not implementing a currency risk strategy to hedge its foreign exchange exposure.

Before we start with the implementation of strategy for hedging of foreign exchange exposure we need to determine individual types of foreign exchange exposures together with the way how to calculate them. Then each type of foreign exchange exposure has different approaches for its minimization or hedging. The combination of these approaches finally forms the overall strategy for the foreign exchange exposure management of the company.

Historical Development

The need of individual currencies was brought by the development of international trade among first settlements and civilizations early in a human history. The trade of individual currencies among early civilizations came later on as well, as we can read for example in. The development of the trade with foreign currencies came across ancient, medieval and early modern times until today. There are many events recorded in this historical time frame that are important steps in the development of currency trade and can be read in many resources. The creation of foreign exchange market is one of the most important for us. With the development of foreign exchange market there were also developed different approaches for the establishment of currency rates. The important milestone came after the decay of the Bretton Woods system created after the Second World War which allowed currencies to fluctuate within a range of 1% to the currency pair[1]. This system proved to be inefficient and thus together with other external influences of the period caused high fluctuation of currency and interest rates leading to the development of financial derivatives[2]. Financial derivatives created as a tool for hedging of foreign exchange exposure finally became very popular object of

[1] Laurence S. Copeland.: Exchange Rates and International Finance, 2008, pp. 444
[2] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 137

trade on foreign exchange markets. They faced a huge increase in total volumes traded nowadays. The huge increase is caused by the possibility of trade with these financial derivative instruments together with the need of hedging for more and more companies because of the globalization of world markets, the phenomenon of 21st century.

Background Research

There were many works dedicated to the basic issue faced by any company operating on a global market. This issue touches the question whether to hedge and minimize the currency exposure or not. Eventually when should the company hedge and how. The practical part of this work is dedicated to the hedging of foreign exchange exposure of the multinational company having assets in many subsidiaries around the world from which it also receives financial flows coming to the parent company treasury. The question whether to hedge or not was examined for example by Glen and Jorion (1993). They analysed the question of currency hedging of international bond and equity portfolios from risk minimization and speculative point of view. They found out under which conditions is the currency hedging of the international portfolio beneficial and compared effects of four currency hedging approaches on the overall performance of various types of international bonds and equity portfolios. They used International Asset Pricing model IAPM which is trying to establish a relationship between the risk and return on investment used to determine the real value of the investment.

This model was first introduced in the work of Solnik (1974) where he discussed the effect of portfolio diversification on reducing the variability of risks of the portfolio. When we want to select the most appropriate strategy for currency hedging we have to first evaluate the foreign exchange exposure.

Next work of Papaioannou (2006) Exchange Rate Risk Measurement and Management: Issues and Approaches for firms provides an overview and definition of types of exchange rate risk and the way how to measure these risks or in other words how to measure the exposure of the subject to these individual types of risks. The other part of the article is dedicated to the description of different approaches to the management of foreign exchange exposure where the use of derivative instruments is described as a part of the overall foreign exchange exposure management. The final paragraph describes the hedging practises of US firms.

The work of Brown (2001) is dedicated to managing foreign exchange risk with derivatives which is also one of the approaches for the practical part of this work. He investigates a foreign exchange risk management program of the real multinational company through its internal documents and through the evidence that the company have already entered into thousands of derivative transactions. The author formulates that the use of such instruments is conditioned by accounting treatment, derivative market liquidity, exchange rate volatility and recent hedging outcome.

The work of Marshall (2000) investigates foreign exchange risk management in UK, USA and Asia Pacific multinational companies based on statistical methods. He surveyed practises of multinational companies in mentioned geographical regions and compared them. He found out that practises and importance of foreign exchange risk management are similar among UK and USA whereas there are significant regional differences in Asia Pacific region. Subjects of the consideration of these practices were emphasis on translation and economic exposures, internal and external methods of hedging and overall policies for dealing with economic exposure.

The work of Nguyen investigates whether the use of foreign currency derivatives can explain variations in foreign exchange exposure based on the evidence from Australian companies. He discusses whether the evidence that the use of foreign currency derivatives minimizes the foreign exchange exposure with regard to the degree of foreign operations. The other point of view investigates in his work is the evidence that Australian companies are extensively exposed to currency fluctuations in the long run whereas their exposition in short run depends on the size of the company. This might be caused because of the higher price for long term derivative contracts.

Another useful sources dedicated to our problem are class notes of Bodnar[3]. He provides description of different types of foreign exchange exposure the company can face together with the most suitable tools for the hedging of such an exposure.

The book of Durcakova and Mandel (2010) provides useful and more complex theoretical frame for the currency risk management than previous resources. The subject of the matter in this book starts from the explanation of currency rate and its establishment on the foreign exchange market. Follows the explanation of fundamental

[3] [online]. [cit. 2015-12-13].
Accessible:http://finance.wharton.upenn.edu/~bodnarg/courses/readings/hedging.pdf

theories of foreign exchange rates their development and technical analyses for the prediction of future spot foreign exchange rates based on its historical values. The book provides also description of foreign exchange market as well as available operations with derivative instruments. The foreign exchange risk exposure and its types are described here as well.

Well organized description of financial markets, the money supply and demand forming the final currency rate used in international finance sector and foreign exchange market are available also in the book of Revenda (2012). More on the theories of the currency rate which are also briefly discussed in this work can be found in the book of Kubišta (2009). Very good book having more complex information for the solution of this work is also the book of Levi (2009) and Madura (2009).

Theoretical Base

This section is dedicated to the theoretical frame important for the practical part of this work. The relation of the theory and its influence to our problem being solved is discussed within the text wherever possible. The book of International Finance from Durcakova and Mandel (2010) is a back bone of the theoretical part of this work which is further extended and compared with the literature introduced in the previous section.

As given previously the aim of this work is to analyse and propose a strategy for hedging of foreign exchange exposure of the multinational company having assets as well as financial flows from many foreign countries around the world. At this stage it is important to realize the currency of the parent company and then the list of other currencies to be converted to this currency. Let's mention here that the company does not need to change all of its cash flows into the currency of its parent company for many reasons, for example the given currency is stable and can be used internationally for purchases or the company suppliers are from the same country as the cash flow and the currency can be used for paying receivables, etc. When we need to hedge value of future receivables or payables we are talking about so called transactional risk related to the foreign exchange exposure. On the other side any multinational company needs to publish its financial statements on the periodical basis and its international assets must be evaluated in one currency according to the pricing standards. Thus the real value of the company which is variable in time can be evaluated for the given date. The sensitivity to change of the real value of the company due to the movements of currency rates is called translational foreign exchange exposure. The last type of foreign exchange exposure is economic or operating exposure which is a sensitivity of the future cash flow on the future changes of foreign exchange rates. Anyway, the fact that we can make the conversion of foreign currencies to our parent currency is enabled due to currency rates. The basic approach of the establishment of the currency rate between two countries is outlined in the next paragraph.

Currency Rate

The explanation of the aggregate balance of payments of the parent country will help us to understand the major influence on the establishment of currency rates for foreign exchange markets. The aggregate balance of payments of the parent country, in our case Iceland, monitors aggregate flows of goods, services and capital among parent country and other particular countries. Based on the final balance of this trade with a given country the currency supply or demand is formed which is a leading factor for establishment of the price for a given foreign currency pair. The final method of the establishment of the particular currency rate depends on the theoretical approach to the currency rate establishment, type of the market where the currency is traded and finally the type of subject who trades the currency[4].

For our purpose it is important to realize that there is spot exchange rate and term exchange rate. The spot exchange rate is derived from the current currency supply and demand on the market and term exchange rate which is based on the prediction of the future value of the currency and is established according to one of the theories mentioned in the next paragraph. It is also very important to realize that following from the currency supply and demand there are always currency rates established for buying and selling. Two different currency rates for buying and selling enable the subject participating on the currency trade to earn the profit when he buys the currency for the lower currency rate and consequently sell the same currency for the higher currency rate. The difference between these two rates is called spread[4].

The theoretical approach of the currency rate establishment, mainly for its future predictions, is influenced by other factors having impact on the currency rates. These are generally divided into the fundamental factors and behaviour of subjects on the exchange markets. Fundamental factors are macroeconomic values like inflation and interest rate differentials, change in aggregate money reserve, tempo of growth of national revenue and previously mentioned balance of payments. The influence of these factors on the currency rate is bidirectional which practically means that changes in currency rates influence these factors and vice versa. For more details on theories of currency and exchange rates see chapter 3 in Durcakova Mendel (2010). The main effect of the subject's behaviour on the final value of a currency rate is so called

expectation of the currency rate development which is considered in the theories trying to predict and establish the currency rates as well.

When talking about subjects participating on the foreign exchange trade we can divide them according to the size of the total volumes traded[4]. We can have a subject most likely commercial bank or national bank trading currencies on the standardized foreign exchange market or we can have smaller subjects like private companies and small commercial banks trading on different not standardized market. Different types of market subjects participating on these markets and possible operations on these markets are described in the following section.

Foreign Exchange Market

Foreign Exchange market, FOREX or FX is a market that enables to sell, buy or exchange foreign currencies. It is considered to be the biggest financial market in the world[5]. From the point of view of exporting and importing companies the FOREX market plays two important roles[6]:

- The Realization of transfer of Purchasing Power Parity – PPP of one currency in units of another currency
- Hedging of foreign exchange exposure

The basic point of view of foreign exchange market is type of the money traded. We can distinguish between currency exchange for cash transfers and currency exchange for noncash transfers. Currency exchange for cash transfers serves mainly for small volumes of individuals going abroad on holidays or for shopping. Currency exchange for cash transfers is usually more expensive than currency exchange for noncash transfers as we are trading in small volumes with higher transactional fees. The price of currency exchange is realized due to so called spread which is the difference between buy and sell currency rates which finally makes the profit for the dealer. The spread might differ depending on the type of the currency. Trading of currency for cash transfers is not the case of this work so further we will focus exclusively on trading on

[4] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 44
[5] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/forex/f/foreign-exchange-markets.asp
[6] J.Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 43

markets for noncash transfers. For more details on trading currency for cash transfers refer to chapter 2 Durcakova Mendel (2010)

Exchange market for noncash transfers, FOREX has the same features as any other market. It has its participating subjects, available operations and different characteristics. Different aspects of the FOREX are given in the overview in the Tab. 1 below.

EXCHANGE MARKET CLASSIFICATION		
TRADING CHARACTER	Exchange	
	Over the Counter	
SUBJECT TYPE	Wholesale – banks	
	Retail – clients	
OPERATION TYPE	Spot	
	Term	Forward
		Futures
		Options
	Swap	

Tab. 1 Foreign Exchange market classification[7]

According to the table above the exchange rate might differ whether the currency is traded on the Exchange or Over the Counter. Whether the trade subject is a national bank or private exporting company or the trade is executed promptly or in the future. In the next section we will describe more in details the two types of foreign exchange markets.

Trading on Exchange

The exchange might be a physical place or any kind of communication platform that enables trade with stocks, bonds or derivatives takes place. Today there are many exchanges around the world physical or electronic. A few of the most famous exchanges are for instance:

- Chicago Mercantile Exchange – CME
- New York Mercantile Exchange - NYMEX
- London International Financial Futures Exchange – LIFFE
- Singapore International Monetary Exchange

[7] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 44

The trading is centralized, standardized and offer clearing facilities for post-trade activities[8]. Very high minimum lots for trade determined the trading on exchange mainly for central banks, huge commercial banks and huge investment companies.

Trading Over the Counter

Over the counter OTC or off exchange trading is done directly between two parties without any supervision of an exchange. It is contrasted with standardized exchange trading, which occurs via exchanges. OTC trading apart from the financial instruments and its derivatives occurs also with commodities and stocks. OTC market does not have a limitation in terms of quantity or quality. OTC market works based on the interconnection of individual dealers and brokers around the world. Today most of the trading is done via OTC[9]. Based on the characteristics described above the OTC market is suitable for companies investing or exporting to foreign countries, smaller commercial banks and other dealers and brokers. OTC market is a suitable place to hedge the foreign exchange exposure of CI as well.

Market Subjects

There are different types of subjects on the market with foreign currencies who can have also different roles related to the purpose of the participation. According to the Tab. 1 there are wholesales participants and retail participant. The wholesale market participants are mainly national and commercial banks so the connection between two subjects is defined according to the pattern bank to bank. Banks in the wholesale sector are typically represented by[10]:

- Dealers of national banks
- Dealers of commercial banks
- Brokers

The retail market is the market whose participants are mainly commercial banks and their clients. So the pattern of exchange is a commercial bank to client. The retail sector is typically represented by:

[8] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 184
[9] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 45
[10] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 47

- Commercial banks
- Various types of companies
- Smaller banks
- Brokers

The connection between the two types of market wholesale and retail is enabled due to the presence of trading departments of individual banks for these two types of market. The above stated subjects form the backbone of the trade with currencies. Dealers of commercial banks are trading with currencies in the name of the bank. The gain is reached due to already mentioned spread among bid (buy) and asks rates (sell). Dome dealers of the wholesale market are in the position of market makers. That means that they are forming the currency rate for the market. Other participants on the market are brokers who are intermediaries for the trade. Their advantage is that they can trade anonymously and have relevant know how. For more detailed description of the subjects participating on the foreign exchange market refer to Durcakova Mendel (2010). In the next section we will describe different roles of the subjects participating on the foreign exchange market applicable either for banks or any type of the company.

Market Roles

Subjects participating on the trade on FOREX markets were characterized in the previous section according to the volume of executed transactions. Based on this division there are two types of markets suitable for different trade volumes. Huge volumes constrained by lots which are traded on Exchange or no volume constraints on OTC. In the next section we will describe subjects participating on any type of market from the different point of view. The role the subject plays on the market is the perspective we will have a look on in this section.

Hedging

A hedge is an investment to reduce the risk of adverse price movements in an asset. Normally, a hedge consists of taking an offsetting position in a related security[11]. In other words the hedging is a process where a subject wants to close his open speculative position to a currency risk with the help of any derivative financial instrument.

[11] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/h/hedge.asp

Arbitrage

It is a simultaneous purchase and sale of an asset in order to profit from a difference in the price. It is a trade that profits by exploiting price differences of identical or similar financial instruments, on different markets or in different forms. Arbitrage exists as a result of market inefficiencies; it provides a mechanism to ensure prices do not deviate substantially from fair value for long periods of time[12].

Speculation

The act of trading in an asset, or conducting a financial transaction, that has a significant risk of losing most or all of the initial outlay, in expectation of a substantial gain. With speculation, the risk of loss is more than offset by the possibility of a huge gain; otherwise, there would be very little motivation to speculate[13].

Investment

It is an asset or item that is purchased with the hope that it will generate income or appreciate in the future. In an economic sense, an investment is the purchase of goods that are not consumed today but are used in the future to create wealth. In finance, an investment is a monetary asset purchased with the idea that the asset will provide income in the future or appreciate to be sold at a higher price[14].

Financial Instruments

In the following section we will describe types of financial instruments available on the market for any of the role described in the section market roles. The market of our interest is the foreign exchange market but the definition of market roles and financial instruments is applicable also for other types of market. Type of the market is defined also by the trading asset which is consequently underlying assets for particular derivative instrument. In this section we will describe derivative instruments according to the asset classes. Subjects generally try to lessen the total risk exposure which is also the purpose of this work. We need to analyse and propose a hedging strategy for a foreign exchange exposure of a real company which basically means that we can use

[12] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/a/arbitrage.asp
[13] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/s/speculation.asp
[14] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/i/investment.asp

derivative instruments whose underlying asset is currency rate. Even though we will introduce overview of all other underlying assets and their derivatives or cash instruments traded on financial markets.

Following Tab. 2 shows derivative instrument types categorized by asset classes Debt, Equity and Foreign Exchange FOREX. Debts are further divided into long term debts and short term debts. Equity based instruments reflects ownership of the issuing entity whereas debt based instruments reflects a loan the investor has made to the issuing entity. FOREX instruments belong to their own category and will be further described in details for the purposes of this work as well as cash and derivative instruments.

Asset Class	Instrument Type			
	Cash Instruments		Derivative Instruments	
	Securities	Other Cash	Exchange Traded Derivatives	OTC Derivatives
Long Term Debt (>1 year)	Bonds	Loans	Bond Futures Options on Bond Futures	Interest Rate Swaps Interest Rate Caps and Floors Interest Rate Options Exotic Derivatives
Short Term Debt (<1 year)	Bills Commercial Paper	Deposits Certificates of Deposit	Short-term interest rate futures	Forward Rate Agreements
Equity	Stock	N/A	Stock Options Equity Futures	Stock Options Exotic Derivatives
Foreign Exchange	N/A	Spot Foreign Exchange	Currency Futures	Foreign Exchange Options Outright Forwards Foreign Exchange Swaps Currency Swaps

Tab. 2 Different types of assets and the instruments for their trade[15]

Cash Instruments

From the perspective of Tab. 2 we can divide cash instruments on securities and other cash. Basically securities are tradable financial assets with a monetary value. According to Tab. 2 we have bonds, which are long term debts issued mostly by individual countries. Bills and commercial papers are issued by commercial companies and are classified as short term debts. Equity based securities are typically stocks.

[15] [online]. [cit. 2015-12-13]. Accessible: https://en.wikipedia.org/wiki/Financial_instrument

The category of other cash includes loans as a long term debt assets, deposits and certificates of deposits as a short term debt assets and finally spot foreign exchange which is described in the next section.

Derivatives

Derivatives are financial instruments with the value based on the underlying asset. Before we step to the description of derivatives which are term contracts we should define the opposite of them. The spot contract is the purchase or sale of a foreign currency or commodity for immediate delivery. Spot trades are settled on the spot which is usually two business days after the trade date[16]. The spot foreign exchange is very important for the purpose of this work as currency rates of any derivative instrument bought to hedge our foreign exchange exposure will be finally compared and evaluated with this spot currency rate in the instrument maturity day in the future. In upcoming paragraphs we will describe theoretically basic derivative operations on the market after which we will describe more in detail derivative instruments especially for foreign exchange together with their quotation.

Forward

Forward is a non-standardized contract between two parties to buy or to sell an asset at a specified future time at a price agreed upon today in contrast to a spot contract, which is an agreement to buy or sell an asset on its spot date. Spot date may vary depending on the instrument, for example most of the FX contracts have spot date two business days from today. The party agreeing to buy the underlying asset in the future assumes long position (assumes that the price will rise up) and party agreeing to sell the asset in the future assumes a short position (assumes that the price fall down). The price agreed upon is the delivery price, which is equal to the forward price at the time the contract is entered into. Typical outright forward is used mainly on OTC market in retail sector between companies and banks. In wholesale sector among banks the outright forward is most likely synthesised with a combination of foreign exchange swap and spot operation[17]. Outright forward operation is processed with a forward currency rate which is dependent on current development of supply and demand for the given

[16] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/s/spottrade.asp
[17] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 139

currency. Following equations give the forward currency rate according to the outright quotation of currency rate between currency A and B for buying BID (long position) and selling ASK (short position) of the currency.

Forward rate BID

$$\mathrm{FR}_{\frac{\mathrm{A}}{\mathrm{B}}} = \mathrm{SR}_{\frac{\mathrm{A}}{\mathrm{B}}} \frac{1+\mathrm{IR}_{\mathrm{A,D}}\frac{\mathrm{t}}{360}}{1+\mathrm{IR}_{\mathrm{B,L}}\frac{\mathrm{t}}{360}} \quad [1]$$

Forward rate ASK

$$FR_{\frac{A}{B}} = SR_{\frac{A}{B}} \frac{1+IR_{A,L}\frac{t}{360}}{1+IR_{B,D}\frac{t}{360}} \quad [2]$$

- FR – Forward rate (direct quotation for currency A)
- SR – Spot rate (direct quotation for currency A)
- IR_D, IR_L – Interest rates for deposits and loans on yearly base for countries either of currency A or B.
- t – Due date of the forward contract in days

Futures

Futures are contracts between two parties to buy or sell an asset for a price agreed upon today with delivery and payment occurring at a future point, the delivery date. Futures can be traded at futures exchanges, the market place between buyer and seller. Similarly as for forwards the buyer assumes long position whereas seller assumes short position. Futures are very similar to forward contracts with the difference that futures are exchange traded and defined on standardized lots and trading is enabled only for transactions with multiples of these lots. Further the delivery dates are standardized as well. The other difference is a possibility of immediate settlement of gains or losses after the position was closed by the opposite operation with the same due date and amount. Only 5 % of all transaction is terminated by a real currency transfer. The rest is terminated by the opposite operation[18]. This distribution differs to transactions with forwards. The smooth operation of the exchange is due to the presence of the clearing house which can be part of the exchange or separate entity. The purpose of the clearing house is to provide settlement of all transactions and to take over the risk from

[18] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 184

transactions. It means that if one client cannot stand his obligations the consequence does not affect the other client but the clearing house. That is also reason why all brokers must deposit a margin in the clearing house after the agreement is concluded. Usually a bit higher margin must be deposited to a broker by their clients. The same is applicable for the case where there are intermediary brokers between clients and exchange brokers. There are more conditions that must be fulfilled in order to keep the position on the exchange than just a margin. Here is the overview.

- Initial Margin – deposit amount that must be settled by the buyer and seller in the clearing house at the end of the business day when the contract was concluded.
- Maintenance Level – bottom limit of the deposit amount. Every day after the computation of gains and losses due to a movements of the price of futures this limit cannot be reached.
- Variation margin – real amount of deposit

More details about standardization of future contracts traded on the exchange, function of a clearing house or system of every day establishment of gains and losses is described in Durcakova, Mandel (2010).

Price of Futures

There are three basic factor having influence on the price of futures.

- Spot rate value
- Level of interest rates on the year basis for given currency pair
- Remaining time to maturity date of the contract

The price of future contract between currency A and B is given by a similar formula as for forward contract.

$$\mathrm{FP}_{A/B} = \mathrm{SR}_{A/B}\frac{1+IR_A.\frac{t}{360}}{1+\mathrm{IR}_B.\frac{t}{360}} \qquad [3]$$

The implication stated above gives a certainty that futures and forwards are interconnected and their price cannot differ considerably. The other fact is that the price of futures is continuously established every day from the contract conclusion to its

maturity which makes the price of future contract at the maturity date identical with the spot rate.

The way how to hedge our payables and receivable with different due days and use of delta futures for dynamic hedging is described in detail in Durcakova Mandel (2010).

Options

It is a financial derivative that represents a contract sold by one party who is called the option writer to another party who is called the option holder. The contract offers the buyer the right, but not the obligation, to buy the call option or to sell the put option on any financial asset at previously agreed price so called strike price, during a certain period of time or on a specific date known as the exercise date. Call options give the option to buy at certain price, so the buyer would want the stock to go up. Put options give the option to sell at a certain price, so the buyer would want the stock to go down.[19] Options are derivative instruments that can be traded either on Exchange or on OTC.

Exchange Options

Well known exchanges for option contracts are for instance:

- Philadelphia Stock Exchange - PHLX
- Chicago Board Options Exchange – CBOE
- London Stock Exchange – LSE
- Sydney Exchange

The options traded on the Exchange are traded on standardized lots and due date terms for given currency pairs as well as future contracts. The difference against the future contracts is in the size of lots. Lots are much smaller for option contracts than for future contracts. The other difference is that the margin is set up only by one side the option writer who is exposed to a loss.

OTC Options

There are no constraints for the option traded on the OTC market in terms of due dates, amounts and realization price. From the performance point of view we can distinguish

[19] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/o/option.asp

between so called American and European option. The American option can be performed whenever within the start of the contract until the due date. On the other side the European option can be performed only at the due date. This fact reflects the option price.

Option Premium

Option Premium is the price for which the option holder buys the option of not performing the option contract for a given amount and volume. The option premium is fixed to one unit of underlying currency. Quotation of the option premium is evaluated on Exchange according to the value of realization price for given intervals from the current spot currency rate. The option premium for the option traded on the OTC market is evaluated based only on the realization price required by the buyer.

Swap

A swap is a derivative contract through which two parties exchange financial instruments. These instruments can be almost anything, but most swaps involve cash flows based on a notional principal amount that both parties agree to[20]. This instrument is mostly traded over the counter with the help of so called swap house. In case of currency exchange we distinguish among following types of swaps[21].

- Foreign Exchange Swap – FX Swap
- Currency Swaps
- Cross Currency Interest Rate Swaps

Foreign Exchange Swap

It is always a combination of two operations of different types.

- Swaps with combination of spot and forward
- Swaps with combination of two forward operations with different maturity
- Very Short Term Swaps with maturity in few days

[20] [online]. [cit. 2015-12-13]. Accessible: http://www.investopedia.com/terms/s/swap.asp
[21] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 156

In first case of spot and forward operation the dealer promptly buys/sells the currency and at the same time he sells/buys the currency with a future term.

In case of forward and forward operation he buys/sells forward with shorter term and then sells/buys forward with a longer term.

Foreign Exchange swaps are mostly short term instruments in contrast to currency swaps and cross currency interest rate swaps. They help swap partners to temporarily converse amounts in two different currencies based on the spot middle rate and one term reimbursement of interest rate difference based on quotation of swap rate for currency A and B with interest rates for deposit D and loan L as given below.

$$\mathrm{SR_{MID}} = \frac{\mathrm{SR_{BID}} + \mathrm{SR_{ASK}}}{2} \quad [4]$$

$$\mathrm{SwapRate_{BID}} = \frac{(\mathrm{IR_{A,D}} - \mathrm{IR}_{B,L}) \cdot \frac{t}{360}}{1 + IR_{B,L} \cdot \frac{t}{360}} . SR_{MID} \quad [5]$$

$$\mathrm{SwapRate_{ASK}} = \frac{(\mathrm{IR_{A,L}} - \mathrm{IR}_{B,D}) \cdot \frac{t}{360}}{1 + IR_{B,D} \cdot \frac{t}{360}} . SR_{MID} \quad [6]$$

Swap Rate BID is a swap for a client with currency A, who buys promptly currency B to be sold in a future term to a quoting bank for this rate.

Swap Rate ASK is a swap for a client with currency A, who promptly sells currency B to a quoting bank to be bought back in a future term.

Currency Swap

Currency swap enables conversion of regular payments in one currency to regular payments in second currency. It is applicable for principal amounts as well as for interest payments. In contrast to foreign exchange swaps this instrument can be used for long term payments.

Cross Currency Interest Rate Swaps

Further to the currency swap this instrument enables conversion of fixed interest rate in one currency to floating interest rate in the second currency or vice versa.

Risk Assessment

Prior to establishment of efficient currency hedging strategy we will need to realize our overall foreign exchange exposure together with a method how to quantify consequent risk. The primary aim of active hedging is not an increase of mean value of gains in a long term period but to reduce gains volatility in time. The stabilization of the operating result of any company is an important aspect of the economic politics of the company. The main effects of foreign exchange exposure of the company operating on international markets have an influence on the value of following items.

- Assets
- Liabilities
- Cash Flows

We need to emphasize that not only a company with operations abroad is affected by the development of currency rates but also a company operating purely on domestic market is affected as well in context of open economy. The above mentioned items are open to following three types of foreign exchange exposures and risk can be assessed individually to each of them.

Foreign Exchange Exposure

Foreign exchange exposure is a sensitivity of value of assets, liabilities and cash flows expressed in a home currency to changes of currency rates. It can be related either to nominal values or real values. Real values are values covering also inflation for a given period. Following from the statement above the foreign exchange exposure is related to state values as well as flow variables included assets and liabilities as state values and cash flows as flow variable. The foreign exchange exposure can be analysed either based on gross approach or net approach. Gross approach means that the foreign exchange exposure is evaluated individually for each asset and liability type or for each revenue and cost type separately. Net approach means that the foreign exchange exposure is evaluated for final resulting assets and liabilities difference or for final balance among revenues and costs of cash flows. Finally the foreign exchange exposure can be measured either statistically as a sensitivity of values given in a home currency

to real, expected and unexpected changes in foreign currency rates. We can distinguish three types of foreign exchange exposure[22].

- Transactional foreign exchange exposure
- Economic foreign exchange exposure
- Translational foreign exchange exposure

Transactional Foreign Exchange Exposure

Transactional foreign exchange exposure is a type of foreign exchange exposure which characterizes a sensitivity of future foreign exchange payments, payables and receivables in a home currency to historical, current or future changes in a currency rate. In other words how much will our balance of payments differ when currency rates in our portfolio change either in history, presence or future.

The difference between foreign exchange position and foreign exchange exposure is that the foreign exchange position is a state value of a balance quantified in a foreign currency whereas foreign exchange exposure analyse possible change of future value of balance in home currency. These two terms are in a tight relation as the value of future balance follow from the current state of balance of foreign exchange assets and liabilities. The main aim of the evaluation of transactional foreign exchange exposure is quantification of the amount needed to hedge. The value of future foreign exchange receivable on the due date is influenced by two basic factors.

- Spot currency rate which enables to calculate current value of the debt
- Spot currency rate influencing foreign prices and interest rates values

Economic foreign exchange exposure

It is a type of foreign exchange exposure that characterizes sensitivity of future cash flows of the company to the changes of exchange rates. Cash flow statement is recorded in the currency of the parent company recounted with the particular currency rate which can be current spot rate, expected spot rate or forward rate. Transactional foreign exchange exposure of our receivables and payables for executed sales and purchases is

[22] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 214

part of the economic foreign exchange exposure which follows from its definition of the exposure of future cash flows but there are two additional effects that make the economic foreign exchange exposure different from the transactional one[23].

- Effect of sensitivity of all cash flows from the home market to the changes of exchange rates that drive the accessibility of the home market for foreign competitors. Appreciation of the home currency causes the rise of the import from abroad that makes the home market more competitive which can lead to the cash flow drop. The opposite effect is applicable for the home currency depreciation.
- Effect of income from abroad in the currency of the exporting company which excludes the transactional foreign exchange exposure but still includes the economic foreign exchange exposure as currency rate movements change the price of goods for the foreign customer.

Translational foreign exchange exposure

It is a type of a foreign exchange exposure that characterizes sensitivity of consolidated balance sheet items of multinational corporations to historical recorded changes of exchange rates. It is a case when a value of assets or liabilities in a currency of the parent company changes due to recorded changes of denominated currencies. The consolidated income statement can be the subject of the translational foreign exchange exposure as well. Apart from the change of the currency rate the translational foreign exchange exposure depends also on[24]:

- Proportion of foreign activities on the total activity of the company
- The currency rate of the primary economic environment
- Accounting methods used for the translation into the currency of the parent company

For more details on translational foreign exchange exposure or accounting methods for the translation of the currencies refer to Durcakova, Mandel (2010).

[23] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 235
[24] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 244

Currency Risk Position

Based on the definition of different types of foreign exchange exposures any subject on the market can assume two types of the position in relation to the particular exposure. It is either closed or open foreign exchange exposure. The two types of the foreign exchange exposures are defined in the following paragraph. The aim of the hedger is to use any combination of external or internal methods of hedging to minimize or close these exposures. On the other side the speculator can either gain or loss from the open speculative position. The following definitions are important mainly for the hedging with the use of derivative instruments.

Closed Position

In case when assets and liabilities of the subject in a given currency are identical from the following perspectives:

- quantitative amount
- due dates of entries on both sides of balance sheet
- the way and amount of interest rate

The fact that the way and amount of interest rate is not identical for asset and liability the foreign exchange exposure is accompanied also with the interest rate risk exposure.

Open Position

Long or short speculative position brings either gain or loss.

- Long Speculative Position – at due date receivables > payables in a given currency
- Short Speculative Position – at due date receivables < payables in a given currency

The subject expects evaluation of the foreign currency in case of long speculative position whereas the subject in short speculative position expects devaluation of the foreign currency. For more details on the position to foreign exchange risk exposure see Durcakova, Mandel (2010)

External Methods of Hedging

We have explained currency rate, different types of markets, different types of roles on the market and types of financial instruments that can be operated on given markets. Further we defined foreign exchange exposures and positions a subject can assume for its transactions. Now we can step to the question how to hedge our position with different types of financial derivative instruments which is an external method of hedging also called active methods of hedging as we use them proactively to hedge our individual transactions. External methods of hedging include use of individual derivative instruments and their combination in order to hedge our foreign exchange exposure. They are useful to hedge our future income and outcome transactions, receivables and payables in different currencies on their due date which is a transactional foreign exchange exposure. They are also useful for hedging of economical (operational) foreign exchange exposure which is in other words hedging of future cash flows coming from different types of operations of the company.

Internal Methods of Hedging

In this section we will focus on more detailed explanation of management of foreign exchange exposure and its division on internal and external methods of currency risk management. These methods are also called passive methods of hedging. In the introduction we were talking about active and passive methods of hedging against currency risk. Internal methods correlate with passive methods and external methods correlate with active methods of currency risk management or hedging. External methods are using financial derivative instruments and are described in the section external hedging whereas internal methods encompasses broad spectre of methods of financial management of the company that we will try to enumerate in this section. The aim of internal methods is decreasing of foreign exchange exposure or constraining of its growth. Individual methods are described below. To see more details refer to Durcakova, Mandel (2010).

Netting

Netting is the type of internal currency hedging method based on the mutual clearance of payables and receivables among subsidiaries of the multinational parent company. We can distinguish between.

- Bilateral Netting – netting between two subsidiaries
- Multilateral Netting – more difficult for more than two subsidiaries, needed a presence of group treasury as the centre of netting operations, important aspect of multilateral netting is timing of clearance.

Matching

Matching is an extension of multilateral netting with the difference that matching includes also third parties apart from the ones operating within one group. The centre for netting or matching operation is needed here as well. The aim of the company in this case is to negotiate match-able due dates and amounts in the same currencies. Then the payment received in one currency (cash inflow) can be used for the payment to other party in this currency (cash outflow) if due date of the first transaction precedes to the due date of the second transaction. Thus the need of use of derivative instruments to hedge the foreign exchange exposure is restricted only for hedging of final balance of these cash flows. The assumption of matching is that we do have opposite cash flows in one currency. Otherwise we can use parallel matching which is concerned with tightly related currencies. Very common for instance for currencies in Europe before introduction of Euro.

Leading and Lagging

Leading is a form of currency hedging based on currency rate predictions. When we assume that the home currency depreciate based on the assumption we will try to settle our payables before the given depreciation.

On the other side when we assume that the home currency consolidates based on the assumption we will try to postpone our payments in foreign currency which is called lagging.

Both methods are considered to be more aggressive as forcing to pay in advance or to postpone payments can lead to tensions among business partners. In both cases the company have to count on change in interest rates for deposit of the given currency which usually according to Fischer's effect move in opposite direction than the movement of a currency rate.

Currency Diversification

Currency diversification is based on the correlation coefficients among our traded currencies when we try to keep our currency portfolio with foreign exchange payables and foreign exchange receivables in currencies with the opposite correlation coefficient to our home currency. Thus we can keep the value of our assets stable because when the value of assets in one currency drops the value of assets in other currency rise up.

Price Politics

Price politics is concerned with the pricing for its products dependent on the real or expected movement of currency rates. The loss on the payment to our foreign supplier caused by the currency rate change can be compensated by charging different price to our customers. Then we have to consider our position on the market when we are in the position of a price maker or price taker.

Currency Clause

In other case we can place a currency clause into our contract which will anchor the value of the currency rate from the date of a contract conclusion to the date of the payment.

Selection of Invoicing Currency

This type of internal currency hedging is based on the contract conclusion in our preferable currency which can be our home currency or any other currency which is considered stable for our purposes. This type of hedging is dependent on the negotiating power of the company.

Company Analysis

In the practical part of this work we will discuss and analyse foreign exchange exposure of Creditinfo Group, h.f. based on the knowledge frame given in the theoretical part of this work. Following questions are examples of questions which any hedger or risk manager of the company has to ask prior the formulation of hedging strategy of the company.

- Which way and how to hedge open position?
- What is the difference between hedging of short and long position?
- When to hedge and when not?
- What type of hedging to choose?

We will try to respond to these kinds of questions in the next part of the work. Thus we will establish a framework for the foreign exchange exposure management. The management of foreign exchange exposure includes following steps and most likely appear to be a continuous process as given on the Fig. 1.

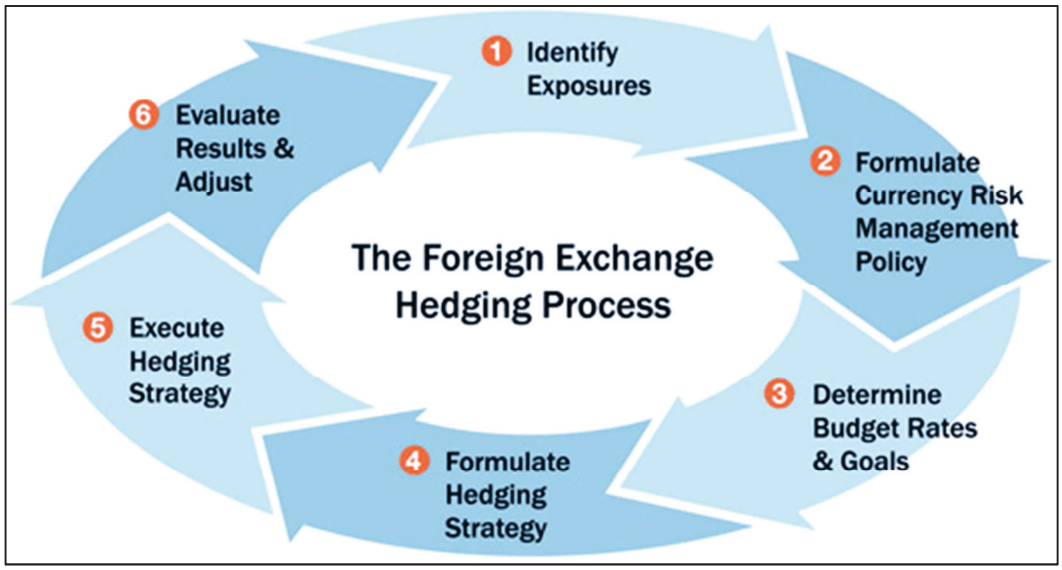

Fig. 1: The foreign exchange hedging process[25]

[25] [online]. [cit. 2015-12-13]. Accessible: http://business.westernunion.com/resource-center/fx-101/hedging/

Creditinfo Introduction

Creditinfo is an Icelandic information group operating in more than 20 countries around the world. The company is focused mainly on operating credit bureaus in different countries. The company itself was established in 1997 in Iceland by its current majority owner Reynir Grétarsson with an initial idea to collect public information. Consequently the idea to create a credit bureau was formed and implemented. In 2003 Creditinfo was established and went international. Today Creditinfo Group, h.f. operates Icelandic credit bureau and owns Creditinfo International which is the main entity to coordinate credit bureaus owned by the group around the world. All its subsidiaries are credit bureau institutions except Creditinfo Solutions, s.r.o established in Prague, Czech Republic. Creditinfo Solutions (CIS) is an IT company that develops supports and maintains products for operation of credit bureaus and risk management for banks. The main product that enables to run credit bureau institution is Credit Bureau Solution (CBS). It is a tool that pertains to a group of credit risk management tools whose final users are financial institutions and banks. Presence of such a tool on the market has vital consequences for a local economy as it provides better, information based decision on credit assessment thus the risk of lending is lowered. Consequently the interest rate of credit products drops so more commercial credit is issued and inverted in the development of various types of industries which has further positive consequences on a local economy. From the technical point of view a credit bureau is a database system that collects, stores and sorts data provided by data providers. Data providers are banks and financial institutions. Each bank or financial institution provides its own data and consumes in back data from the whole market which is value added for individual banks and financial institutions. Data from the credit bureau are consumed in form of credit reports which is a basic sales unit of a credit bureau. More on the history of Creditinfo Group can be found in the book by Reynir Grétarsson (2012) which is not published publicly but can be sent by the author on the request.

More detailed picture about operations of Creditinfo Group provides Fig. 2. We can distinguish among countries where the group operates, where the system is delivered to the third party and countries with other major system installations.

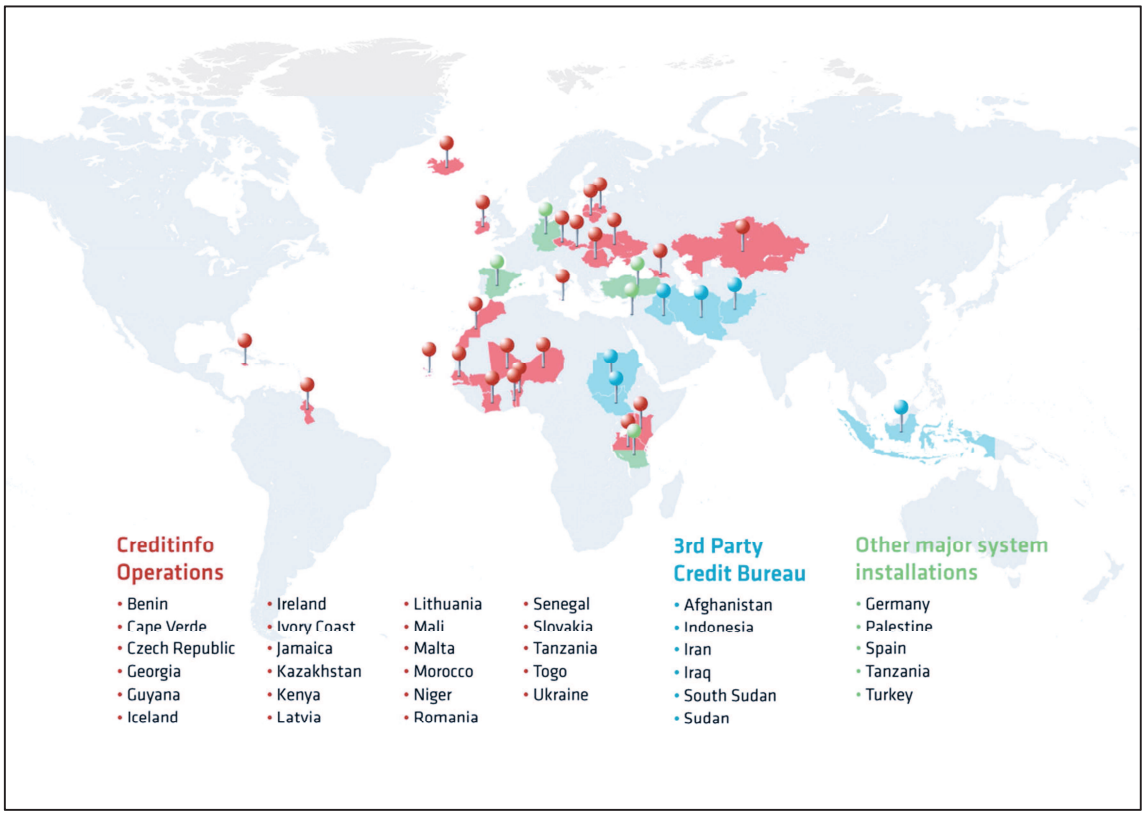

Fig. 2 Map of Creditinfo operations[26]

Analysis of Consolidated Financial Statements

As a base for our analysis of foreign exchange exposure serve consolidated financial statements of the group. Consolidated financial statements are the financial statements of a group in which the assets, liabilities, equity, income, expenses and cash flows of the parent company and its subsidiaries are presented as those of a single economic entity[27]. The currency of amounts on consolidated financial statements is Icelandic Krona ISK. The statements include following items:

- Balance Sheet
- Income Statement
- Cash Flow Statement

[26] [online]. [cit. 2015-12-13]. Accessible: https://www.creditinfo.com/about-us/
[27] IFRS 10 - Consolidated Financial Statements *www.iasplus.com*. IAS Plus. Retrieved 2013-11-29.

Consolidated Financial Statements

Balance Sheet

Consolidated balance sheet is a balance sheet of the group comprising of balance sheet of parent company as well as its subsidiaries. It is one of three basic financials a company have to publish periodically. It summarizes total assets, liabilities and shareholder's equity to the given date. Thus we can say that it is a state value.

BALANCE SHEET 2014	Notes	2014	2013
ASSETS			
Fixed Assets			
Intangible Assets			
Goodwill		1 236 250 000	1 255 034 000
Other Intangible Assets		372 129 000	346 372 000
TOTAL	13	1 608 379 000	1 601 406 000
Property and Equipment			
Tools and Equipment		115 798 000	83 419 000
TOTAL	14	115 798 000	83 419 000
Investments			
Investments in Affiliates	16	281 317 000	229 926 000
Investment in other companies	17	125 300 000	51 828 000
Deferred income tax asset	21,22	37 922 000	3 786 000
TOTAL		444 539 000	285 540 000
Fixed Assets Total		2 168 716 000	1 970 365 000
Current Assets			
Inventory			
Inventory	2	8 171 000	4 416 000
Receivables			
Accounts Receivables	2	543 534 000	516 758 000
Other Receivables		218 536 000	187 190 000
Related Companies Receivables	18	213 714 000	167 237 000
Cash			
Cash and Cash Equivalent	2	283 296 000	171 836 000
Current Assets Total		1 267 251 000	1 047 437 000
Total Assets		3 435 967 000	3 017 802 000
Liabilities and stockholders equity			
Stockholders equity			
Share Capital		311 219 000	306 388 000
Premium Capital		26 923 000	0
Statutory Reserves		111 831 000	111 831 000
Retained Earnings		1 189 151 000	823 094 000

Equity of shareholders of parent company		1 639 124 000	1 241 313 000
Minority interest		2 809 000	34 212 000
Stockholders equity	19	1 641 933 000	1 275 525 000
Long-term Debt			
Long-term Debt		1 030 448 000	1 204 308 000
Long-term Debt, related parties		44 589 000	0
Current maturities		776 480 000	200 101 000
TOTAL	20	298 557 000	1 004 207 000
Current Liabilities			
Account Payable		146 708 000	110 652 000
Accured Liabilities and Expenses		558 567 000	402 208 000
Current Maturities	20	776 480 000	200 101 000
Taxes for the year	21,22	13 720 000	25 110 000
Current Liabilities		1 495 475 000	738 071 000
Total Liabilities		1 794 032 000	1 742 278 000
Liabilities and stockholders equity		3 435 965 000	3 017 803 000

Tab. 3 Balance Sheet of Creditinfo Group

Income Statement

Income statement is a statement that combines the revenue, expenses, and income of a parent company and its subsidiaries. A consolidated income statement presents an aggregated picture of the whole corporation rather than its individual parts. Any money owed between the companies included in the statement is not considered.[28]

INCOME STATEMENT 2014	Notes	2014	2013
Operating Revenues			
Net sales		2 784 914 000	2 578 006 000
TOTAL		2 784 914 000	2 578 006 000
Operating Expenses			
Cost of goods sold		457 384 000	294 639 000
Salaries and related expenses	11	1 186 260 000	1 184 746 000
General and administrative expenses		797 385 000	780 381 000
Depreciation	6, 13, 14	96 697 000	74 116 000
TOTAL		2 537 726 000	2 333 882 000
Resulr for the year before financial items		247 188 000	244 124 000
Financial Income and Expenses			
Financial income	12	18 747 000	15 540 000

[28] [online]. [cit. 2015-12-13]. Accessible: http://financial-dictionary.thefreedictionary.com/consolidated+income+statement

Financial expenses	12	36 950 000	59 165 000
Recalculation of long-term liabilities	12	31 095 000	138 110 000
Loss on sale of shares		0	10 000 000
TOTAL		12 892 000	84 485 000
Result for the year before tax		260 080 000	328 609 000
Income tax	21,22	35 019 000	45 540 000
TOTAL		35 019 000	45 540 000
Result before effects of affiliates		225 061 000	283 069 000
Effects of affiliates	2,16	186 740 000	142 751 000
TOTAL		186 740 000	142 751 000
Net result for the year		411 801 000	425 820 000
Profits for the year attributable to			
Shareholders of parent company		452 896 000	468 649 000
Minority interest		41 095 000	42 829 000
TOTAL		411 801 000	425 820 000

Tab. 4 Income Statement of Creditinfo Group

Cash Flow Statement

A consolidated cash flow statement similarly as two previous financial statements aggregates cash flows from financing, investing and operating activities across all majority-owned companies that are legally separate businesses.[29]

STATEMENT OF CASH FLOWS 2014	Notes	2014	2013
Operating Activities			
Net result for the year		411801000	425820000
Items not affecting cash:			
Depreciation		96697000	74116000
Gain (loss) of sales of assets	6,13,14	0	10000000
Effects of associates	16	-186740000	-142751000
Exchange rate difference and interest		-25957000	27676000
Loans write-offs		0	-88449000
Effects of Income taxes		-46838000	-5926000
TOTAL		248963000	300486000
Change in current assets and liabilities			
Change in trade and other receivables		-58122000	33924000
Change in inventories		-3754000	-4357000
Change in trade and other payables		28363000	53302000
TOTAL		-33513000	82869000
Cash flow from operating activities		215450000	383355000

[29] [online]. [cit. 2015-12-13]. Accessible: http://smallbusiness.chron.com/prepare-consolidated-cash-flow-statement-65205.html

Investing Activities		
Operations acquired during the year	-77862000	-184026000
Dividends from affiliates	90433000	62309000
Investment in excess of assets sales	-161543000	-114471000
Related parties receivables, change	-46477000	-157072000
Investing activities	-195449000	-393260000
Financing activities		
Payments of bank loans	-168825000	-253404000
Proceeds from bank loans	64478000	951000000
Short term bank loans, (overdraft)	164051000	0
Sale/(Purchase) of treasury stock	31754000	-1116540000
Financing activities	91458000	-418944000
Increase/decrease in cash	111459000	-428849000
Cash and cash equivalents at beginning of year	601549000	600686000
Cash and cash equivalents at end of year	283295000	171836000

Tab. 5 Cash Flow Statement of Creditinfo Group

When we take a look on the consolidated financial statements of Creditinfo Group we can state that the group is exposed to all of the previously mentioned foreign exchange exposures as it has property and investments in other countries of its subsidiaries and it pays and receives transactions from abroad as well.

Transactional foreign exchange exposure is a subset of economic foreign exchange exposure which is discussed further in detail. When we want to consider transactional foreign exchange exposure we have to first quantify total amounts of payable or receivable transactions in all foreign currencies in our portfolio and then we have to decide by which tool we will hedge these amounts. The analysis of use of different derivative instruments on a specific transaction will be executed in the next section of analysis of external hedging but based on the theoretical frame of this work we could also use some internal methods of hedging to lessen the total transactional foreign exchange exposure.

Analysis of Internal Methods of Hedging

Use of internal methods of hedging should be part of the overall economic politics of the company. In this case we can use netting where we can pair receivables and payables among subsidiaries with the same currency. We can use either bilateral netting or multilateral netting in which we would need to establish a group treasury as a centre

of netting operations. After the application of netting the final foreign exchange exposure is equalled to the final balance of payments among two or more subsidiaries.

We can also establish good business relations with our business partners from the outside of the group and use the same approach as in case of netting. Then we are talking about matching. When we are trying to match our payables with our receivables in one currency we have to always consider the due dates of these transactions. Obviously to be able to match these payments with our business partners from the outside of the group is more difficult.

Methods of leading and lagging are also suitable for minimizing of transactional foreign exchange exposure by adapting due dates of payable and receivable transactions to the prediction of future development of currency rates. This method is more suitable for subjects outside the group than inside the group because based on the movement of currency rate there is always on side making a loss whereas the other side gains. The final result within the group would thus equalize. The disadvantage of this method is that it is not easy to enforce.

The currency diversification is less convenient method for our case as it is conditioned by the fact that we have to do a business in currencies with different correlation to our parent currency. Thus if one currency depreciate the other one with opposite correlation should appreciate and due to this fact we can minimize the total fluctuation of value of our assets, incomes and cash flows. Subsidiaries of Creditinfo Group and its business partners come from different countries. The business development into these countries was not driven by the currency diversification of the total portfolio but by other factors so the currencies are not selected based on this factor. The most suitable case how to use this method for the group might be enforcing contracts to individual subsidiaries and business partners with respect to currency correlation.

Enforcement of the currency for a given contract is also another method of internal hedging. In this case the company is trying to enter into contracts in its local currency or into the currency which is stable in relation to the home currency. USD is one of the currencies which are considered to be stable and given by the fact that the business of the group is mostly outside the Europe, excluding thus euro, the USD is very convenient currency for the business. From the legal point of view the group have to report its

financials in the currency of the country where is the legal entity legally inscribed but still it can keep its capital for instance on USD bank accounts in case it is the currency enforced for most of the contracts. Then there are two consequent advantages for us. First we are exposed only to one currency and the second that we are exposed to relatively stable currency.

Another suitable tool that can be applied for transactional foreign exchange exposure is a currency clause in contracts that fixes the value of current spot rate for the future settlement of the transaction. Unfortunately it might be difficult to agree on such a currency clause with our counterpart.

The final possibility how to minimize transactional foreign exchange exposure or in this case the consequence of the currency risk movement from the internal methods of hedging is a pricing policy. This method is using different pricing for products or services based on the prediction of future currency rates. In case of Creditinfo Group this method is useful when we generally consider the currency rate movements prior entering into the contract. The company either sell the product or sell the license or charge individual reports. The first case is suitable for change in price when currency rate movements are expected. The other ones are long-term continuous relations so it is difficult to change the price simply because of the fact that we expect the currency rate appreciation or depreciation. Also the more long term prediction the less likely the prediction is accurate thus we cannot predict well the future payment that we expect for example in one year.

Analysis of Economic Foreign Exchange Exposure

In regards of economic foreign exchange exposure we know that it is a sensitivity of our future cash flows on future changes in foreign exchange rate as described in the theoretical section. We also mentioned that the transactional foreign exchange exposure is a subset of economic foreign exchange exposure which was analysed in the previous paragraph. The economic foreign exchange exposure is extended about two cases such as influence on cash flows from the home market in case of appreciation or depreciation of a home currency in relation to foreign currencies. In case of Creditinfo Group the cash flow coming from the home market is not of a relevant size and also due to the industry specifications it is not very probable to be affected by the competitors from

abroad. To be explained further the revenue from the operation of local credit bureau in Iceland can be considered as a cash flow from the home market. The revenue is generated due to sold reports to banks and financial institutions on Iceland who are connected to the system of Creditinfo Iceland and to change such a provider is a question on years. In case the home currency appreciates the technical market entrance conditions are still a huge obstacle for a foreign competitor to enter the market. The other factor in such case can play a legal requirement as we are dealing with a sensitive data. The legal system of many countries does not accept a foreign entity to manage such a data.

The other effect of economic foreign exchange exposure apart from the transactional foreign exchange exposure is related to customers. In case our home currency appreciates and customers pay for products or services in our home currency they will have to pay more to be able to pay in our home currency. This effect could cause some problems for Creditinfo Group especially when do we consider the fact that most of the group subsidiaries operates in considerably unstable currencies. It would be convenient for the group to establish a functional currency suitable for all its subsidiaries. The ISK is not an international currency but it is a home currency of Creditinfo Group. Still to lessen transaction fees and its exposure it could imply for example USD as its functional currency. Than the group can operate only in one currency and the problem of economic foreign exchange exposure is passed to individual subsidiaries because they still have to buy USD for their home operational currency.

When we have a look on the cash flow statement in Tab. 5 we can notice that the exchange rate difference and interest item in 2014 makes -25 957 000 ISK which is quiet huge loss related to the differences in currency rates. In case the group setup any hedging strategy the final loss can be limited. On the other side such a hedging strategy most likely implies additional expenses and if we have a look on 2013 the item of exchange rate differences and interest is in positive numbers, exactly 27 676 000 ISK. Here we have to admit that the difference is almost equalized in these two years but the aim of implementing a strategy for management of foreign exchange exposure is not to increase a mean value of gains in a long term period but to reduce gains volatility in time. We assume that most of these losses are due to the transactional foreign exchange

exposure which is hedged by the derivative instruments which are analysed in the chapter of external hedging in company analysis.

Analysis of Translational Foreign Exchange Exposure

The translational foreign exchange exposure is the exposure that affects multinational companies as for example in our case the Creditinfo Group. It is the sensitivity of all items on financial statements to the movement of currency rate. When we hypothetically assume that the group operates in USD as its functional currency and for the accounting reasons it has to translate all its financial statements to the home currency which is ISK the translational foreign exchange exposure is the difference in the total value of the company in relation to the movement of currency rate USD/ISK. There are various methods for the translation of the items of financial statements from foreign currencies to the home currency[30] but it is questionable if it is really needed to hedge against such an exposure when its consequences are reflected only in consolidated financial statements. For example if the group wants to invest its capital in new markets USD is more suitable than ISK so there is no need to change physically USD to ISK.

Analysis of External Hedging

Eternal hedging is a method to hedge a transactional foreign exchange exposure. In the chapter of external hedging we will compare use of different derivative instruments for hedging of receivable transaction according to the following assignment.

Recently the company implemented system to Indonesia. After the first mile stone of the project on 15 of September 2015 the company invoiced a bill to 1 000 000 USD with due date on 15 of December 2015. The company needs to secure this transaction to be able to pay salaries and other expenses related to the project in CZK the same month as the system is developed and supported from the Czech subsidiary.

Forward and Spot Operation

So called outright forward is a derivative instrument that enables to promptly enter into a term contract. As forward contracts are traded on OTC market there are no

[30] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 244

constraints for amounts or delivery time. The most frequent forward contracts are with due dates on OTC up to one year. In our case the maturity of the contract we want to enter are three months. Our position is open for next three months unless we close our position. We will analyse the use of forward contract and spot operation with historical currency rate development and evaluate convenience of using such a derivative instrument. The expected transaction is in USD and we need to convert it to CZK to be able to pay Czech subsidiary expenses thus we need to find a counterpart on OTC who will buy 1 000 000 USD for a given BID forward rate. According to equation 1 in the theoretical section the rate is given as follows.

$$FR_{\frac{CZK}{USD}} = SR_{\frac{CZK}{USD}} \frac{1+IR_{CZK,D}\frac{90}{360}}{1+IR_{USD,L}\frac{90}{360}} \quad [7]$$

For the outright quotation of the forward currency rate we will consider values of spot rate BID as published by Czech National Bank for given date and interest rates for currencies as given by PRIBOR for CZK and LIBOR for USD plus 3 % and plus 1,5 % respectively for deposit interest rates and 1.1 of PRIBOR and 1.1 of LIBOR plus 3 % and plus 1,5 % respectively for loan interest rate. PRIBOR stands for Prague Interbank Offered Rate and LIBOR stands for London Interbank Offered Rate which gives the interest rate for interbank trade of the currency on the given market.

15.9.2015

- $SR_{CZK/USD}$ = 23,922[31] (BID)
- $IR_{CZK/D}$ = 3% + PRIBOR[32] (year based) = 3+0,47 = 3,47
- $IR_{USD/L}$ = 1,5% + LIBOR[33] (year based) x 1,1 = 1,5+0,85455x1,1= 2,44

15.12.2015

- SRCZK/USD = 24, 57030

[31] [online]. [cit. 2015-12-13]. Accessible: https://www.cnb.cz/cs/financni_trhy/devizovy_trh/kurzy_devizoveho_trhu/denni_kurz.jsp
[32] [online]. [cit. 2015-12-13]. Accessible: https://www.cnb.cz/cs/financni_trhy/penezni_trh/pribor/denni.jsp
[33] [online]. [cit. 2015-12-13]. Accessible: http://online.wsj.com/mdc/public/page/2_3020-libor-20150915.html?mod=mdc_pastcalendar

Then we can substitute to the equation and get the forward rate for selling 1 000 000 USD according to the outright quotation on 15th of September 2015 with maturity date on 15.12.2015 which is in three months.

$$FR_{\frac{CZK}{USD}} = 23{,}922\frac{1+0{,}0347\frac{90}{360}}{1+0{,}0244\frac{90}{360}} = 23{,}983 \quad [8]$$

Total price of forward contract for our company is a value of transaction multiplied by the forward BID rate which is.

$$P_{\text{forward contract}} = 1\ 000\ 000\ .\ 23,\ 983 = 23\ 983\ 000\ \text{CZK} \quad [9]$$

When we compare the price of forward contract for selling of 1 000 000 USD with the real spot rate for the given due date we found out that closing of our position was inconvenient as we could sell the given amount for 24 570 000 CZK on the spot.

With the above given input data we can compare other method of hedging of this transaction. As an alternative approach we can get a loan with a given interest rate for 1 000 000 USD in one bank which we convert immediately into CZK for a given spot rate and given amount in CZK we deposit into another bank for a given interest rate for three months.

USD loan

The company will not take the total amount of USD loan as it must be repaid by the future income transaction in USD together with the interest so the amount of the loan is the total amount of the transaction less the interest to be paid with.

$$\text{USD}_{loan} = 1\ 000\ 000\frac{1}{1+0{,}0244\frac{90}{360}} = 993\ 936,\ 984\ \text{USD} \quad [10]$$

CZK Deposit

The company converts the given amount in USD into CZK by the given BID spot rate.

$$\text{CZK}_{deposit} = 993\ 936{,}984 \times 23{,}922 = 23\ 776\ 960,\ 531\ \text{CZK} \quad [11]$$

On the due date the company repays the loan in USD by incoming transaction and also get the deposited amount in CZK back together with the interest.

$$\text{CZK}_{3months} 23\,776\,960{,}531 \times (1 + 0{,}0347^{\frac{90}{360}}) = 23\,983\,225{,}663\ \text{CZK} \qquad [12]$$

We can see the overview of all results in the table below.

Hedging	Gain [CZK]
Forward	23 983 000
Spot operation	23 983 226
No Hedging	24 570 000

Tab. 6 Results of operations used for hedging

In this case the Czech Crown depreciated which was exactly the opposite than we expected. Thus no hedge for this operation would be the most beneficial operation we could do. If the development of the Czech Crown moves on the other side we would select the spot operation with loan in USD and deposit in CZK as it is slightly more beneficial than the operation with the forward. Here we can notice that the market is effective in the way that it makes almost no difference whether to use either first option or the second one. In the next section we will hedge our transaction with the future contract.

Futures

The future contract was described in the theoretical section of this work. It is a derivative instrument that works in the similar way as a forward contract with the difference that the future contract is traded on the exchange in standardized lots and standardized dates of delivery. The advantage of usage of future contract for us can be for example better transparency, efficiency in settlement, organization and the fact that the risk of default of either side in the contract is ensured by the clearing house and not by trading parties. The presence of clearing house also enables before mentioned efficiency with the settlements from the trade. On the other side standardized lots and delivery dates are disadvantage as the hedge with such a contract needs better planning than the forward contract. Trading on the floor of the exchange is available only via finite amount of brokers and traders who must settle the initial margin after entering into the contract.

First of all we have to find out delivery dates of the exchange for our future contract. If the delivery date is identical with our due date the approach of the hedge is similar as in case of forward contract. If it is not we have to use different approach for the hedge.

From the selection of exchanges we choose for our contract London International Financial Futures and Options Exchange LIFFE which is part of Intercontinental Exchange Group ICE. From the web page of LIFFE we can find out that the amount for the contract and delivery dates are[34]:

- Contract Size – 100 000 USD
- Final Settlement – third Wednesday of the expiring month of the contract

According to the information given above we will need 10 contracts to cover our total amount of 1 000 000 USD. Our due date is on 15th of December and the third Wednesday of the given month is on 16th of December which is only one day after the maturity so the most suitable scenario for Creditinfo Group is to arrange one day delay to pay off its obligations towards Creditinfo Solutions in Czech Republic. In such case the hedge is similar as in case of forward contract according to the following equation giving the price of future contract FP.

$$FP_{\frac{USD}{CZK}} = SR_{\frac{USD}{CZK}} \frac{1+IR_{USD}\frac{90}{360}}{1+IR_{CZK}\frac{90}{360}} \quad [13]$$

When we substitute details for the spot rate SR according to the data provided for the forward contract and interest rates for individual currencies given by PRIBOR for CZK and LIBOR for USD plus 3% and plus 1,5% respectively we get following values.

- IR_{USD} = 2,44 [%] year based
- IR_{CZK} = 3,47 [%] year based

$$FP_{\frac{USD}{CZK}} = 1/23{,}922 \frac{1+0{,}0244\frac{90}{360}}{1+0{,}0347\frac{90}{360}} = 0{,}04170 \text{ USD/CZK} = 4{,}170 \text{ USD/100CZK} \quad [14]$$

When compared to the spot rate in USD per CZK notation.

$$SR_{\frac{USD}{CZK}} = \frac{1}{23{,}922} = 0{,}04180 \text{ USD/CZK} = 4{,}180 \text{ USD/100 CZK} \quad [15]$$

Total amount for ten lots for 100 000 USD with above given price is.

[34] [online]. [cit. 2015-12-13]. Accessible: https://www.theice.com/products/182/Dollar-Based-Currency-Pairs-US-Dollar-Czech-Koruna

$$\text{TFP}_{\frac{USD}{CZK}} = 10 \times \frac{100000}{0{,}04170} = 23\ 980\ 815{,}347\ \text{CZK} \qquad [16]$$

When we compare the value we will get on the due date for future contract with previous results we find out that the hedge using future contract is almost identical as other possibilities but in small orders it is for now the least convenient option. See Tab. 4 below.

Hedging	Settlement [CZK]
Forward	23 983 000
Spot operation	23 983 226
Futures	23 980 815
No Hedging	24 570 000

Tab. 7 Updated results of operations used for hedging

The fact that hedging on futures and forwards market returns almost identical results is given already by the same equation for price of either future contract or forward contract which reflects using of same or similar spot currency rate and interest rates for given currencies. This leads to the conclusion that prices on either market cannot deflect from each other notably.

Other fact to be considered is that the price of future contract is quoted continuously and can be closed whenever within its life span until the due date by the opposite operation. The price of future contract within this life span is approaching to the spot rate as a date is approaching the due date causing thus the price of future contract identical with the spot rate on the due date. Mathematically it is given by the fact that the influence of interest rate proportion for time t → 0 is weakening; see equation [3] in the theoretical part. This is valid only under the condition of constant relation of interest rates which is not in reality necessarily true. The relation among interest rates can swap leading to the crossing of spot rate and future currency rate[35].

For our purposes it is important to realize that when we enter into the contract we do not need to wait until the settlement on the due date but we can terminate the contract whenever within its life span by the opposite operation. The closer we are to the due date the closer we get to the spot rate and thus we can buy a future contract for the closer price to the final spot rate.

[35] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 189

The option for hedging when the due date is different than the futures delivery date is more complicated but still it is possible. For such a case we need to have liquidity in any other currency in the equivalent amount of the hedged transaction.

Different due dates

Based on the assumption that the relation between both interest rates is relatively stable we can hedge our position also under the condition that the due date is different than the settlement day of futures by the following operations.

First we do is to buy corresponding amount of lots of future contracts for buying CZK for USD. Here we have to consider an assumption that we do have liquidity in USD. Future lots can be bought for instance on exchange market for future contracts of Chicago Mercantile Exchange CME Group. The delivery date is on the second business day immediately preceding the third Wednesday of the contract month[36] in case of December it is on Monday 14th which is prior our needed due date. Thus we have to consider for this option the next available month which is on Monday 14th of March. The offered currency pair on web page is CZK/EUR but we can find out that the currency pair CZK/USD is also possible[37]. Spot rate and future price on 15th of September are.

- $SR_{September}$ = 4,180 USD/100 CZK
- $FP_{September}$ = 4,160 USD/100CZK (given below for six month future contract)

The amount of lots for buying CZK that we have to buy is given according to the following equation.[38]

$$n = \frac{X}{SR_0 \times q_f} = \frac{1\,000\,000}{0{,}0418 \times 4\,000\,000} = 5,\ 98 \text{ –> } 6 \text{ lots} \qquad [17]$$

- X – hedged receivable
- SR_0 – spot rate in September
- q_f – size of a future lot in CZK

[36] [online]. [cit. 2015-12-13]. Accessible: http://www.cmegroup.com/trading/fx/emerging-market/euro-fx-czech-koruna_contract_specifications.html
[37] [online]. [cit. 2015-12-13]. Accessible: http://www.cmegroup.com/confluence/display/EPICSANDBOX/Czech+Koruna
[38] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 190

So we buy future contract for buying six lots of CZK for USD with the exercise date on Monday 14th of March 2016 for the following future price, when we consider the same interest rates for given currencies as in case of future contract with the same due date as the futures delivery date but different maturity of the contract. Instead of three months here we have six months.

$$\mathrm{FP}_{\frac{USD}{\mathrm{CZK}}} = \mathrm{SR}_{\frac{USD}{\mathrm{CZK}}} \frac{1+\mathrm{IR}_{USD}\frac{180}{360}}{1+\mathrm{IR}_{\mathrm{CZK}}\frac{180}{360}} = 0{,}0418 \times \frac{1+0{,}0244\times 0{,}5}{1+0{,}0347\times 0{,}5} = 0{,}0416 \text{ USD/CZK} \qquad [18]$$

So the total amount for the future contract in USD is.

$$\mathrm{TFP}_{\frac{USD}{\mathrm{CZK}}} = 6 \times 4\,000\,000 \times 0{,}0416 = 998\,400 \text{ USD} \qquad [19]$$

Now in my balance sheet I do have two contrarious open operations.

- 1 000 000 USD Receivable item on 15th of December 2015
- Contract for buying CZK for 998 400 USD on 14th of March 2016

On the due date of the receivable on 15th of December I will close both positions by following operations.

- Buy contract to sell six lots of CZK for USD on 14th of March 2016
- Sell 1 000 000 USD on the spot market

The amount we get for the selling of the receivable on the spot market is 24 570 000 CZK. The initial value of the receivable was 23 922 000 CZK so we gain on the depreciation of CZK amount of 648 000 CZK.

On future market we initially bought the contract to buy six lots of CZK for 998 400 USD on 14th of March 2016 on 15th of December we bought another contract to sell six lots of CZK for USD on 14th of March for the following future price when the spot rate is the rate for 15th of December and both interest rates are considered as given for previous future contracts with the maturity of three months from December to March.

$$\mathrm{FP}_{\frac{USD}{\mathrm{CZK}}} = \mathrm{SR}_{\frac{USD}{\mathrm{CZK}}} \frac{1+\mathrm{IR}_{USD}\frac{90}{360}}{1+\mathrm{IR}_{\mathrm{CZK}}\frac{90}{360}} = 0{,}0407 \times \frac{1+0{,}0244\times 0{,}25}{1+0{,}0347\times 0{,}25} = 0{,}0406 \text{ USD/CZK} \qquad [20]$$

So the total price of the future contract to sell six lots of CZK is.

$$TFP_{\frac{USD}{CZK}} = 6 \times 4\,000\,000 \times 0,0406 = 974\,400 \text{ USD} \quad [21]$$

In this transaction we lost due to appreciation of USD 24 000 USD which is with the given spot rate on 15th of December 2015 an equivalent of 589 680 CZK.

Finally after the exercise of all of these transactions we can cash following amount of CZK for the given receivable.

$$P_{receivableCZK} = 24\,570\,000 - 589\,680 = 23\,980\,320 \text{ CZK}. \quad [22]$$

We can compare the result with the previous hedging operations in the following table. We can see that the result is almost identical with all other operations used for hedging. It is slightly less convenient than the hedging on the future market with the contract with the same receivable due date as the delivery date of the future contract.

Hedging	Settlement [CZK]
Forward	23 983 000
Spot operation	23 983 226
Futures	23 980 815
Futures different due date	23 980 320
No Hedging	24 570 000

Tab. 8 Updated results of operations used for hedging

Options

Based on the previous results from hedging with different derivative instruments we already know that CZK depreciated against USD at the due date so it turned to be inconvenient to hedge our transaction as we could speculate on the depreciation of CZK and thus gain a profit. In such case when the development of currency rate turns to be convenient for us we can use the right of not performing the contract at the due date to make a profit which is possible only with the option contract. The option premium is the price of the option contract which is dependent on the following parameters[39].

- Strike Price
- Spot Rate on the date of entering into the contract
- Duration of the contract

[39] J. Durcakova, M. Mandel.: Mezinárodní finance, 2010, pp. 198

- Riskiness of the currency

The final option premium depends on the mathematical model used for the determination of the price based on the above mentioned parameters.

For our purpose we need to enter into the put option contract on 15th of September 2015 for selling 1 000 000 USD/CZK with due date in three months. We will use the option tradable on the OTC market thus we are not constrained by the amount and specific due dates. In terms of type of the option contract we consider an American option which means that the contract can be performed whenever within its life span. The price of the contract is expressed in units of home currency per unit of foreign currency and is dependent on the factors stated above mainly on the strike price we want to perform on the contract. For simplification we count with the price of the contract, the option premium 1 CZK/USD. All parameter needed for the analysis are summarised in bullet points below.

- Amount = 1 000 000 USD
- $SR_{CZK/USD}$ = 23, 922 CZK/USD (15.9.2015)
- $SR_{CZK/USD}$ = 24, 570 CZK/USD (15.12.2015)
- Strike Price = 24,500 CZK/USD
- Option Premium = 1 CZK/USD

Total Price for option contract equals to the product of the total amount and option premium.

$$P_{option} = 1\ 000\ 000 \times 1 = 1\ 000\ 000 \text{ CZK}. \quad [23]$$

The development on the market for the future spot rate and our position related to the spot rate development is well described on the following yield curve in Fig. 3.

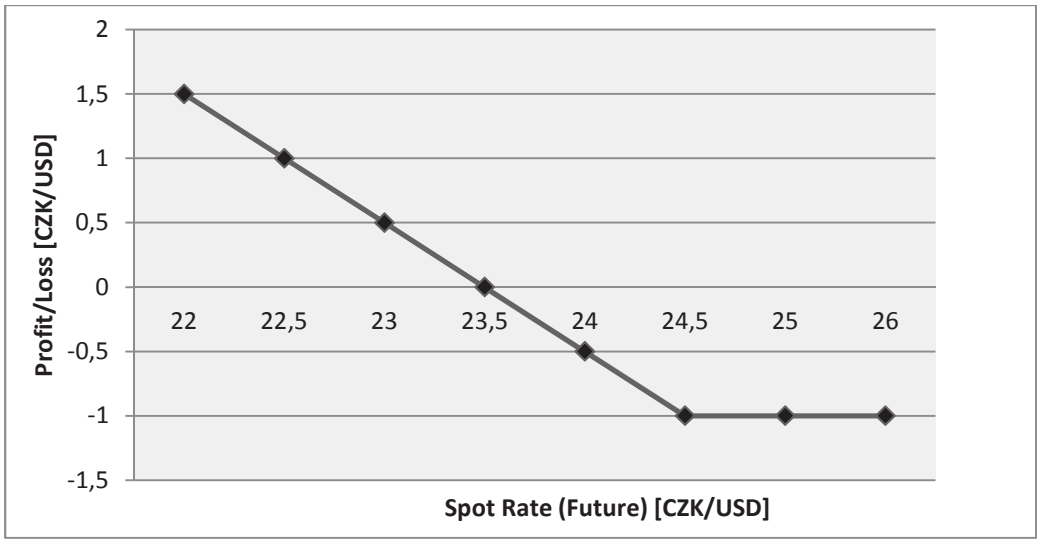

Fig. 3 Yield curve of our Put Option

We entered into the option contract in order to hedge our future receivable transaction against appreciation of CZK but final movement of the currency rate got the opposite direction and CZK currency at the given due date depreciated to the final spot rate 24, 570 CZK/USD. For the better understanding we analyse other hypothetical values of spot rate on the due date.

First we consider the value of spot rate 22,500 CZK/USD. In case we do not have an option contract we could sell one USD per this price but due to the contract we could sell one USD per 24, 500 CZK/USD minus option premium which is finally 23, 500 CZK/USD and according to the figure above it is 1 CZK/USD more than the operation on the spot market. Totally over the contract we gain 1 000 000 CZK. The option contract is in the money.

Another case we consider the value of spot rate 23, 500 CZK/USD. In case we do not have an option contract we could sell one USD per this price but due to the contract we could sell one USD per 24, 500 CZK/USD minus option premium which is finally 23, 500 CZK/USD and according to the figure above we do not have any gain against the spot rate but the option contract is still in the money as we have to pay the option premium regardless the option exercise or not.

Next value to be considered is spot rate 24, 500 CZK/USD. In case we do not have an option contract we could sell one USD per this price but due to the contract we can sell one USD per 24, 500 CZK/USD minus option premium which is finally 23, 500

CZK/USD and according to the figure above it is 1 CZK/USD less than the operation on the spot market. Totally over the contract we lost 1 000 000 CZK. This value is indifferent and we can choose whether we exercise the option contract or not. The option contract is at the money.

Finally we will analyse our result the real spot rate at the due date is 24, 570 CZK/USD. In case we do not have an option contract we could sell one USD per this price but due to the contract we can sell one USD per 24, 500 CZK/USD minus option premium which is finally 23, 500 CZK/USD and according to the figure above it is 1,070 CZK/USD less than the operation on the spot market. Totally over the contract we lost 1 070 000 CZK. This loss is even higher than the payment of option premium and exercise of the option so we will not exercise this contract. The option contract is out of the money. We will sell our receivable on the spot market and gain 24 570 000 CZK from which we still have to pay 1 000 000 CZK the option premium. So finally we receive 23 570 000 CZK. We can compare the value of this hedge operation with the previous results in the following table.

Hedging	Settlement [CZK]
Forward	23 983 000
Spot operation	23 983 226
Futures	23 980 815
Futures different due date	23 980 320
Options	23 570 000
No Hedging	24 570 000

Tab. 9 Updated results of operations used for hedging

We can see that price of option contract is relatively high and even we decided not to exercise the option contract because of the convenient development of the spot rate. After the payment of option premium this operation results in the worst option. Here we have to consider the fact that the option premium, the price of the option contract, was assessed based on our estimation. In case we negotiate better price on the OTC market the option contract becomes more suitable for us.

Swap

A swap operation was described in the theoretical part of this work where we defined different types of swap operations available on the market. Basically we can use foreign

exchange swap or currency swap. The foreign exchange swap includes two simultaneous operations on the market to overcome short term lack of liquidity in one currency when we possess the liquidity in another currency and when we do not want to open to foreign exchange exposure. On the other hand the currency swap can be used for hedging of regular payments in one currency to regular payments in another currency so it is suitable for long term repetitive operations, e.g. cash flow from foreign direct investment, etc.

For our case we will consider almost the same scenario as for the previous operations with the difference that we have to pay our obligations in CZK already after one month from the date of the issuing of invoice, it is on 15.10. 2015, and the invoice is to be paid back already in CZK so we assume that the invoice was issued on the amount of 24 000 000 CZK not USD. To sum up our position we do have obligations of 24 000 000 CZK to be paid in one month and in parallel we do expect to receive 24 000 000 CZK in three months. We assume that we do have sufficient liquidity in USD on our accounts. In order to be able to meet an obligation we enter into the foreign exchange swap contract with combination of two forward operations with different maturity days.

- Forward operation with maturity 1 month to buy 24 000 000 CZK for USD
- Forward operation with maturity 3 months to sell 24 000 000 CZK for USD

We have following input parameters for the BID swap quotation as we want to buy foreign exchange currency (CZK) for the forward operation with lower maturity and we want to sell foreign exchange currency (CZK) for the forward operation with higher maturity to our swap partner.

- SR = 23, 922 CZK/USD – spot rate on 15th of September (considered mid-rate)
- IR_{USD} = 2,44 [%] year based (valid for USD deposits)
- IR_{CZK} = 3,47 [%] year based (valid for CZK loans)

First we need to enter into the forward contract to buy 24 000 000 CZK with maturity one month for following forward rate.

$$FR_{\frac{CZK}{USD}} = SR_{\frac{CZK}{USD}} \frac{1+IR_{USD,D}\frac{30}{360}}{1+IR_{CZK,L}\frac{30}{360}} = 23{,}922\,\frac{1+0{,}0244\times 1/12}{1+0{,}0347\times 1/12} = 23{,}901\ CZK/USD \qquad [24]$$

So the total price of the forward contract with maturity one month is.

$$\mathrm{P}_{\mathrm{forward}} = \frac{24\,000\,000}{\mathrm{FR}_{\frac{\mathrm{CZK}}{\mathrm{USD}}}} = \frac{24\,000\,000}{23{,}901} = 1\,004\,142{,}1\ USD \qquad [25]$$

Now we entered into the forward contract with our swap partner which practically means that we can deposit 1 004 142,1 USD in one month in order to get 24 000 000 CZK and this amount we can swap back to 1 004 142,1 USD after next two months once we get our payment in CZK for the invoice we made for the system implementation. For such a transaction we have to pay a swap fee which is in our case a product of BID swap rate and swapped amount. We have to pay the swap fee as we are getting the currency with a higher interest rate (CZK) for the period of two months.

$$\mathrm{SwapRate}_{BID} = \frac{(IR_{USD,D} - IR_{CZK,L}) \times \frac{t}{360}}{1 + IR_{CZK,L} \times \frac{t}{360}} \times SR_{MID} \qquad [26]$$

$$\mathrm{SwapRate}_{BID} = \frac{(0{,}0244 - 0{,}0347) \times 60/360}{1 + 0{,}0347 \times 60/360} \times 23{,}922$$

$$\mathrm{SwapRate}_{BID} = -0{,}041\ \mathrm{CZK/USD}$$

We can reflect the swap rate with a positive sign as the negative value is given by the higher rate for the currency which was granted as a loan (CZK). The total amount of swap fee as stated previously is given by the following equation.

$$\mathrm{Swap\ Fee} = \mathrm{SwapRate}_{BID} \times Swapped\ amount \qquad [27]$$

$$\mathrm{Swap\ Fee} = 1\,004\,142{,}1 \times 0{,}041$$

$$\mathrm{Swap\ Fee} = 41\,169{,}8\ \mathrm{CZK}$$

Due to the foreign exchange swap operation we could stand our obligations in CZK prior the encashment of the future transaction in CZK as well as hedge the price of the future transaction. For such a possibility we had to pay 41 169,8 CZK swap fee to our swap partner. The disadvantage of such an approach is in the fact that we have to have an equivalent liquidity of expected amount in another currency.

Discussion

The practical part of this work was dedicated to the analyses of foreign exchange exposure, internal methods of hedging and external methods of hedging. According to the theoretical frame of this work the company is exposed to all three types of foreign exchange exposure. It is given by the fact that the multinational company Creditinfo Group apart from the exporting to foreign countries is also investing in these countries as follows from consolidated financial statements. The combination of internal and external methods of hedging formulated into the continuous process is a good way for the management of foreign exchange exposure. The foreign exchange exposure to economic and translational currency risk is discussed within the section of analysis of consolidated financial statements together with suitable methods of internal hedging. The analysis of transactional foreign exchange exposure is evaluated in the section of analysis of external hedging. Derivative instruments were used for this type of exposure.

The convenience of use of internal methods of hedging depends on their application either among subsidiaries of the group or towards the external business partners. They also depend on the negotiating power of the group and should be combined with the tools of external hedging in order to establish a useful framework for foreign exchange exposure management. The management of such an exposure should be a continuous process with persistent evaluation of it efficiency in order to adapt to changes on the global market.

The practical use of derivative instruments as part of the external hedging was evaluated for individual operations available on the foreign exchange market. We hedged a receivable debt of 1 000 000 USD with a due date in three months invoiced in September 2015 by which we wanted to cover expenses in CZK for the project delivery. First we used was a forward contract and operation on the spot market. Due to the fact that we used these two contracts for the same hedging scenario we got almost identical result which is caused by the same maturity of the contract and also same interest rates for loan and deposit of given currencies. After the exercise of the forward contract we cashed 23 983 000 CZK for the forward contract and 23 983 226 CZK from the

operations on the spot market. The slight difference is given by the use of different technique for the computation based on the character of the operation. For the spot operation we had to get a loan for one interest rate and deposit the given amount for another interest rate paid to us which might cause the final gain against the forward contract.

The other operation evaluated was a future contract where we had to face a disadvantage of standardised contracts and due dates on the foreign exchange. For such case we considered both scenarios. First scenario is use of future contract with its delivery date and shift the payment of our obligation in CZK and the second scenario was counting with the different maturity day of the future contract and our due date in CZK. In the first case we cashed 23 980 815 CZK and in the second case we cashed 23 980 320 CZK. Here we can compare the result of future contract with the forward contract. They use the same formula for the computation but return different results. It is given by different input parameters from the exchange. A slightly less convenient result is given from the operations counting on different due dates. For this case we had to enter into two contrarious contracts and also operation on the spot market. The fact that we had to count with longer maturity of the contract due to the settlement day of future contacts in March 2016 caused that we cashed slightly less for this operation compared to the future contract with the same maturity day as a due date of our obligation.

In case of use of the option contract we cashed 23 570 000 CZK which we finally did not enter into because of the fact that CZK depreciated on the due date and it was more convenient to sell our receivable on the spot market. This option is less convenient for us when compared to the previous operations and it is given by the fact that option contracts are generally expensive. But on the OTC market we could find another option seller to enter into the contract with lower option premium and higher strike price.

In terms of swap operation there are different types of swaps as given in the theoretical part of this work. Each of them has different purpose. We selected a currency swap used for overcoming a temporal currency shortage when we do have liquidity in another currency. We changed our hedging scenario and assumed that we have to pay our obligations already one month after the invoice of the bill which has due date still in three months. We also assumed that the bill will be paid in CZK and we do have an

equivalent liquidity in USD. We used a version of the swap with two forward operation with a different due date. First forward operation with maturity 1 month to buy 24 000 000 CZK for USD to be able to stand for our obligation in Czech Republic and the second forward operation with maturity 3 months to sell 24 000 000 CZK for USD once our invoiced bill is paid from Indonesia. For this operation we had to pay 41 169,8 CZK swap fee to our swap partner as we receive a currency with higher interest rate. Finally after the payment of a swap fee we cash 23 958 830,2 CZK but we cannot compare this value with the previous ones as we changed a currency of the receivable transaction and also the amount cannot be considered as an exact equivalent of 1 000 000 USD.

Due to the development of currency pair CZK / USD in our examined period the most suitable derivative instrument for hedging of our position is no participation on the derivative market at all. CZK depreciated in this period and thus we could cash 24 570 000 CZK on the spot market without any hedging which is the best result. The opposite is true for the swap operation where we expected the payment in CZK hypothetically having this receivable in CZK and our obligations in USD the hedge would be convenient. But this was not our case.

Conclusion

There were two aims of this work setup in the beginning. The first was to establish a theoretical frame for the currency risk management and the second was the application of this theoretical base for the statement of the strategy for management of foreign exchange exposure of Creditinfo Group hf. Both aims of this work were successfully accomplished. The theoretical part was elaborated in the first section of this work to support the practical part of this work which is a real case of the multinational company operating in many countries around the world. The use of internal methods of hedging together with the application of derivative instruments as a tool of external methods of hedging were applied in the second part of this work.

In the beginning there is a brief introduction to the topic of this work in relation to the current global economy environment followed by the quick historical development leading to the creation of financial markets and different tools for currency hedging. The evidence of literature and scientific papers related to the topic is also discussed in the introduction in the section of background research to support our initial assumptions.

The theoretical part is consequently elaborated in more details in the theoretical base section. The theory background starts with the explanation of the currency rate and its formation on the market based on the current supply and demand for the given currency pair. Other theories of the currency rate formation and mainly the ways of its prediction and quotation based on the fundamental and technical analyses are mentioned as well. The definition of foreign exchange market with its description, characteristics and main partition on the over the counter market and the exchange market is followed by the introduction of different subjects participating on the foreign exchange market with various market roles including the role of the hedger. The most important assets of the hedger on the foreign exchange market are tools for hedging which are described in the last part of foreign exchange market section. These tools are derivative instruments which derive its value from the underlying asset which is in our case a currency. These tools are used for the hedging in practical part of this work and compared. They are part of so called active or external methods of hedging. These methods can be supported by

internal or passive methods of hedging to minimize foreign exchange exposure. These methods are described in the theoretical part as well. The prior mentioned foreign exchange exposure and its types are described in the section of risk assessment as it is essential to realize what type of exposure we are open to before we close it. Open position is the situation when we are exposed to currency risk which we can close with any operation of external or internal methods of hedging or its combination.

In the practical part of this work the Creditinfo Group hf. was introduced with its history and the industry of their business followed by the consolidated financial statements of the group. The analysis of the foreign exchange exposure in the relation to the consolidated financial statements is worked out in the analysis of consolidated financial statements section. It starts with the analysis of convenience of individual methods of internal hedging for the group. The analysis of economic foreign exchange exposure together with the analysis of translational foreign exchange exposure follows afterwards. The analysis of the final type of foreign exchange exposure which is transactional foreign exchange exposure is analysed in the separate section as this type of exposure is hedged with the help of derivative instruments and pertains to the group of external methods or passive methods of hedging. The use of derivative instruments is analysed in more details as we put emphasis on external methods of hedging in this work. Thus the individual types of available operations on the foreign exchange market were used to hedge a receivable transaction with a given due date coming from the company operation on the foreign market. The final results are given again in the Tab. 10 representing the results for the identical assignment for all below mentioned operation. The swap operation must be presented apart as we had to due to the nature of this instrument change the hedging scenario to the operation dealing with a temporal shortage of liquidity in one currency where we have available the liquidity in another currency.

Hedging	Settlement [CZK]
Forward	23 983 000
Spot operation	23 983 226
Futures	23 980 815
Futures different due date	23 980 320
Options	23 570 000
No Hedging	24 570 000

Tab. 10 Final results of operations used for hedging

The Tab. 10 has to be understood in the way that the settlement column gives us the final amount to be obtained after the exercise of the given instruments on the due date in CZK.

For the swap operation we had to pay a swap fee 41 169,8 CZK to overcome a temporal shortage of 24 000 000 CZK according to the transaction specification given in the swap analysis for the swap of amounts we had to deposit the equivalent amount in USD as we assumed we do have an additional liquidity in this currency.

Individual results are discussed in the discussion but the most important for us is the fact that no hedging in this case resulted in the best option for us due to the appreciation of USD towards CZK in three months horizon from September 2015 to December 2015. This fact gives us important insight that it is needed to use hedging tools with the prior analysis of the currency rate development. Based on the literature given in the introduction we have to say that it is not always convenient to hedge our foreign exchange exposure with derivative instruments rather we should focus more on other types of currency hedging which are more natural and less expensive. The optimal strategy for hedging of currency risk exposure is thus the combination of external and internal methods discussed in this work which has to be adapted continuously in time with relation to the market development according to the Fig. 1 in the company analysis section. Based on the analysis of consolidated financial statements of the group we suggest to engage in multilateral netting and matching which are suitable methods for transactional foreign exchange exposure. Methods of leading and lagging are less suitable as they require the currency market overview and the market analysis based on which we can enforce due dates of our transaction towards our partners, which might be difficult. The last method of internal hedging that we suggest is the enforcement of one currency for all contracts. We do suggest the use of USD as an international currency which is relatively stable.

The above stated analysis and proposal of the strategy for the management of the foreign exchange risk exposure can be applied for any other company participating on the global market with relevant adjustments to the size and type of the multinational company, the given industry of the company and mainly on the current development of currency rates on the foreign exchange market.

This work could be also further extended for example by the evaluation of the total translational foreign exchange exposure which can be determined based on the information given in the consolidated balance sheet. Thus we could observe the change in the total value of the group in time in relation to the changes of currency rates.

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Appendices

Appendix A

Consolidated Financial Statements

- Consolidated Balance Sheet
- Consolidated Income Statement
- Consolidated Statement of Cash Flows

Appendix B

CD ROM

- Master Thesis Assignment
- Master Thesis
- Consolidated Financial Statements
- Excel File

Evidence výpůjček

Prohlášení:

Dávám svolení k půjčování této diplomové práce. Uživatel potvrzuje svým podpisem, že bude tuto práci řádně citovat v seznamu použité literatury.

V Praze, 3.1.2016.

Ing. Ondřej Vomáčka

Jméno	Katedra / Pracoviště	Datum	Podpis