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A Dissertation on the Impact of Foreign Exchange for Non-Financial Companies.

How can non-financial companies use the foreign exchange market and manage the risk it involves?

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RESUMO

Esta dissertação visa analisar a utilização do Mercado Cambial por empresas não financeiras que lidam diariamente com moedas diferentes das transações económicas e financeiras realizadas com clientes, fornecedores, bancos e outras partes. A dissertação analisa a evolução dos mercados FOREX e os riscos associados de operar em moedas estrangeiras e quais as estratégias que podem ser adotadas pelas empresas para fazer face a esses riscos. As informações sobre o impacto e riscos da FOREX nas unidades de negócio foram recolhidas utilizando uma abordagem de pesquisa qualitativa baseada em entrevistas feitas com profissionais do sector, nomeadamente, vendedores de FX e estrategas de cobertura de empresas. Este mercado financeiro é essencial numa economia global e, consequentemente, importante para a maioria das empresas poder utilizá-lo eficazmente.

JEL:

F31: Câmbio de divisas

G15: Mercados Financeiros Internacionais

Palavras-chave: Moeda estrangeira, Moeda, Empresas, Mercados financeiros

ABSTRACT

This dissertation aims to understand and analyse the use of the Foreign Exchange Market by non-financial corporations that regularly deal with different currencies from economic and financial transactions carried out with clients, suppliers, banks and other parties. This dissertation analyses the evolution of the forex markets and the associated risks of operating in foreign currencies as well as investigates strategies that can be adopted by corporations to cope with those risks. The information about the forex impact and risks on the business units were gathered using a qualitative research approach based in interviews made with professionals of the industry, namely, FX Salesmen and Corporate Hedging strategists. It is imperative that corporations are able to use the financial market effectively as it is essential in today's global economy.

JEL:

F31: Foreign Exchange

G15: International Financial Markets

Keywords: Foreign Exchange, Currency, Corporates, Financial markets

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Dissertation delivery

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TABLE OF CONTENTS

RESUMO 2

ABSTRACT 3

ACKNOWLEDGEMENT 4

TABLE OF CONTENTS 6

LIST OF ABREVIATIONS AND ACRONYMS 8

1. INTRODUCTION 9

2. LITTERATURE REVIEW 11

2.1. Evolution of the foreign exchange market from bartering to electronic trading 11

2.1.1. From bartering to the Gold Standard 11

2.1.2. Bretton Woods 11

2.1.3. The Free Floating System and The Plaza Accord 12

2.1.4. The Maastricht Treaty and the creation of the Eurozone 13

2.1.5. The expansion of the internet 13

2.2. The functioning of the foreign exchange market 14

2.2.1. Operators in the foreign exchange market and their role 14

2.2.1.1. Government and Central Banks 14

2.2.1.2. Banks 15

2.2.1.3. Brokers 16

2.2.1.4. Institutional investors 16

2.2.1.5. Non-financial Companies 16

2.2.1.6. Individuals 17

2.2.2. Nature of the operations 17

2.2.2.1. Purpose of the foreign exchange market 17

2.2.2.2. Instruments 18

2.3. Foreign exchange and non-financial companies 21

2.3.1. Volatility and currencies' fluctuations 21

2.3.2. Currency Risk exposure 22

2.3.3. Risk Management 23

2.3.4. Limits of the research 23

3. METHODOLOGY 23

4. RESULTS 24

4.1. The Qualitative Research 24

4.1.1. Interview Participants 24

4.1.2. Interview Process 25

4.1.3. Interview main findings 25

4.2. The Hypotheses 26

4.3. Purpose of the forex for non-financial companies 26

4.3.1. Hedging 26

4.3.1.1. Commercial margin 27

4.3.1.2. Liquidity and Cash Flows 27

4.3.1.3. Funding and Investment 28

4.3.2. Speculation and arbitrage 28
4.4. Currency Risk 28
4.4.1. Financial risk 28
4.4.1.1. Transaction risk 28
4.4.1.2. Risk for liquidity and cash 29
4.4.1.3. Hedging risk 29
4.4.1.4. Internal risk 30
4.4.1. Economic risk 30
4.4.2. Counterparty risk 31
4.5. Determinants of the strategies (regulation, price, efficiency) 31
4.5.1. Regulations 31
4.5.2. Price and efficiency of the strategy 32
4.6. Solutions and derivative strategies 33
4.6.1. Manage the currency risk with non financial tools (by reorganisation) 33
4.6.1.1 Centralized everything in one currency 33
4.6.1.2. Leading and Lagging 33
4.6.1.3. Matching and Netting 33
4.6.2. Manage the currency risk with derivatives 33
4.6.2.1. Forwards and swaps 34
4.6.2.2. Simple options 34
4.6.2.3. Exotic options 35
4.6.2.4. Others products 38
5. CONCLUSION 39
6. BIBLIOGRAPHY 40
7. APPENDIXES 43
7.2. Appendix 1: Global foreign exchange market turnover 43
7.3. Appendix 2: EUR/USD and QE impact since 2008 44
7.3. Appendix 3: Banks top 10 overall global market share in 2019 44
7.4. Appendix 4: EUR/SEK curves following the cession of Volvo by Renault in October 2010 45
7.5. Appendix 5: Currency Instruments illustrations. 45
7.6. Appendix 6: Illustrations of Call and Put profits. 48
7.7. Appendix 7: Questionnaire firstly launched. 49

GLOSSARY OF ABREVIATIONS AND ACRONYMS

BIS	Bank for International Settlement
CB	Central Bank
EMS	European Monetary System
EMU	Economic and Montary Union
EUR	Euro (€)
FED	Federal Reserve Bank
FF	French Franc (F)
FOREX, FX	Foreign Exchange
FX	Great Britain Pound (£)
GBP	Gross Domestic Product
GDP	International Swaps and Derivatives Association
ISDA	Japanese Yen (¥)
JPY	Know Your Customer
KYC	Market in Financial Instruments Directive
MIFID	Non Deliverable Forward
NDF	Non Deliverable Swap
NDS	Net Investment Hedge
NIH	Open Market Operation
OMO	Over The Counter
OTC	Quantitative Easing
QE	Russian Ruble
RUB	Swedish Krona
SEK	Small and Medium Enterprises
SME	United Kingdom
UK	United States
US	United States Dollar ($)
USD	World War I
WWI	World War II
WWII	

1. INTRODUCTION

The Foreign Exchange Market (FOREX) is the largest financial and most liquid market in the world. Unlike other financial markets such as the stock and commodities markets, the forex is not a central and organized marketplace managed by a given entity. It is a decentralized market split into an interbank market which includes the transactions between financial institutions, and an "Over The Counter" market that mainly includes the transactions between the financial institutions and their non-financial clients. The significant expansion in the between 1960 and 1970 of this market has been driven by the economic and financial liberalisation movement across the world (Benassy, 1976).

The FX market grew and expanded in the same way that companies have internationally expanded in the past decades. With the internationalisation of transaction of goods and services alongside the considerable increase of commercial exchanges with other countries, companies started to use the FOREX as they were starting to have financial flows denominated in currencies other than their own reference/local currency. This globalization trend also led to an increased integration of the world's financial markets (Sokoler, 2005).

In spite of the increase of commercial related transactions in the FOREX, the majority of the transaction's volume is of speculative nature (Moore, Schrimpf & Sushko, 2016). The liquidity of forex is exceptionally high with such speculative trading volumes. Nonetheless, speculation is mainly operated by financial institutions and non-financial companies are mainly using the FOREX to deal with the financial dimension of their commercial transactions and also for hedging purposes.

The high liquidity of the FOREX for the majority of the currency pairs facilitates the access to the FOREX of non-financial companies to use the forex to buy and sell currencies. From a user's point of view, liquidity is a relevant feature as it determines how easily the price can vary in a given time. A market as liquid as forex allows the existence of very high transaction volumes with little or no impact on prices. Although the forex market is liquid, the market's depth can vary depending on the currency pair and also something as simple as the time of the day. These elements can introduce higher volatility in the markets. Corporations should be aware of these trends when they are using the FOREX.

Different instruments are available and are used for different purposes, which means that currencies are not only traded in the spot market (buying or selling currencies at the moment),

but also in the derivatives markets – forwards, swaps, options and futures. According to the BIS, the daily currency trading volumes rose to around 6.6 trillion dollars in April 2019 compared to 5.1 trillion dollars in April 2016 when the last survey was published, which is considerably higher than the 1.5 trillion dollars published in 1998. In terms of operation's type, swaps represented 50,2% of the exchanges, spot represented 30%, forwards represented 15,2%, and options represented 4,5%, the remaining being less frequently used products[1]. Regarding the currencies, the most commonly used is the dollar which has maintained its status of reference and dominant currency (used in 88.3% of the global foreign exchange transactions), with the euro coming in second (used in 33,3% of global exchanges) followed by the Japanese yen (used in 16,5% of global exchanges). In terms of currency pair, the EUR/USD represents 25% of the transactions and is closely followed by the USD/JPY pair that represents 13%[2].

After briefly explaining the forex market's main principles and features, this dissertation aims to see how corporations trade on the forex, namely if they trade for similar reasons as well as the risks and advantages they encounter.

[2] *BIS, Triennial Central Bank Survey of Foreign Exchange and Over-the-counter (OTC) Derivatives Markets in 2019*

2. LITTERATURE REVIEW

2.1. Evolution of the foreign exchange market from bartering to electronic trading

2.1.1. From bartering to the Gold Standard

Initially, transactions were made by barter and some goods were commonly used as a bartering system such as salt or spices (Rosenstreich, 2005), where ships and other water vessels were transporting and exchanging the goods. Then the first gold coin appeared during the 6th century B.C. and was used as currency. However, strictly speaking, the first currency at a bigger scale was in Ancient Greece under King Cresus. It became a real currency due to its portability, sustainability, and, most importantly, its uniformity. Due to everyone using the same money with the same value, it made trades much more fluid. (Bradfield, 2018). However, they quickly realised that they were in fact very impractical due to their weight, which later led to the Gold Standard.

Countries started to trade with each other because they could convert the currencies they received into gold. The use of gold, silver, and other metals as currencies of exchange had become widespread. The number of different currencies also multiplied, and in addition to their fiduciary value, currencies started to represent the power and identity of a nation. The Gold Standard started to be adopted in the 1800s with England first in 1817, followed by the United States in 1834, then France, Germany and Japan in 1870. Gold Standard is a monetary system in which the monetary unit is defined by reference to a fixed weight of gold and each national currency is freely convertible into gold. To ensure this convertibility, the amount of currency issued by the central bank is strictly limited by its gold reserves. It guaranteed that the government would redeem any amount of paper money for its value in gold. (Bordo and Rockoff, 1996). This system was adequate until World War I, where the amount of money in circulation was no longer sufficient and governments decided to suspend the Gold Standard in order to create and print more money to finance the war effort and at this time, the Great British pound was used as a benchmark.

2.1.2. Bretton Woods

At the end of World War II in 1944, in Bretton Woods took place the United Nations Monetary and Financial Conference, where the United States, France and Great Britain met to shape a new global monetary system. By that time, the US Dollar reputation was weak due to the stock market crash of 1929 on the New York Stock Exchange, which led to an explosion of unemployment and poverty during the Great Depression (James, 2010). Nevertheless, the US's

decisive role in the outcome of WWII and the size of the American economy vaulted the US Dollar to play the central role in the new monetary system. The aim of Bretton Woods was to find a solution in which the global economy could restore itself (Eichengreen, 1996). The Gold Exchange Standard was created and the dollar became the only currency convertible into gold and the exchange rate of other currencies was fixed against the dollar. It was also created an adjustable pegged foreign exchange market where foreign countries would fix their exchange rate to the US Dollar. The US dollar himself pegged to gold, backed by the fact that the US held the most gold reserves in the world at that time. So foreign countries would transact in the US Dollar and the US dollar became the world's reserve currency. However, less than three decades later, the Bretton Woods agreement failed because there was not enough gold to back the quantity of US Dollars in circulation. The oil crisis and shock of 1971 marked the end of the Gold Exchange Standard as President Richard M. Nixon terminated the Bretton Woods system which soon led to the free-floating of the US Dollar against all other foreign currencies (Holland, 1994).

2.1.3. The Free Floating System and The Plaza Accord

In 1973, the floating exchange rate system was gradually introduced. After the Bretton Woods Agreement ended, the Smithsonian Agreement, concluded in December 1971 for a new dollar standard, but providing a greater range of fluctuation for currencies (Magee, 1973). The US pegged the dollar at $ 38 per ounce of gold, which caused the dollar to depreciate. Under the Smithsonian agreement, other major currencies could fluctuate in a range of 2.25% against the US dollar, and the US dollar pegged to gold. However, in 1972, the European Community attempted to get independence from the dollar. The European Joint Float was then created by West Germany, France, Italy, the Netherlands, Belgium and Luxembourg. But it collapsed in 1973. On the 8th of January 1976, the Jamaican agreements put a definitive end to the monetary system of fixed but adjustable parities. It officially ended the international legal status of gold as a foreign exchange standard and these failures resulted in an official shift to a fully free-float system (Lee, 1984). In this new framework, during the 1980s the dollar appreciated against the other currencies, which harmed exporters and GDP. In order to reverse this situation, Paul Volcker, President of the FED, raised interest rates to decrease inflation, leading to a stronger dollar and negatively impacted in the US factories' competitiveness in the global market (Feldstein, 2013). In 1985, a supposedly secret reunion of the G5 – 5 most powerful economies (France, Germany, Great Britain, Japan, and the US) was held in the Plaza Hotel in New York City. The meeting's main goal was to force the US to devaluate the dollar by 20% and rebalance

the global competitiveness of the major currencies to reduce the substantial current account deficits that were accumulated during the war, while the surpluses that other countries were recording vis-à-vis the US were threatening their growth. Central bankers decided to cooperate in order to rebalance their exchange rates based on parity objectives (Frankel, 2015). However, this agreement only lasted for eight months before it burst and opened the way to a complete floatability of the currencies.

2.1.4. The Maastricht Treaty and the creation of the Eurozone

After the Plaza Accord, the main event in the world monetary system was the creation of the European Union and the creation of the Euro. After WWII, the fall of the Berlin Wall and the disappearance of the Communist bloc raised questions about the need to simplify the monetary relation among Europe's countries and make exchanges easier between each other's (Grieco, 1995). On 9 and 10 December 1991, the European Council was held in Maastricht (Netherlands). Twelve countries signed a treaty establishing a new entity, the European Union (EU), creating a common market and a political unification. On 7 February 1992, the twelve Foreign Ministers signed the "Treaty on European Union." The Maastricht Treaty, which entered into force on 1 November 1993, established for the first time a European Union between the Twelve (Belgium, Denmark, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, and the UK). A critical foundation of this Economic and Monetary Union (EMU) introduced a single currency from 1 January 1999 and under the protection of a European Central Bank. The Euro gave to European banks and companies a chance to reduce their currency risk exposure in a growing globalisation stage, which also allowed them to compete more with the dollar.

2.1.5. The expansion of the internet

The 1990s also reflect the rise and development of the internet. Economic expansion has followed World War II with a 30-year post-war boom, sustained by solid technical progress and an increase in international trades. The development of communications and online information systems led to the access of a large group of users, from corporations to investors, to the forex market, previously mainly reserved to the financial institutions. Additionally, it allowed emergent currencies to become more tradable, especially Asian currencies, which lead investors to increase currency speculation transactions. New entrants and more speculation created a very liquid market, blurring borders and boundaries. Currency higher liquidity also led to a decrease in the spreads. Indeed, the competition between financial institutions increased

because forex became a more atomized and efficient market, with participants having access simultaneously to prices and relevant information.

2.2. The functioning of the foreign exchange market

2.2.1. Operators in the foreign exchange market and their role

The foreign exchange market is a place for both financial and non-financial organisations. In order to understand their role, previous empirical researches and studies have highlighted four major categories of participants with distinct roles and concerns. Financial authorities, financial institutions, non-financial companies, and individuals.

2.2.1.1.Government and Central Banks

Unlike other players, central banks have a duty of protection to ensure the proper functioning of the markets and uphold parities. Even if exchange rates are mainly determined by the law of supply and demand since the passage to the floating system, Central Banks can influence them through their actions and monetary policies. Central Banks played a significant role with recurrent but controversial interventions to defend the value of their currencies. Thus, the crisis and their repercussions also impacted how Central Banks act even though they keep an essential role in the foreign exchange market. The primary goals of Central Banks are to support the economy, keep the inflation at given target and stabilize the exchange rate. Each central bank has its own targets, instruments and policies regarding interest rates and exchange rates aiming to maintain a sustainable economy within its country or economic zone (in the case of the euro).

Typically, central banks have at their disposal three main tools: interest rates, foreign exchange reserves and open market operations (OPO).

- Rates

Central banks can modify several rates to influence their currency prices, such as the Repurchase Agreement rate (remuneration that banks obtain by placing their excess of cash with the CB), the Discount Rate (for banks short term loans), and more. However, they will evolve equally with the refinancing rate (or policy rate), the main driver of the currency rates, representing the borrowing rate of a currency. A lower policy rate involves an increase in the currency supply, which should lead to a depreciation of its currency, and conversely, a rise in the rate involves an increase in the currency demand, which should lead to an appreciation (European Central Bank*)*.

- Reserves

Polterovich and Popov (2003) demonstrated that foreign exchange reserves stimulate investment and increase the GDP, helping the economy. Still driven by the law of supply and demand, the foreign exchange reserves principle is to exchange its currency directly against another to reduce or increase the liquidity on the market. This process can impact the pairs considering that it is often followed by a subsequent adjustment of the money supply by the central bank to offset any unwanted snowball effects on the local economy (Federal Reserve Bank).

- Open Market Operations (OMO)

Another action with impact on currencies is the OMO. Central banks can buy securities on the open market to "sterilise" the effect on the monetary base of the decline in foreign exchange reserves. Carpenter and Demiralp (2006) argue that there is not a unique way of putting in action an open market operation. The reason is that each central bank has its own policy and actions related to open market operations. For instance, the ECB details that its OMO to manage liquidity is made of Main Refinancing Operations (MROs) and Long-Term Refinancing Operations (LTROs) consisting on providing liquidity for one week to steer short term interest rate (MRO) and for three months for a long term refinancing of the financial sector (LROs).

- Others actions

Following the 2008 financial crisis, other strategies have been introduced to improve the economy's recovery, such as the Quantitative Easing. The Central Bank purchases government bonds from financial institutions in order to reinject liquidity into them. This strategy targets to increase lending and, consequently, increasing consumption and investment and prevent against price deflation. However, it has also an important impact on the value of a currency. In fact , the fall of interest rates and yields can create an outward shift in the supply of currencies and an increase of the exports (positive for companies), but the concerned currency will devaluate against the others. For example, a QE in the US will lead to a rise of the EUR/USD, and a QE in Europe can lead to a decrease of the EUR/USD (see appendix 2).

2.2.1.2. Banks

A study of EUROMONEY from June 2020 shows that 65% of the volumes traded, carried out by only ten banks (*Appendix 3*). They are essential and hold a dual role on the forex, acting for

themselves and mainly for other counterparties. In fact, banks are mainly acting as an intermediary or a dealer between the market and companies or individuals. They execute orders directly in the market to facilitate foreign exchange transactions for their clients. They execute from simple currency transactions to complex hedging strategies with derivatives and different degrees of risk regarding client needs. However, banks can also act directly, in order to hedge their unbalanced positions from client's orders or to engage in speculative positons. In fact, dealing with many counterparties leads them to be largely exposed to the currency market, with a position needing constant hedging (Instefjord, 2005).

2.2.1.3. Brokers

Brokers also act as intermediaries between financial institutions and other organisations, with the difference that they do not operate in the forex for their own account. They facilitate transactions by connecting participants. Initially restricted to professionals, since the rise of the internet and online trading, brokers can also give access to the market for individuals, offering financial services mainly for speculation purposes (King, Rime for the BIS, 2010).

2.2.1.4. Institutional investors

Various other financial institutions exist, but the main ones are hedge funds, pension funds, insurance companies, investment managers. There are some institutions specialised in currencies using the foreign exchange market in order to complete their investment strategy, hedge or diversify their investments, and, eventually, also to speculate. Some other institutions that are not specialised on currencies will still use the forex to cover currency exposure generated by the investment in assets denominated in other currencies. According to the BIS, their transactions represent almost 30% of the total exchanges carried out on the market.

2.2.1.5. Non-financial Companies

The expansion of the foreign market exchange was initially based on international trade activities and developed through companies' globalisation. Companies with international activities must buy or sell currencies to convert exports into the local currency and to have the foreign currencies needed to cover charges or remittances of suppliers, workforce, or any other foreign costs. Additionally, these international activities create FX exposure that need to be managed. They do not intervene directly on the market and use banks to carry out their operations or implement hedging strategies. However, due to the significant liquidity exhibited by the currency markets, corporate transactions will have a limited impact on currency prices and volatility unless it is an exceptional, in terms of size, transaction. For example, on the 6

October 2010, the French multinational Renault sold 14.9% of Volvo's capital[3] (Swedish firm); this transaction represented 3.1 billion EUR/SEK (according to Renault) exchanged on the 25th of October, where the Swedish Krona rose about almost 19 basis points from 9.1955 to 9.3840[4] (see appendix4).

2.2.1.6. Individuals

As mentioned previously, individuals gained access to the market by the rise of the internet and online platform of trading and brokerage. There is still a lack of information regarding individuals because this activity remains very modest in terms of volume and has no impact on prices. Indeed, the transactions originated from individuals are estimated less than 5% of the total transactions according to Euromoney and they are all executed through intermediaries such as banks, brokers, platforms etc.

2.2.2. Nature of the operations

2.2.2.1. Purpose of the foreign exchange market

- Currency Speculation

Speculation is the riskiest use of the forex market because it is not based on market forces but assumptions and intuition about prices. Kaldor (1939) describes any transaction made with the perspective of making a reverse position of the same transaction at a later date to make a profit, as speculative. This definition is still relevant in 2020; speculators on the foreign exchange market are making purchases (sales) on currency rate, forecasting a resale (repurchase) expecting an evolution of the exchange rate to be in their favour. They will try to take advantage of the impact of events or any type of information about market prices and possible move on pairs of currencies (Hirshleifer,1977).

- Currency Arbitrage

Arbitrage is a strategy mainly used by Hedge funds and institutional investors as it tends to be less risky than speculation. When the same security is traded in two different markets, they can be traded at different prices. The strategy of arbitrage consists of buying the security at a lower price on the market and consequently selling it for a slightly higher price on another market to profit from the difference (Marston, 1976). The most popular arbitrage strategy is the carry trade, by which a high-interest currency is bought against a low-interest currency. In other

[3] *The Wall Street Journal : « Renault Sells a 14.9% Stake in Volvo», 6 October 2010.*
[4] *Bloomberg Database*

words, the high yielding currency trade is funded by the gain coming from the low yielding currency sale (Jylha & Suominen, 2009).

- Currency Hedging

Overall, hedging strategies aim to minimize the impact of changes in exchange rates on the results, cash flow and value of the companies. However, possibilities of hedging are multiple in terms of strategies and purpose as it can be used for both speculative and risk minimisation of other financial strategies (Campbell & all., 2010). This dissertation will focus on companies' hedging strategies to cover exposure positions that may impact on their financial results. As mentioned before, international trades can generate large exposition on currency. Financial, and non-financial organisations doing foreign transactions are involved in different types of risks that positively or negatively affect their financial results. Hedging instruments are multiple and mostly imply derivatives (Mishkin, 2010) and will be explained in the next section.

2.2.2.2. Instruments

To deal with the foreign exchange market, investors benefit from currency instruments from spot exchange to derivatives. They can be adapted for both speculation and hedging purpose and can be dealt individually or combined to implement strategies.

- Spot Exchange

The spot exchange contract is between two parties agreeing to exchange today, an amount in one currency against another at a defined price. The delivery date is usually two working days after the trade date (except USD/CAD and USD/RUB that are only one day); this delay allows counterparties to mutually confirm the terms of the transaction (price, amount, method of settlement) and to give payment instructions (see appendix 5 for illustration).

- Foreign Exchange (FX) Forward

The forward is a derivative contract aiming to exchange currency against another, at a future date and a future price agreed today. The delivery of the agreed currency takes place at the maturity date. The forward can be part of other transactions such as in a currency swap or combined with options but can also be used as an isolated instrument, called in this case, an outright forward. It is a security for the counterparty in case of fluctuation of prices on a pair since the forward contract has been locked at the transaction day (see appendix 5 for illustration). How is a forward calculated? It is equal to the spot rate multiplied by the ratio between the currency interest rates and need to be adjusted until maturity.

$$F = S_{CCy1/CCY2} \frac{(1 + r_{CCy2})^T}{(1 + r_{CCy1})^T}$$

Where:

- F = Forward
- S = Spot exchange rate
- CCY1 = Base currency
- CCY2 = Quote currency
- r = risk free rate of interest
- T = maturity date (in years)

If the rate of currency 1 is lower than the rate of currency 2, the forward change rate will be higher than the spot exchange rate, and we say that the forward rate has a premium rate, and symmetrically if the rate of currency 1 is higher than the rate of currency 2, then the forward exchange rate will be lower than the spot exchange rate and we say that the exchange rate has a discount rate.

➢ FX SWAP

An FX swap is a combination of a spot exchange and a forward contract. The first exchange of currency is made at the trade date (spot), combined with a second exchange in the opposite direction at maturity (forward) (see appendix 5 for illustration). The amount at maturity can be the same that at the spot date (round FX swap), or a different amount (non-round FX swap). In the same way than a forward, the difference between spot and forward rate is based on the interest rate differential between the two currencies (swap points), with a forward premium if the forward rate is higher than the spot rate and a forward discounted if the forward rate is lower than the spot rate. This instrument can be used for both hedging by securing future exchange rates and speculation by predicting a future market situation change.

➢ Cross Currency Swaps (CCS)

The CCS contract is similar to a classic currency swap, besides, that it allows exchanging the interest rate of a currency against the interest rate of the other currency at a predefined date. Three types of cross-currency exist, with coupon payment fixed to floating, fixed to fixed, and the cross-currency basis floating to floating (see appendix 5 for illustrations). CCS are used to transfer assets or liabilities from one currency to another but can be used for both hedging and speculation purposes and mainly used as a funding instrument. It can also generate the same effect than carry trade due to the possible arbitrage from the interest rate differential on the day

of the transaction, but again at maturity. The counterparty will bet for a stable exchange rate or a depreciation of the funding currency and appreciation of the targeted one. The carry becomes more attractive if the interest rate differential is higher (Jylha & Suominen, 2009)

- Currency Options

A currency option gives to the buyer the right, but not the obligation, to buy (or sell) a predefined amount of one currency for another currency at an agreed price (strike price, noted K), on a specific date or for a specified period of time. The option to buy is a call option while the option to sell is a put option, and they both can be of European type (the exercise of the option is only at maturity) or American type (the exercise of the option can be during the entire life of the option). The price of the option is the upfront premium paid by the buyer to the seller of the option. The call option will give the buyer the chance to benefit from an increase in the spot rate, whereas the seller can benefit from his premium, which is lost in case of an increase of the spot rate above the strike price. Similarly, the put option buyer benefits from a decrease of the spot, and the seller benefits from his premium until a decrease of the spot price under the strike price (Appendix 6 for illustrations). Options are mainly used for hedging purposes and are highly used by non-financial corporations in order to cover high-risk exposure or as an alternative to making risk free profit (Ghosh & Ghosh, 2005). Calls and puts can be combined into more complex instruments (usually called exotic options) aiming to benefit from specific price movements. These instruments will be later analysed.

- Non-deliverable instruments

Due to their lowest liquidity or poor regulation, some currencies are traded as non-deliverable and are subject to more official controls. These transactions are similar to classical transactions, with the difference that there is no settlement in the non-convertible currency. Instead of resulting in the physical movement of nominal, the counterparties settle the difference between the non-deliverable forward price and the spot price in a more liquid currency such as the US Dollar, Euro, or the Sterling. (McCauley, Shu & Ma, 2014). It can be either forwards (NDF), swaps (NDS), or even options. For example, at maturity like the classic forward, the forward rate is compared to the reference rate of the day and difference between the agreed forward rate and the fixing of the day is settled to your account in the convertible currency. Therefore, it will be debited or credited for the difference between the two rates.

2.3. Foreign exchange and non-financial companies

2.3.1. Volatility and currencies' fluctuations

What is volatility? It measures the amplitude of variations of an underlying asset; the lower is volatility, the more stable the currency pair. Historical currencies are known for being more stable than emergent. For example, 1% of volatility over one year means the currency pair is expected to have a 1% difference compared to the spot price on the upward or the downward side. A study from Galati (2000) demonstrates that there is a positive correlation between volume and volatility. Nonetheless, another study from Huchet-Bourdon and Korinek (2011) also demonstrates that short-run exchange rate movements impact trades only in a moderate way between countries, positively as much as negatively, but no specific pattern has been found on short-run effects. However, the impact has been proven more important towards companies. Indeed, even though trades are moderately impacted, the volatility of exchange rate strongly impacts on imports and exports, often a decisive element in the performance of non-financial companies. It is important to precise that in addition to the volatility of exchange rates, the volatility of the instruments related to it also needs to be considered by companies. Factors impacting in this exchange rate volatility are economic factors such as countries' economic growth, inflation, employment, and political factors such as elections or conflicts between countries.

In the same way than every financial market, prices of parities fluctuate along the day reflecting the laws of supply and demand (Benassy, 1976; Hull, 2018). Financial markets are the meeting point between buyers and sellers, making possible the determination of market equilibrium, resulting from the adjustment of the quantity offered and demanded. The challenge for companies is to understand what affects these two forces of supply and demand in order to anticipate them. Global economists affirm, as said earlier, that the two main factors are of political and economic nature. The graph below, from the Bloomberg database, shows the evolution of the EUR/USD (in white) and the EUR/GBP (in yellow) from 1975 since 9 September 2020. The representation of the two pairs is a sequence of upward and downward trends interrupted by non-directional movements (Schulmeister, 1998). The fact that the curves are not linear demonstrates that currencies are volatile and the curves are fluctuating globally in a relatively similar pattern, meaning that they are impacted by similar events.

EUR/USD and EUR/GBP curves between 1975 and September 2020:

2.3.2. Currency Risk exposure

In a very global economy, companies are likely to engage in international strategies to develop their business, using other currencies than the domestic currency to receive exports and to pay to suppliers. In this case, they are exposed to foreign currency risk . Therefore, an appreciation or depreciation of a currency will impact all prices related to imports and exports. A case study from Achy (2003) about a Moroccan textile company showed that the fluctuation in the Moroccan dirham's exchange rate affected the exports of this company negatively, and even more, the entire textile industry, which is a crucial sector for the Moroccan economy. But not only from a commercial point of view, consumers' behaviour can be impacted, and so are the companies' profits. Just after creating the single currency in 2001, the euro was strong and worth 0.85 dollars which mean that 100 euro was the equivalent of 85 dollars of US goods. The dollar depreciated the following years and reached a value of 1.36 dollars by the 28 of December 2004, reversing the trend with a strong dollar. 100 euro was then worth 125 dollars of US goods[5]. The impact is considerable for consumers and companies doing imports and exports. A weaker domestic currency boosts exports, favourable for companies but harming consumers who are losing purchasing power and will have to pay more for imported goods. Conversely, a stronger domestic currency involves the decrease of the cost of imports, benefiting consumers, at the expense of the companies' international competitiveness,

[5] *Bloomberg Database*

Another risk to take into account is the counterparty risk. It corresponds to the risk of default by the counterparty in a financial transaction. This default may be voluntary or due to an impossibility for one of the parties to partial or totally fulfil the terms of the contract (Amundi, 2020). It is something that the company faces when dealing with a bank, financial institution, or with other corporations. Levich Richard (2012), explained that counterparty risk became more critical after the numerous financial crisis.

2.3.3. Risk Management

In order to minimize these risks and be protected against currency exposure, companies can use financial instruments. Researches has shown that the best protection is hedging through the use of financial derivatives. A study from Makar & Huffman (1997) attests that the degree of currency exposure is positively correlated to the notional amount of exchange derivatives contracted by a company. Among the published works regarding hedging strategies, many shown that short and long term hedging needs to be differentiated, and so is the use of instruments. Röthig, Semmler and Flaschel (2005) analysing a panel of Indian companies found that forwards and options were more appropriate for short term hedging and swaps more appropriate for long term hedging. Options are also mentioned in many studies to be highly used.

2.3.4. Limits of the research

There is a considerable set of literature analysing the behaviour and impact of exchange rates on organisations. But while doing this empirical research, generalised information about the foreign exchange market was not really discussed in specialised press or reviews but was more centralised on websites (financial institutions, financial authorities, banks, databases, trading websites, or simple blogs written by individuals or professionals). Websites are not always official which involve specific filtering on the sources available and it is hardly referenceable. Whereas technical and strategical approaches were discussed through studies and specialised press releases from private databases, it was not always accessible to the public. Moreover, anterior studies were really specific to certain countries, problematic or currency, not always applicable to this research. Thus, the lack of public information made the building of this empirical research challenging.

3. METHODOLOGY

During the literature review, the primary information collected was about currency fluctuations and hedging in general and the impact of currency risk and hedging strategies for large non-

financial firms or through a sector that impacts a country's economy. Nevertheless, only a few described, strictly speaking, how a company, small or large, uses the forex to build real financial strategies. After processing the information from the literature review , we can then wonder the possibilities for non-financial companies in terms of transactions and strategies on the foreign exchange market, how they determined their strategies, and how they can manage the risk it generates.

In order to conduct the research associated with this dissertation, I first prepared a questionnaire about the use of the forex and the risk, impacts, and solutions for companies (*Appendix 7*). After receiving a few answers, I realised that the given information was too vague and not consistent enough to build a solid set of conclusions. I needed more precise and sourced answers, so I decided to make instead of a qualitative research type, consisting of real in-depth interviews with the industry professionals to gather some information. The objective was to have access to relevant sources that were not found in the existing literature and to be able to adapt questions according to my dissertation.

Moreover, during my last internship, I had the chance to work in Investment Banking and be very close to FX and rates sales and traders for corporations but also directly dealing with the front office of these corporations. This gave me opportunities to ask questions about this topic and gather information during these six months, from both sides (banking and corporate). In addition to this, formal interviews were made, with open questions about the use of the forex for corporates, the risks, and ways to avoid or take advantage of those risks explained in the next section.

4. RESULTS

4.1. The Qualitative Research

4.1.1. Interview Participants

Alexandre Cordier, has more than 12 years of experience on the FX and rates derivatives for corporations in France and Europe. He has been working on different international investment banks building and selling FX and rates hedging strategies for corporates.

Stefan Ionescu have been in the past 15years head of UK, Benelux and Scandinavian FX sales for Corporations at Société Générale CIB in France and London. With more than 18 years of experience on the forex and corporates FX strategies.

Alexandre Hellier Du Verneuil, Selling speculation and Capital protection Multi Asset for corporations. He has been working for the past 6 years in several fields related to FX, Credit and Equity.

Laurent Favreau, working as an FX Derivatives structurer at Société Générale CIB and was previously working as a Financial Engineer at AXA designing asset allocations.

I also interviewed two other persons that did not allow the disclosure of their names in this dissertation. One has been working for more than 10 years as a FX dealer in the treasury team in a big multinational (we will call him Pierre in this dissertation, to be able to quote him) and the second is also working as a FX dealer but in a smaller company (we will call him Georges in order to quote him).

This panel of participants covers a trading activity involving over hundred different companies, from different sectors, different sizes and different countries, which make it relevant.

4.1.2. Interview Process

After explaining the reason and the stake of this interview to the participants, and in order to gather more and more precise information, I used the funnel method to guide my interviews. Opening the interview by asking large and broad questions to introduce the context, such as "Can you explain what use can you do of the forex?" The intention was to make more and more precise questions, and focus at the end on the risks and the solutions to these risks, in order to obtain as much detail as possible but always by adapting to the answers given by the participant. The interviews were processed by phone, and they lasted between 45 minutes and 1h45.

4.1.3. Interview main findings

Regarding the scope of their jobs, and their background, they shared complementary information with a different perspective of the risk and solutions that a company faces with the forex exposure. Some of them had a more global approach of the question while others had a more technical approach about strategies of hedging, both on bank and companies' view.

First of all, they mentioned the importance and impact of some large companies on the foreign exchange market. For example, the giant automobile Volkswagen group represented a FX book

estimated at 160 billion of dollars for the year 2016[6]. After processing and comparing their answers, different types of risks were highlighted. Financial risks involving transactions risks and impact on balance sheet, economical risk with impact on competitiveness, counterparty risk and risk related to hedging strategies already implemented. The aim of the companies is to reduce as much as possible these risks in order to protect their financial results and their reputation. Diverse solutions can be used to be protected against these risks, and confirmed the vision of Mishkhin (2010), who stated that the most efficient solutions involve derivatives contracts traded with banks. Forwards, swaps and options are the most used, and have their specific functions. Not only financial instruments, regulations also exist to protect both companies and other counterparties from these risks, such as MIFID regulation, the use of ISDA, KYC etc. Adittionaly, the participants affirmed that small companies were also using hedging strategies as long as they had an exposure on different currencies, and, somewhat surprisingly they also engage in some speculative positions, unlike large firms, as they are less scrutinized and monitored.

4.2. The Hypotheses

From the literature review and insights gained in the interaction with market experts four hypotheses were made and we will try to answer them.

H_1: Small and Large non-financial companies can use the same instruments.

H_2: Different companies will use the same FX hedging strategies if they have a similar situation in terms of exposure.

H_3: Every company using the forex can trade derivatives.

H_4: Derivatives can cover 100% of the risk.

4.3. Purpose of the forex for non-financial companies

The use of the forex depends on the investment strategy implemented by the company. We have seen 3 different types of practice from the empirical research: speculation, arbitrage and hedging. Answers from the interviews unanimously confirmed this.

4.3.1. Hedging

Resulting from the interviews, three main conclusions have been highlighted: protect the

[6] *Bloomberg Database and Volkswaggen Annual report*

liquidity position, the commercial margin, and protect the investments.

4.3.1.1. Commercial margin

The process of managing currency risk is established in line with the specific context of the company to be sure that decisions reflect the process of margin creation. Laurent explained: "The specific business context must be related to that of the markets, but ultimately the business margin is the overriding decision factor of every hedging strategy". The company will follow hedging policies that provide protection against adverse market movements while maintaining the flexibility required for optimal use of the business operating cycle. In other words, the aim is to protect their commercial margin from potential loss due to the currency exposure. As every company has different policies, objectives and margin processes, there is not an universal rule regarding hedging. Nonetheless, Stefan slightly offset this idea explaining that the smaller the margin is the more important it is to protect it. Some companies hedge less or do not hedge at all because they have a large commercial margin, and thus the eventual loss from currency exposure will be less important. For example, comparing Renault cars that have around a 2.60%[7] commercial margin and Ferrari cars with almost a 50%[8] commercial margin, the former is much more exposed to a variation of the EUR/USD if, for instance, we are thinking in terms of exporting cars to the US. If we imagine 10% of volatility over a year, on a EUR/USD pair fixed ate 1.17, it means that in one year, the currency pair could at maturity, appreciate to 1.28 or depreciate to 1.06. In other words, for €100,000 worth $117,000 now, in 12 months' time it could be worth between $128,000 and $106,000 and this could be the totality of the 2.60% margin, thus, a huge loss.

4.3.1.2.Liquidity and Cash Flows

According to all the participants, hedging cash flows in order to protect liquidity is automatic. Every transaction and every cash flow affect the treasury. If a company is dealing with more than one currency it is directly exposed to currency depreciation and appreciation. In fact, fluctuations in the foreign currency may result in payments being higher than forecasted. Nonetheless, a company operating in one market could also be indirectly impacted through their supply chains. In the same way that they want to protect their commercial margin they want to protect their cash reserves in order to be able to pay suppliers, investments, dividends etc.

[7] *L'Echo : « Les marges des concessionnaires automobiles à nouveau sous pression », 5 December 2019.*
[8] *Automotive News Europe : « The Porsche 911 is the most profitable car of 2019 », 12 September 2019.*

4.3.1.3. Funding and Investment

Funding and investment are also a big part of the hedging strategy, especially for large companies. More than the operational side, companies also use the forex to conduct their financial operations whether of internal nature such as intercompany loans and increase of capital of subsidiaries, or of external nature, such as payment of dividends, engagement or reimbursement of a loan or, more exceptionally, one-off transaction such as merger or acquisitions that will need to be hedged, as mentioned with the Renault/Volvo case earlier.

Stefan explained that the Net Investment Hedging (NIH) is built to soften the currency exposure against the fluctuations of the value of its investment in a possible foreign activity that could occur as a result of changes between the local currency and the home currency. The aim is to reduce the possible fluctuations in the income statement by offsetting these fluctuations with equivalent value of hedging instrument, which confirms the argument of Makar and Huffman (1997).

4.3.2. Speculation and arbitrage

Speculation is not the principal usage of the forex according to Stefan. Only a few companies trade for speculation purpose and arbitrage purpose. Most companies will try to hedge but in a selective manner, keeping open a potential benefit from a positive move in the exchange rate. For example, Porsche made three times more profit from derivatives options strategies than car selling before the financial crisis of 2008, which represents €3.6 billion out of a €5.867 billion profit.

However, Georges explained that smaller companies have less internal policies and procedures regarding hedging and they could be able to engage in a speculative move more easily than large firms.

4.4. Currency Risk

After seeing the purpose of the forex, we will investigate the associated risk.

4.4.1. Financial risk

4.4.1.1. Transaction risk

The transaction risk is strictly related to change in exchange rate between the economic transaction day (a sale or a purchase, for instance) and the payment date or settlement date. The time difference between the economic and financial flows generates an exposure to the possible

volatility of the currencies. If the exchange rate fluctuates it can generate a gain, but it can equally generate a loss. Depending on the amount of commercial margin the loss could lead to a profit reduction, and in the worst case a default of payment as Stefan explained.

To illustrate this, we can imagine a Portuguese company *A* selling goods to company *B* which is American. Company *A* is supposed to receive $1 million in 1 year, and needs to convert them into euros. If the EUR/USD spot rate is 1.19 (price as of September 1st, according to Bloomberg), Company *A* will receive €0.84 million, whereas if the spot rate moves to 1.05 (like in January 2017), Company *A* will receive €0.95 million, which represents a discrepancy of €110,000. The transaction risk is then impacting liquidity and the cash position of the company

4.4.1.2. Risk for liquidity and cash

The transaction exposure, if relevant can translate into a risk of liquidity and cash position.

Laurent explained that this risk is generated by the possible discrepancy occurring between the revenues and the costs. The fluctuations of the foreign exchanges imply an uncertainty in the amount of cash flow and a lack of anticipation could create a lack or an excess of cash reserves. Using the previous example, the cost of company *A* is in euros, so this loss of €110,000 will deteriorate the company's profitability. Alexandre and Pierre both explained that the degree of exposure to this risk depends on three characteristics: the size of the transaction, the time period (maturity of the transaction), and the anticipated exchange rate's volatility during this time period, which also confirmed the vision of Chan-Lau (2008) seen in the empirical research.

4.4.1.3. Hedging risk

During the interview, Stefan mentioned several times the hedging risk which is driven by changes in the underlying position that is being hedged. Fluctuations of exchange rates can impact the hedging positions already implemented, and put the company in position of under hedge or over hedge. An example he used was the group Airbus. Following the start of the covid-19 pandemic, and because of the travel restrictions, Airbus experienced a large cancellation of orders (in USD) that they hedged by anticipation these cash flows in order to lock an exchange rate to convert the proceeds from the orders (in USD) into euros. However, as transactions were cancelled, they were in an over hedge position on the USD[9]. This situation had an exceptional amplitude, but in smaller scale can regularly happen in many companies. For example, car dealers such as Renault selling worldwide, with limited commercial margins

[9] Numbers have not been disclosed because not published yet.

(2.60% in 2018[10]), they will usually hedge for a two year anticipation period, in terms of locking the commercial spreads of its portfolio of sales However, if in 2 years they sell less than the expectation they will be on over hedge, which means the offset position exceeds the initial position, and if they sell more than expected by contrary the offset position is lower than the initial position, they will be in under hedge. This situation represents a real economic (impact in profitability) and a financial risk (impact in cash flow and liquidity).

4.4.1.4. Internal risk

This type of risk, also designated as translational risk, as Pierre explained, is related to the consolidation of accounts in a single currency, for a group with subsidiaries in different countries. Performance of subsidiaries are indicatively converted in the home currency of the group to compute the consolidated accounts. If there are unfavourable movements in the involved currencies, it can lower the performance and value of a subsidiary on paper, unless an active hedging is in place. This impact on the performance send a bad signal for investors can lead to a decrease of investment, of the share prices (if listed company) and increase the fear of investors (for both large and small companies). These financial risks tend to be more short term, and will become economical risks if the impact exceeds 2 years.

4.4.1. Economic risk

This risk is mainly related with relative relation of the economic environment of different countries in the competitive position of the home companies. There are important macroeconomic perspectives of the risks involved such as incoming (or outgoing) regulation, political uncertainty and rising interest rates (Riggins, 2019). As just seen in the financial risks, from their commercial activity, companies can be led to import and export their goods or services, which generates cash flows in foreign currencies. Economical risk tends to have more of a long-term vision. By economical risk, Georges explained that the value of the company is very important, for both large and smaller companies. As said for the internal risk, the sentiment of confidence from the investors reflects the financial sustainability of a company, but it is also a key factor of its reputation on the market.

As Feldstein (2013) mentioned, exchange rate can impact the competitiveness of a company. Georges affirmed that companies can be directly or indirectly exposed to this risk. If the domestic currency strengthens, for the same reason that enounced in the literature review, the

[10] *L'Echo : « Les marges des concessionnaires automobiles à nouveau sous pression », 5 December 2019.*

product will be sold at a higher price which means that foreign competitors will be able to sell more at the detriment of this company, or even further that the company will have to reduce its margin in order to compensate for this increase in price. However, it can also expose the company indirectly.

Using again a simple example: company A in Portugal (EUR), company B in the US (USD) and company C in Japan (JPY). Company A sells to company B, but company C is the main competitor of company A. If the yen depreciates against the dollar, then company A could be indirectly affected and lose competitive edge against C because B now has an advantage to trade in USD/JPY instead of EUR/USD.

4.4.2. Counterparty risk

As described in the literature review, the counterparty risk represents the possible partial or total breach of a contract from any of the parties (Levich, 2012). Some counterparties present more risks than others, mainly due to more or less important risk of default. Pierre clarified that the risk is for both the company and the financial institution it is facing. If the counterparty facing the company bankrupts, or does not honour immediately the contract, the company can face losses of up to the totality of the transaction.

To evaluate this risk, the more common approach is using one of the three main credit rating agencies: S&P, Fitch and Moody. Naturally, the lower the rating, the higher will be the risk of default of the counterparty. This risk may change with time as the economic and financial situation of a company of a bank may also change and, consequently, leading to a upgrade or downgrade of the rating score.

4.5. Determinants of the strategies (regulation, price, efficiency)

Three main determinants have to be taken into account regarding hedging strategies: regulations (both internal and external, defining what can the company do and what they have to avoid), prices (how much a company is able to pay to be hedged) and level of hedging efficiency.

4.5.1. Regulations

Corporate risk management policy states that the acceptable level of exposure on the foreign exchange and the use of financial and derivatives instruments depends on the hedging policies approved by the board of directors but also depends on the the official regulations set up by international and local markets and financial authorities. Size is also an important factor. In fact, for instance, SMEs will have a harder time to engage in derivative transactions as the

financial institutions, because of the counterparty risk, will require a wide amount of documentation in order to prove their financial strength allow them to buy or sell a given instrument. By contrast, the SME will be more flexible in terms of product use because the internal regulations (unlike in a large company, especially if listed) will be softer allowing a lot of informality. In some jurisdictions, maintaining an FX exposure register will also help organisations to meet their regulatory obligations around accounting standards under rules like, for instance, the MIFID II. These types of regulations are frequently updated, and give precise instructions concerning the use and accounting register of several instruments. For example, in 2018, the MIFID II reduced the flexibility regarding the offer by financial institutions of leverage strategies for retail clients (medium and small corporations), due to the high potential loss it could cause to companies. In this context, companies also have to present a detailed documentation to be able to trade financial products and derivatives. During my last internship working on the FX sales desk, I was in charge of launching the on-boarding of companies willing to trade and had the chance to ask questions about the documentation required. Among these documents the two more important ones were the KYC and the ISDA Master Agreement. The person responsible for on-boarding explained that KYC (Know Your Customer), which is part of the MIFID II regulation, is a way for the bank to know if a company checks some features in terms of characteristics and risk profile that will allow it to trade some financial instruments. It is based on the activity of the company, the country it operates and analyses also the board of directors in order to be sure that there is no conflict of interest, or no illegal practices that could harm both the company and the financial institution. The ISDA Master Agreement is a legal contract signed between the company and the financial institution and it set up key elements in the configuration and use of derivatives.

4.5.2. Price and efficiency of the strategy

The price of the strategy is also a main determinant. After determining the type of product that the company wants to use, it will analyse its efficiency and cost. For example, how much the company is willing to pay in order to be fully covered against any loss? The hedging strategy is an important part of the overall company strategy. Not surprisingly, for large companies, there is a specific section in the notes annexed to the financial statements, in which the company should describe its hedging strategy and type of instruments employed, namely derivatives. That is the reason why, as George explained, a small company will be able to trade riskier products as it will have to comply with lesser regulation and monitoring.

Moreover, they unanimously explained that most companies are trying to do zero cost hedging. Zero cost hedging means that the strategy is self-financing. It is really common with options strategies as you can simultaneously sell options to finance the protection that you buy.

4.6. Solutions and derivative strategies

4.6.1. Manage the currency risk with non financial tools (by reorganisation)

In order to minimize the FX risk exposure companies can undertake a limited number of other non-financial strategies.

4.6.1.1 Centralized everything in one currency

First of all, companies can attempt to centralize, as much as possible, their foreign inflows and outflows in the same currency (suppliers, customers, workforce etc.) However, this would involve the risk avoided by the company being bounced to the other counterparties, therefore, it is not efficient for very competitive environment. This could thus be a solution reduce the currency exposure for niche market, or low competitive environment and industry.

4.6.1.2.Leading and Lagging

This principle consists of modifying the original date of payment or reception of FX flows in order to adjust the occurrence of those cash flows to an expected evolution of the exchange rates. Nonetheless, this strategy is questionable, as it requires a view on the evolution of the exchange rates, meaning that in a way it represents a speculative position.

4.6.1.3.Matching and Netting

Transaction in foreign currencies are both inflows and outflows. Georges explained that a solution in order to minimise the level of exposure needed to be hedged was netting those inflows and outflows in order to hedge only the difference. The aim is to match the date of payment and reception of the same currency so they can finance each other and the remaining part will be the part to hedge. To be able to do matching and netting, two entities require the same netting policy, usually used within the same group of corporations or with a third party if they sign an agreement to net off. This strategy considerably reduces the need for hedging.

4.6.2. Manage the currency risk with derivatives

Hedging an exposure has a price, and some companies are willing to guard against currency depreciation or appreciation in order to protect their financial results and their transactions even if it harms a part of the profit. Whether short or long term, companies will use financial derivatives in order to gain visibility on the exchange rate, and lock their rates for transactions. When I asked the participants what length of time short term represents, they unanimously

replied 12 months or less. Pierre explained that the 12-month time horizon makes sense because it relates with the report cycle of results. Regarding the objective and purpose of the strategy, it can be simple or complex, including one or several instruments. The following strategies are described according to the answers from the interviews.

4.6.2.1.Forwards and swaps

Currency forwards and swaps are not so different. They both lock-in the exchange rate for a future transaction at a future date and at a predefined price.

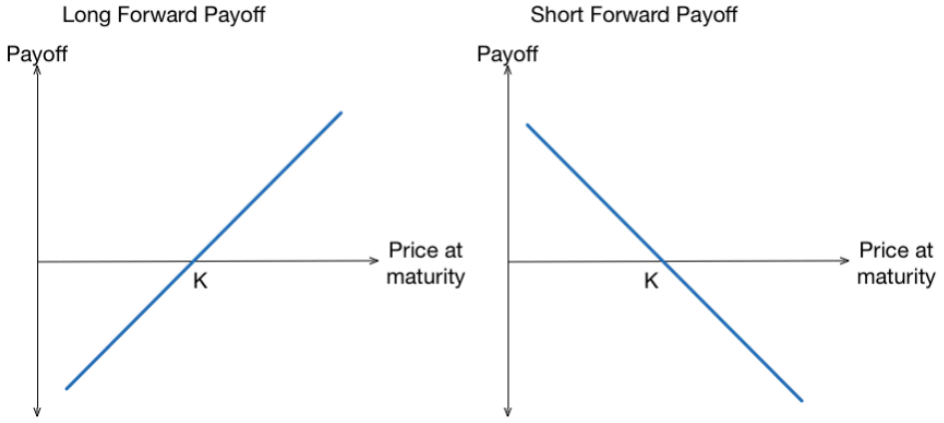
The forward is limited in time, indeed long term forwards are rare, and only exist on the market for the biggest currency (the USD forward is one of the only ones having a 10y forward price). They are a good alternative for cash flow hedging because the maturity date of many commercial transactions are known in advance and, therefore, allowing the effective use of a forward. Forward also are easy to implement, and can be easily modified, in terms of maturity.

The currency swap has the same objective but can be done for a longer maturity, and lock-in the exchange rate but it also gives indirect access to foreign loans that, eventually, would be very difficult to obtain. Also easy to implement, swaps are an alternative for NIH and intercompany transactions.

According to Stefan and Alexandre, forward and swaps are the most used instrument for hedging cash flows.

4.6.2.2.Simple options

Options are mainly used as selective hedging tool as they allow to take advantage of the favourable fluctuations of the exchange rate. It only is exercised in case of favourable move, which means you limit the loss while letting unchanged the possibility of profit. They can also replicate every other strategy in term of payoffs. For example, a forward is replicated by a call and a put in the opposite direction with the same strike (exercise price), and it allows to add some features in order keep flexibility for both timing and amount of the underlying. It is possible to manage the degree of hedging and the degree of possible profit due to the fact that the selling of the call (put) will finance the purchase of the put (call).



For example, a company in Europe that want to pay a supplier in the US will buy USD and sell EUR, thus, enter into a short position that consists of buying a put EUR/call USD, and selling a call EUR/put USD at maturity, with both the same exercise price and maturity. By definition, options always go by pairs because you are exchanging a currency against another.

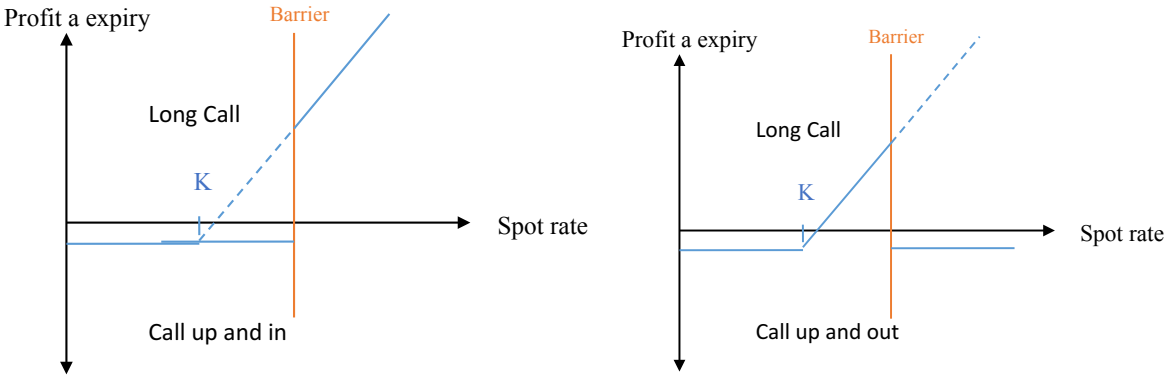
4.6.2.3.Exotic options

Various exotic strategies exist but 2 different types of exotic options have been highlighted as the most used, during the interviews: barrier products and leveraged products.

- Barrier product

The barrier product is based on an event; when this event occurs the product changes. The barrier trigger either activate or deactivate the option. It can be knock-in if the option is activated when the underlying reaches the barrier, or knock-out if the option is deactivated when the barrier is reached. Barrier products allow to reduce the premium (the cost of the strategy), in exchange of the possibility of deactivation of the strategy, which means in exchange of a possible loss if the conditions of the barrier are not filled at maturity for european option type based strategies or until maturity for american option type strategies. In order to avoid a deactivation, the company can minimize the risk by doing several knock out levels or by choosing different expiration dates.

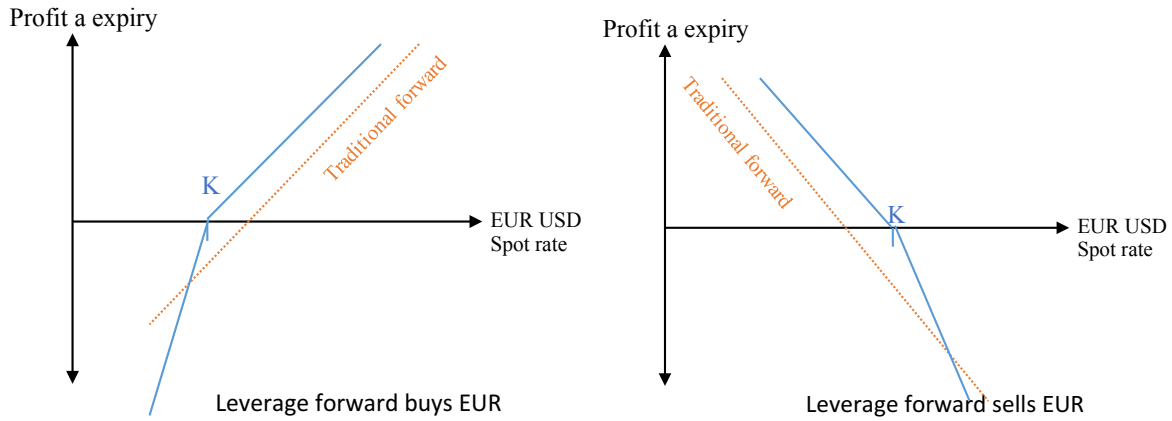
For example, a call up and in is similar that a traditional call, with a trigger activating the option if the spot rate increase above the barrier. The company buying a call up and in will be protected against the loss if the exchange rate sufficiently increases. At the contrary, a call up and out will protect the buyer until a certain evolution of the exchange rate.



- Leverage products

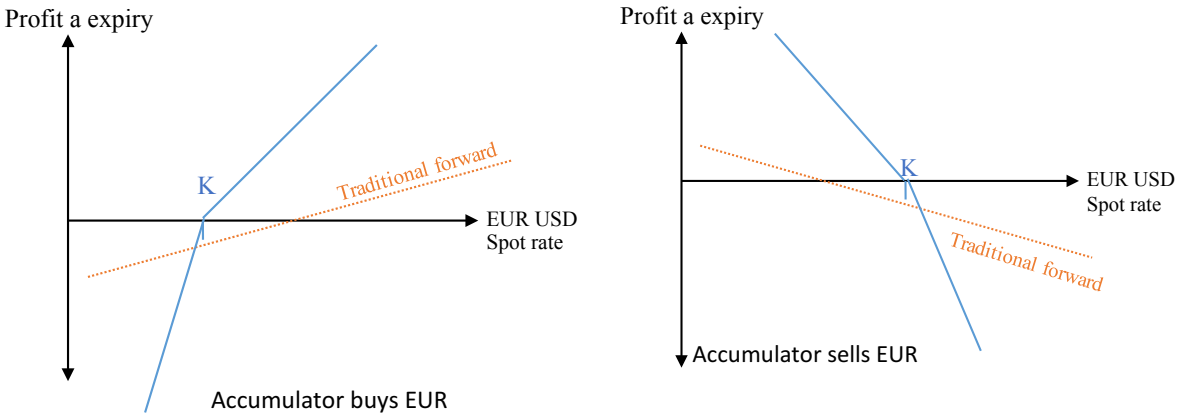
Leverage products (mainly forwards) are zero cost strategies, allowing a company to partially hedge a foreign currency exposure normal forward, and to benefit from a favourable exchange rate move. The leverage defines the amount of risk the company is willing to take. Various products can be adapted with leverage, the most common is the leveraged forward. The difference with a traditional forward is that it offers a more favourable rate but the notional amount remains unknown until maturity due to the leverage effect.

For example, if a company wants to buy euros against dollars, the strategy will be a purchase of a call EUR/put USD with a nominal of EUR 100,000 and a sale of a put EUR/call USD with a nominal of EUR 100,000. The company decides to have a leverage of 200%. The favourable scenario will be that at maturity the EUR/USD is higher than the exercise price (K), in this case the company will be buying 100,000 euros at the price of exercise. If the exercise price (K) is higher than the spot EUR/USD at maturity, it means that due to the leverage, the company will be buying 200,000 euros at the exercise price which is unfavourable. Same results if the company sells euro but reversed, if the exercise price (K) is lower than the spot rate, the company will be selling the 200,000 euros at the exercise price, otherwise it will be selling 100,000.



Other common variation of this product is the forward accumulator. Compared to the barrier product, the accumulator is not based on an event but on a trend, on a behaviour of the currency exchange rate, that changes. Accumulators are an alternative to forwards, they offer a more favourable strike, but the strategy is deactivated as soon as a predefined target of exchange rate is reached. The difference is that the exact amount of currency exchanged will only be known at maturity because it depends on the spot rate at each fixing date. The fixing dates will be pre-defined and are usually daily or weekly, and at each fixing you purchase or sell an amount up or an amount down also predefined.

For example, if the company pre-defined the amount up being 75,000 EUR and the amount down 50,000. If the EUR/USD is higher than the exercise price (K), the company will be buying 75,000 euros at the price of exercise. If the exercise price (K) is higher than the spot EUR/USD at maturity, it means that due to the leverage, the company will be buying 50,000 euros at the exercise price which is unfavourable. Same results if the company sells euro but reversed, if the exercise price (K) is lower than the spot rate, the company will be selling 75,000 euros at the exercise price, otherwise it will be selling 50,000.



4.6.2.4.Others products

Many more strategies exist to hedge the forex risk. Money market is one of them. The aim is to avoid the exchange rate uncertainty by borrowing or deposit the foreign currency until the transaction. However, this strategy involves large cash flows movement that can be difficult to implement because of the policies of the company or the country.

Other strategy related to acquisition has been described by Stefan and Laurent: the contingent. Contingent is a secured transaction that will be hedged at one condition, the competition authority has to approve the transaction (it can be refused if it breach the rules of absolute competitiveness). Those transactions are usually representing exceptional amount, and over or under hedge on such a size could deeply harm a company. However, this product has a huge cost, and regulations constraints are also important.

Futures are also commonly used to hedge currency exposure, and is similar to the forward, at the difference that it is not traded on the OTC market futures.

5. CONCLUSION

This dissertation analyses the different risks a company can face while dealing on the foreign exchange market in order to exchange internationally for their activity, and what strategies they can implement to reduce these risks. We identified that risks are driven by fluctuations in the exchange rates and they can have a considerable impact on the financial results of the company and on their competitiveness.

Four hypothesis have been made and analysed. Both large and small companies can be exposed and can use financial instruments to hedge their currency exposure, and these instruments vary according to the internal and external regulations they are exposed to. They can globally use the same instruments but some features can be limited, especially for exotic instruments such as leveraged strategies. Companies with similar exposure will not use the same instruments because they will not have the same objective in terms of hedging and profits. Concerning the degree of hedging the risk, it can be fully hedged depending on the strategy used and the cost the company is willing to pay for this strategy.

We can conclude that flexibility and adaption are key elements in a successful strategy. The hedging strategies need to be adapted to follow the trends of the company and the constraints regarding the use of derivatives. Both the literature review and the interview results demonstrated that the option based strategies are the most flexible and adaptable strategies, and they offer a large range of possibilities according to the risk the company is willing to take and the financial resources that is willing to allocate.

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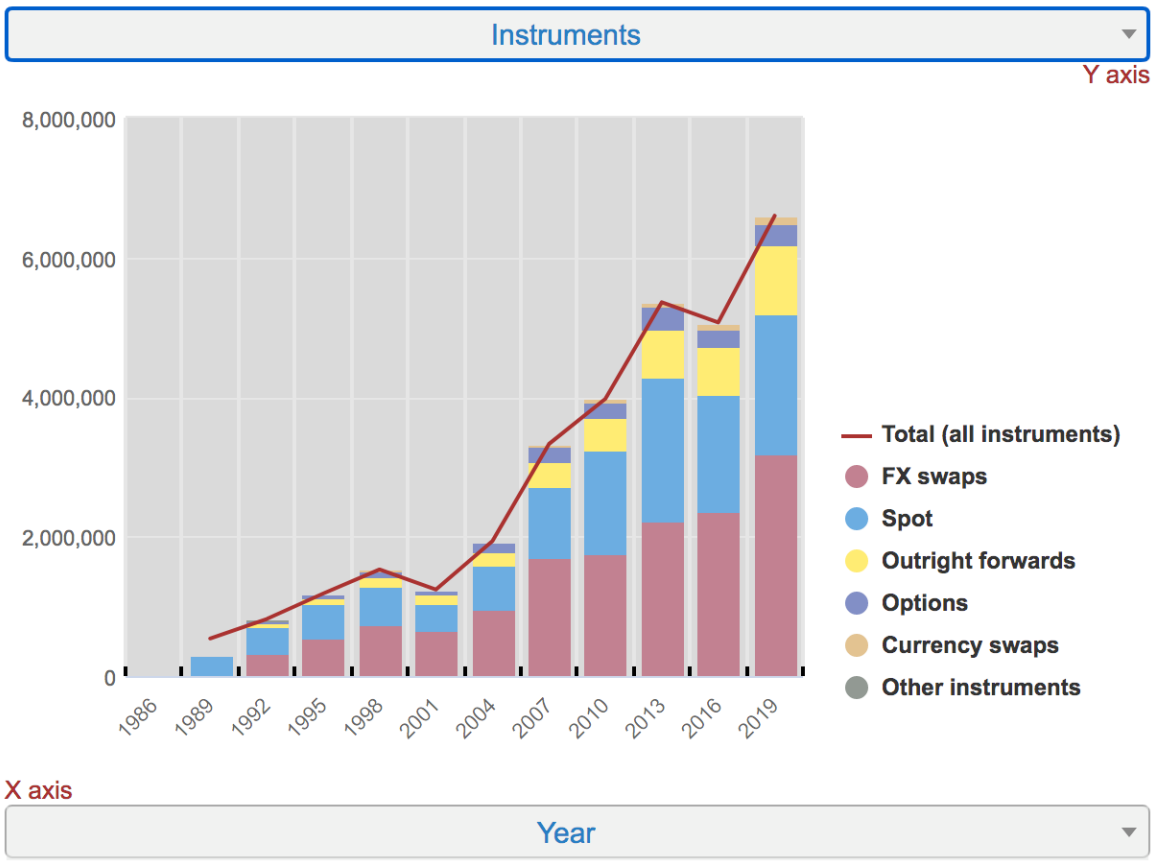
7. APPENDIXES

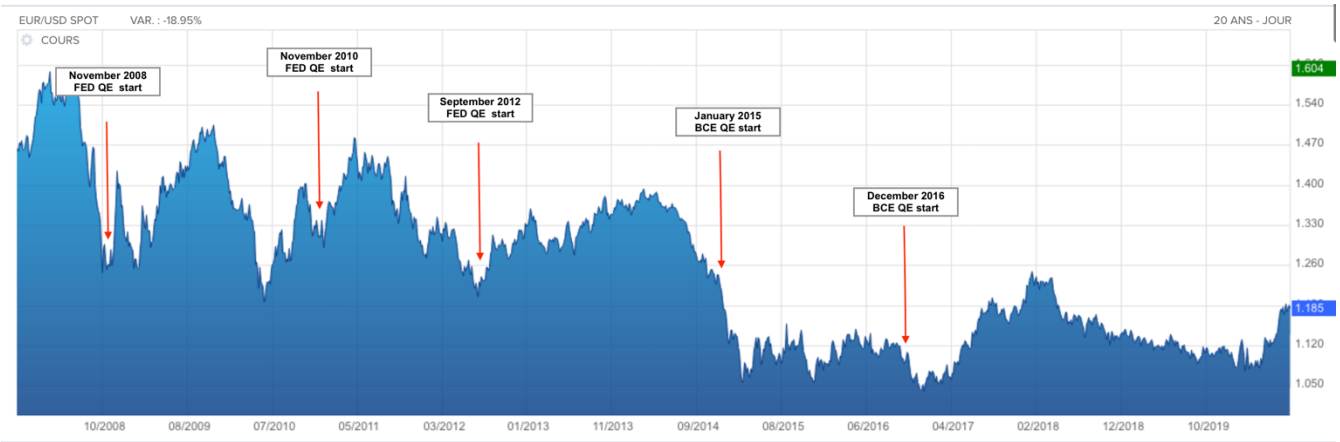
7.2. Appendix 1: Global foreign exchange market turnover

Net-net basis, Daily averages, in millions of US dollars



Source: *BIS Triennial Central Bank Survey of Foreign Exchange and Over-the-counter (OTC) Derivatives Markets in 2019.*
(https://www.bis.org/statistics/rpfx19.htm?m=6%7C381%7C677)

7.3. Appendix 2: EUR/USD and QE impact since 2008



Source : *Boursorama cours EUR/USD spot (https://www.boursorama.com/bourse/devises/taux-de-change-euro-dollar-EUR-USD/)*

7.4. Appendix 3: Banks top 10 overall global market share in 2019

In overall volume of SWAPS

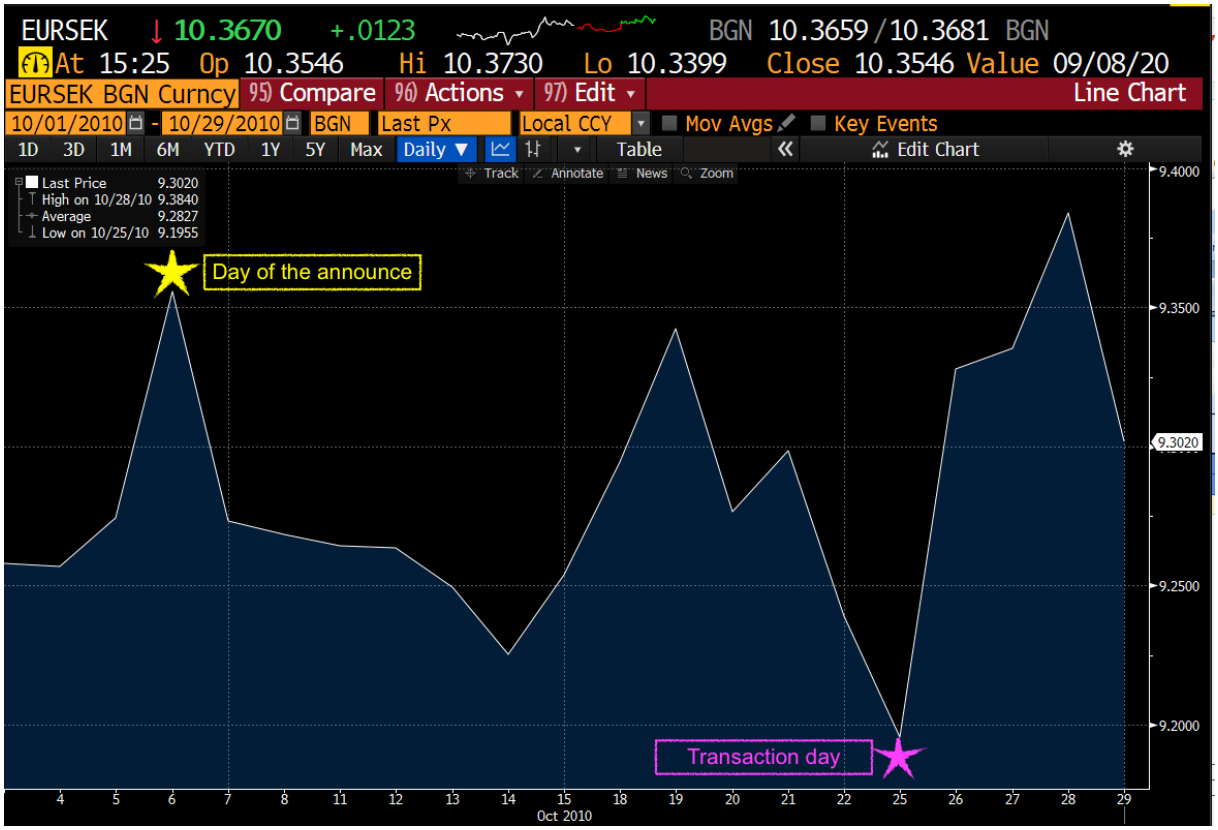
Global Markt Share
Global - All products (Adjusted SWAPS*)

Rank 2020	Rank 2019	Counterparty	Shares % 2020
1	1	JPMorgan	10.78%
2	5	UBS	8.13%
3	4	XTX Markets	7.58%
4	2	Deutsche Bank	7.38%
5	3	Citi	5.50%
6	8	HSBC	5.33%
7	11	Jump Trading	5.23%
8	10	Goldman Sachs	4.62%
9	6	State Street	4.61%
10	9	Bank of America	4.50%

Source: *Euromoney FX Survey 2020 (https://www.euromoney.com/article/b1lp5n97k4v6j0/fx-survey-2020-press-release)*

**The 2020 rankings are based on swaps-adjusted volumes that exclude volumes from short-dated swaps.*

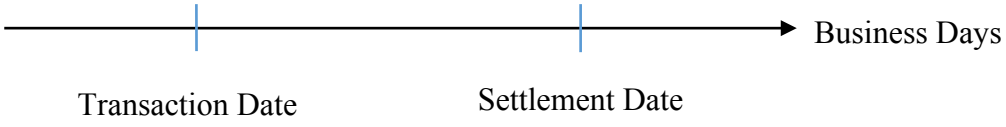
7.5. Appendix 4: EUR/SEK curves following the cession of Volvo by Renault in October 2010



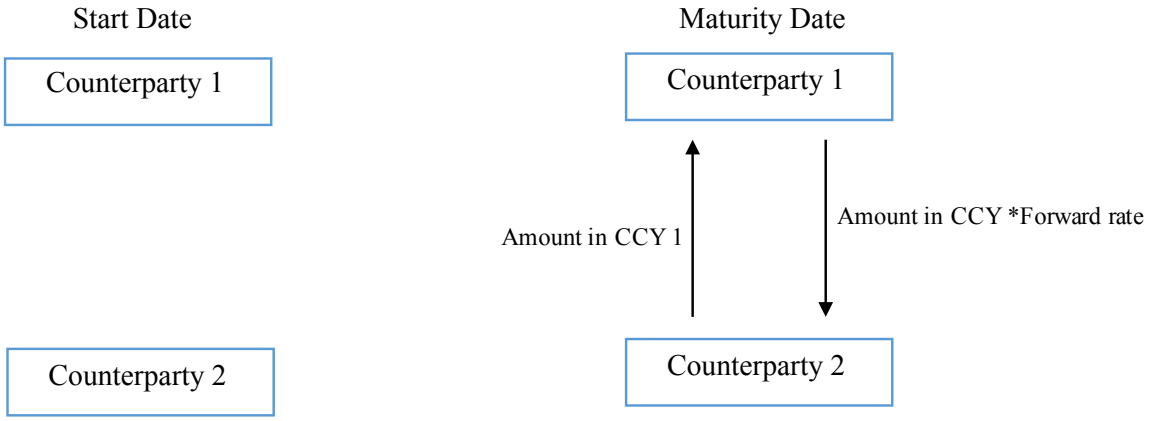
***Source** : Bloomberg databased graph.*

7.6. Appendix 5: Currency Instruments illustrations.

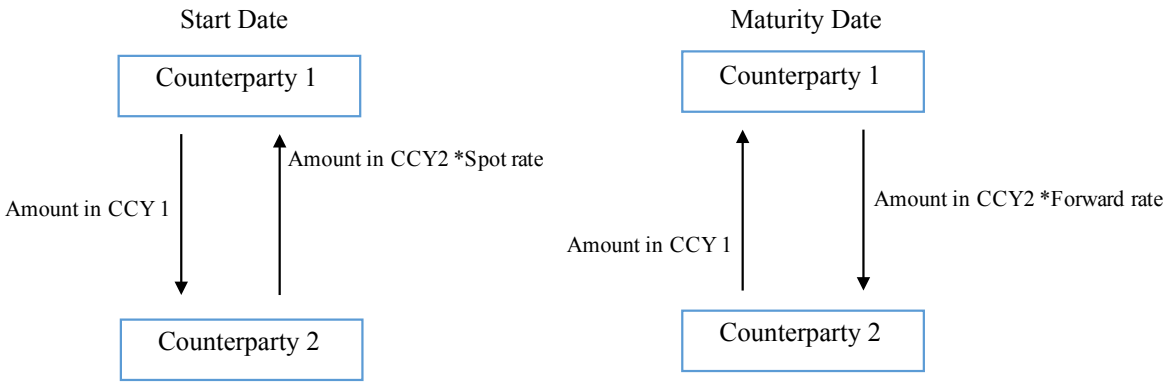
- Spot Exchange illustration:



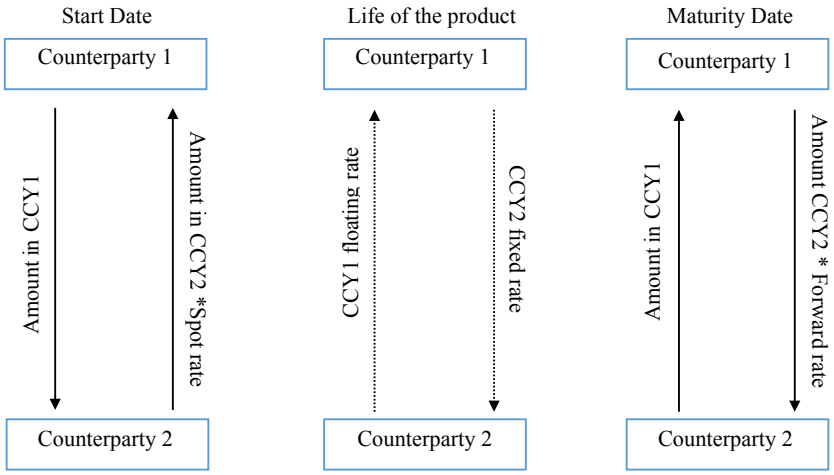
- Forward Exchange illustration



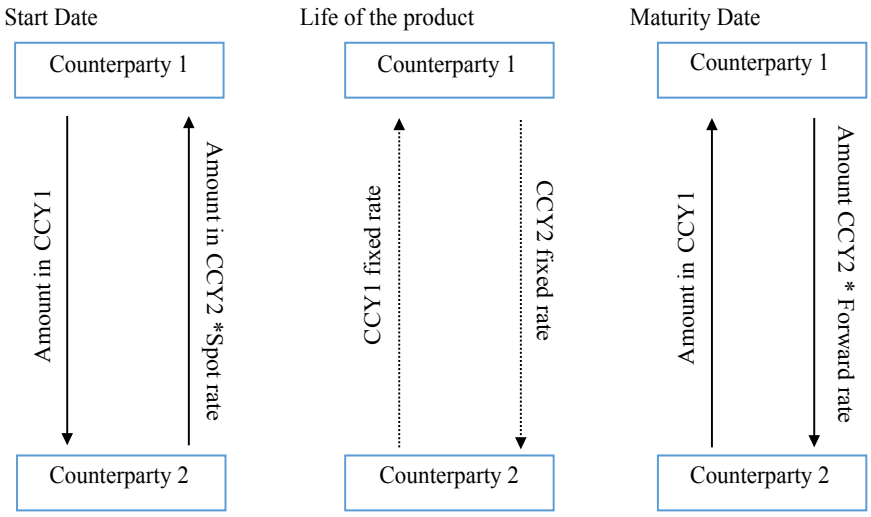
- FX Swap illustration



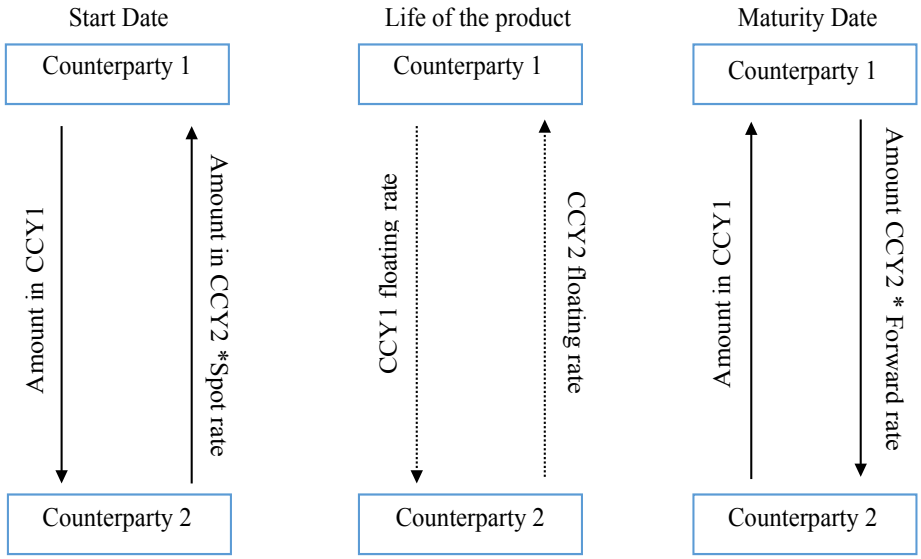
- Cross Currency Swap with coupon payment fixed to floating:



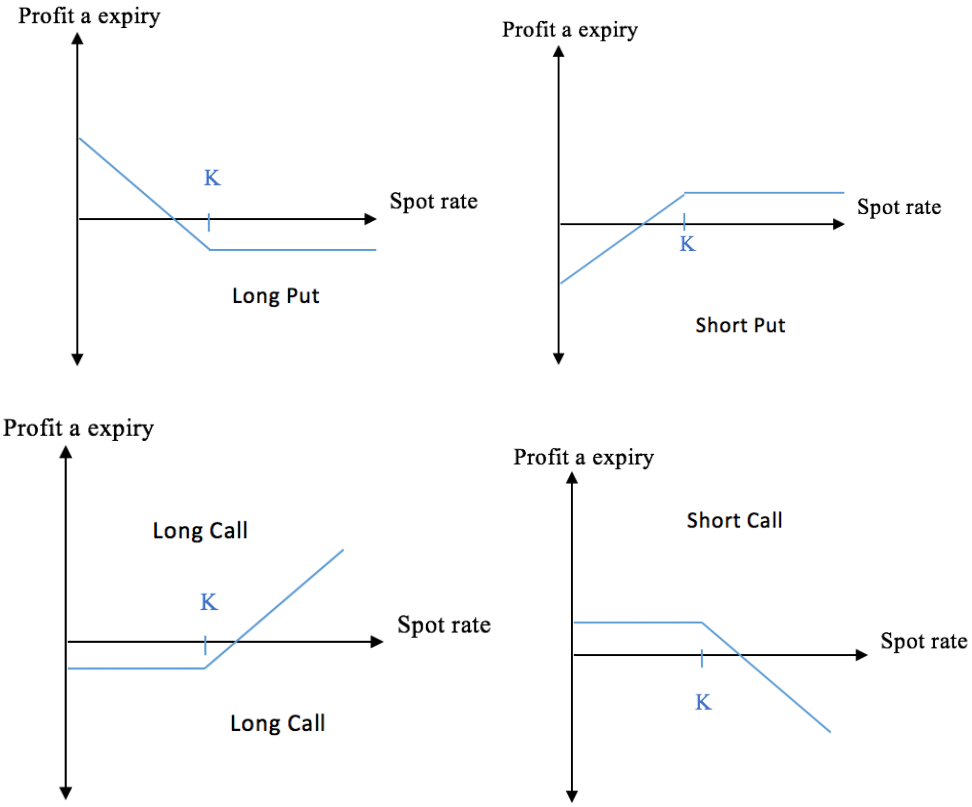
- Cross Currency Swap with coupon payment fixed to fixed:



- Cross Currency Basis Swap with coupon payment floating to floating:



7.7. Appendix 6: Illustrations of Call and Put profits.



7.8. Appendix 7: Questionnaire firstly launched.

In what type of company are you working ? / Dans quel type d'entreprise travaillez vous? *

- ○ Bank / Banque
- ○ Financial intermediaries / Intermédiaires financiers
- ○ Other financial institution / Autre institution financière
- ○ Large non financial corporation / Grosse entreprise non financière
- ○ Mid-small non financial corporation / Petite ou moyenne entreprise non financière
- ○ Other / Autre

If other please precise / Si autre veuillez préciser

Réponse longue

What is your role in this company ? / Quel est votre rôle dans cette entreprise? *

Réponse longue

Is your company doing financial transactions in other currencies than your home currency? / Votre entreprise fait-elle des transactions financières dans une devise autre que la devise locale? *

- ○ Yes / Oui
- ○ No / Non

If yes, how many currencies is your company dealing with ? / Si oui, combien de devises votre entreprise utilise ? *

- ○ Only the home currency / seulement la devise local
- ○ Between 2 and 4 / Entre 2 et 4
- ○ Between 5 and 10 / Entre 5 et 10
- ○ More than 10 / Plus de 10

If yes, for which reason the company uses the forex? / Si oui, pour quelle(s) raison(s) traite t-elle sur le marché du forex?

- ☐ Hedging
- ☐ Speculation
- ☐ Arbitrage
- ☐ Funding
- ☐ Autre...