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MANAGEMENT

MASTER'S THESIS

AN INVESTIGATION OF THE USE OF FOREIGN EXCHANGE RATE
RISK MANAGEMENT TOOLS IN PRACTICE

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DEDICATION

I dedicate this master's thesis to my family, who have always supported and inspired me throughout my academic career. I would not have achieved so much without their love, care, and guidance. I am deeply grateful for all of their sacrifices and encouragement. Furthermore, I would like to extend my gratitude to all my professors and mentors who have helped me by sharing their knowledge and experience. I am truly thankful for their support and guidance throughout my journey.

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ABSTRACT

The purpose of this study is to investigate the use of foreign exchange rate risk management tools in practice. To determine the best practices, determine the most commonly used tools, and explore the impact of firm size and country of origin on the degree of the use of foreign exchange rate management instruments. To accomplish our objectives, we analyzed 14 empirical studies conducted by other researchers focused on foreign exchange risk management using context analysis. In addition, by taking a sample consisting of 27 multinational companies, we performed an empirical study of the foreign exchange risk management tools employed by UK, French, and German multinational companies using descriptive statistics and regression analyses. The data was collected using a combination of quantitative and qualitative information obtained from secondary sources, including annual reports, financial statements, and previous research studies. The empirical work of the study led to the following conclusions regarding the use of foreign exchange risk management tools and practices: First, it has been observed that all the selected firms in our study use a wide variety of internal and external tools, as well as other practices to manage foreign exchange rate risk. Second, it has been concluded that the size and the country of origin of the company are considered to be significant determinants of the degree of use of various foreign exchange risk management tools. Third, it has been observed in general that large companies tend to use more complex and varied tools and practices to manage foreign exchange risk, while small companies tend to use simple tools and practices. Additionally, besides tools and practices, it has been demonstrated that the knowledge and experience of managers and other staff members involved in foreign exchange risk management are crucial to curbing risk.

KEYWORDS: FOREIGN EXCHANGE RATE RISK, FOREIGN EXCHANGE RATE RISK MANAGEMENT, FOREIGN EXCHANGE RATE RISK MANAGEMENT TOOLS AND PRACTICES, THE USE OF TOOLS IN PRACTICE, BEST PRACTICES.

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LIST OF ABBREVIATIONS

£	Pound Sterling
C\$	Canadian Dollar
CIP	Covered Interest Parity
CME	Chicago Mercantile Exchange
EUR / €	Euro
FASB	Financial Accounting Standards Board
FC	Centrally-Cleared
FERM	Foreign Exchange Risk Management
FRS	Financial Reporting Standard
FX	Foreign Exchange
GBP	Great British Pound
ICE	Intercontinental Exchange
IRPT	Interest Rate Parity Theorem
MNCs	Multinational corporations
MNEs	Multinational Enterprises
OTC	Over-The-Counter
UK	United Kingdom
US	United States
USA	United States of America
USD / \$	United States Dollar
VaR	Vector Autoregression
GDP	Gross Domestic Product

CHAPTER 1:

INTRODUCTION

Foreign exchange rate risk management is essential for businesses operating in the international market. Businesses can better protect their bottom lines by hedging against adverse changes in the global exchange rate to avoid sudden, large losses due to currency fluctuations. Additionally, businesses can use foreign exchange rate risk management tools to take advantage of opportunities to improve profitability by exploiting favorable exchange rate trends. There are several different instruments available to businesses seeking to manage their foreign exchange rate risk, including forwards, futures, options, swaps, etc. Each has its advantages and disadvantages, making it important to understand the details of each instrument and its associated risks before deciding which one is most suitable for a particular business. In addition to these instruments, businesses can also use other techniques to manage their foreign exchange rate risk, including currency diversification, matching currencies, currency hedges, invoicing in domestic currency, etc. Currency diversification involves spreading the risk of a single currency across multiple currencies and can be used to reduce the overall risk of a business' foreign exchange rate exposure. A currency hedge involves using certain assets or investments to reduce the risk of foreign exchange rate losses. When businesses decide to use foreign exchange rate risk management tools, they should carefully evaluate the risks associated with each instrument and ensure that they have the capacity and expertise to manage these risks effectively. Though these tools can help reduce the risk of adverse exchange rate movements, they can also be risky if used incorrectly. It is important to understand the instruments and the associated risks before deciding to use them.

1. Problem Statement, Objectives, and Value of the Study

The rapid growth of international trade and globalization have exposed companies to significant foreign exchange rate risks. These risks arise from the volatility and fluctuations in exchange rates between currencies, which can have a significant impact on firm operations and profitability. The problem arises when companies fail to identify and adequately manage these risks, lack the necessary knowledge and reliable data sources, have high costs associated with implementing the necessary tools, and face challenges in implementing these tools. leading to potential financial losses and negative impacts on their overall performance. The primary objective of this study is to understand and identify the various foreign exchange risk management tools and practices that international companies utilize to protect themselves against foreign exchange risk on the global market. Afterward, they will be compared to determine the best practices, determine the most commonly used tools, and explore the impact of firm size and country of origin on the degree of the use of foreign exchange rate management instruments. To achieve these objectives, 14 previous empirical studies were analyzed that examined the use of tools and practices for managing foreign exchange risk. In addition, an empirical study consisting of 27 multinational companies heavily dependent on foreign exchange was conducted. The value of studying foreign exchange rate risk management tools in practice is immense. In addition to assisting businesses in gaining a better understanding of exchange rate risk management tools and practices, it can also assist them in improving foreign exchange rate risk management strategies, maintaining competitiveness in global markets, and improving performance.

2. Research Questions

To identify and analyze the use of foreign exchange rate risk management tools in practice and understand the factors that influence their adoption and effectiveness, it is necessary to address the following questions:

- Which practices are considered to be the best?

- What are the most common tools and practices used by companies based on their size and country of origin?
- Is there an impact of firm size and country of origin on the degree of the use of foreign exchange rate management instruments?

By addressing these questions, the research will contribute to the existing literature and provide valuable insights for companies seeking to manage their foreign exchange rate risk effectively.

3. Data Collection and Analysis

The data was collected using a combination of quantitative and qualitative information obtained from secondary sources, including annual reports, financial statements, and previous research studies. The data was then analyzed and interpreted using context analysis for 14 empirical studies conducted by other researchers focused on foreign exchange risk management. Moreover, descriptive statistics and regression analyses were employed for an empirical study consisting of 27 multinational companies heavily reliant on foreign exchange rates.

4. Outline of the thesis

The rest of the thesis is organized according to the following plan: Chapter one provides an overview of the problem statement, objectives, and value of the study, research questions, and data collection and analysis. Chapter two presents a theoretical overview of foreign exchange risk and exposure and the nature of exchange rate volatility. It also discusses the types of foreign exchange rate risks and exposures companies face. These include transaction risk and exposure, translation risk and exposure, and economic risk and exposure. Furthermore, it explains the concept of covered interest rate parity. Additionally, it discusses exchange rate risk measurement. Chapter three describes techniques for managing foreign exchange risks. It begins by introducing the concept of foreign exchange rate risk management. As well, it discusses the best practices for managing foreign exchange risk and presents internal and external tools for foreign exchange risk management. Chapter four presents an analysis of 14 empirical studies conducted

by other researchers focused on foreign exchange risk management. Chapter five presents an empirical study consisting of 27 multinational companies listed on the stock exchange and heavily reliant on foreign exchange rates.

CHAPTER 2:

THE NATURE OF FOREIGN EXCHANGE RISK IN THEORY

The nature of foreign exchange risk has been a subject of significant interest and study in the field of finance. As businesses continue to expand globally and engage in cross-border transactions, they are exposed to various risks associated with fluctuations in exchange rates. Understanding the theoretical literature on the nature of foreign exchange risk is crucial for businesses and investors to effectively manage their exposure and make informed decisions. This chapter reviews and analyzes the key theories and findings in the literature to provide a comprehensive understanding of foreign exchange risk and its implications for international business. The following points will be discussed in this chapter: The concept of foreign exchange rate risk and exposure, the nature of exchange rate volatility, types of foreign exchange risk and exposure, beginning with transaction risk and exposure, translation risk and exposure, and economic risk and exposure. In addition to covered interest rate parity as well as measurement of exchange rate risk.

1. Foreign exchange rate risk and exposure.

To begin with, we will discuss the differences between foreign exchange rate risk and exposure. There have been numerous studies addressing the differences between these concepts. Risk was used to describe exchange rate volatility without identifying any particular implications for firms. In contrast, exposure was used to describe the actual change in a firm's financial performance as a result of a change in an exchange rate (Adler and Dumas, 1984).

Each concept will be discussed separately, starting with the concept of foreign exchange risk and then the concept of foreign exchange risk exposure. This will enable us to better understand the differences between them.

1.1 The concept of foreign exchange risk.

This paragraph describes the concept of foreign exchange risk. Generally, foreign exchange risk is also known as currency risk, forex risk, or exchange rate risk. A foreign exchange risk can be defined as losses due to unfavorable changes in the foreign exchange rate. These losses can result from a currency imbalance between the local currency and the foreign currency market value of certain assets or liabilities (Bessis, 2002). In contrast to foreign exchange risk, foreign exchange exposure refers to the extent to which unexpected fluctuations in exchange rates adversely affect a firm's assets and liabilities. Foreign exchange risk refers to the impact of unanticipated fluctuations in foreign exchange rates on the value of an organization's foreign assets. It pertains to unexpected changes in foreign exchange values and their adverse consequences for organizations and individuals operating internationally (Butler, 2008). As a result, foreign exchange rates fluctuate, and their extent may negatively impact the parties involved as a result of the fluctuations. A company's foreign exchange risk is determined by the magnitude of exchange rate changes as well as the duration and size of its foreign currency exposure (Shapiro, 2009). The risk of foreign exchange, also referred to as currency risk, is a consequence of financial transactions conducted by a company that is highly denominated in foreign currencies. The exchange rate between the national currency and the foreign currency may fluctuate unexpectedly before the completion of the transaction (Moffett et al., 2009). In addition to foreign exchange risk, earnings may also be subject to additional variability as a result of unanticipated fluctuations in the value of a foreign currency. Foreign exchange risk management is a method of eliminating substantial earnings variability, partially or fully. However, this cost is not warranted, or, in other words, corporate treasurers should be concerned with the smooth earnings patterns that security analysts value. Corporate treasurers should consider the effects of volatile earnings patterns on their organizations' ability to raise funds at a reasonable cost (Jacque, 1981). In emerging markets, exchange rate risk plays a significant role, and negative correlations between stock and currency prices can reduce stock volatility (Hauser et al., 1994). As a risk factor for businesses, exchange rates are four times more volatile than interest rates and even ten times more volatile than inflation rates (Jorion, 1990). Consequently, multinational companies are less competitive due to exchange rate risk since their

supply chains, output markets, and financing sources are located in different countries (Raihan, 2013). Various aspects of the firm's activities and operations can be affected by changes in exchange rates, including income receivable from abroad, future payments for import transactions, the valuation of foreign assets and liabilities, the viability of foreign operations in the long term, and the acceptability of overseas investment projects. Failure to properly manage these unexpected fluctuations in exchange rates can result in diminished shareholder wealth (Arnold, 2008).

1.2 The concept of foreign exchange risk exposure

Foreign exchange rate exposure refers to the sensitivity of a company's market value to changes in currency exchange rates. Usually, these unpredictable changes are caused by temporary deviations from international parity conditions such as the International Purchasing Power Parity and the International Fisher Effect, which have been extensively demonstrated to hold at best over the long term. Corporations are exposed to risk as a result of unexpected exchange rate fluctuations. These fluctuations can yield irreversible changes in the firm's value, strategic position, and competitive position in the short run (Eun and Resnick, 2014). More specifically, it may be defined as the degree to which a market value is influenced by changes in exchange rates. As a source of macroeconomic uncertainty, exchange rate fluctuations likely have a significant impact on firm value, regardless of whether the firm operates domestically or internationally (Shapiro, 1975). Furthermore, foreign exchange exposure is determined by the degree to which an exchange rate change affects a company's performance. There are three types of foreign exchange exposures identified in the literature: accounting or translation exposures, transaction or conversion exposures, and economic exposures (Shapiro, 1996). The term "foreign exchange exposure" refers to the potential for a company's profitability, cash flow, and market value to change depending on the direction of exchange rates (Eiteman et al., 2004). In light of currency fluctuations, the home currency's value may be influenced." Therefore, exposure occurs. If a currency movement alters the value of a company's assets, liabilities, profits, or anticipated future cash flow stream, it is said to be exposed to exchange risk (Kenyon, 1990). In addition, the degree of sensitivity of a company's

assets, liabilities, and cash flows to fluctuations in exchange rates can be used to measure and determine whether a company faces this exposure (Eun and Resnick, 2014). Some firms may not be adversely affected by exchange rate fluctuations. Exchange rate volatility alone does not constitute a sufficient condition for foreign exchange risk. As a result, foreign exchange exposure must be evaluated based on an assessment of the sensitivity of assets, liabilities, and operating income to exchange rate fluctuations. As a result of exchange rate changes, a company's value at risk is affected. Thus, foreign exchange exposure is the most important factor for each corporation (Choi, 2003). An investigation has been conducted into the relationship between exchange rate exposure and company characteristics. Among other factors, firm size, multinational status, and foreign sales have been found to play a significant role in determining exchange rate exposure (Dominguez and Tesar, 2006). Several factors influence the foreign exchange exposure of firms, including foreign currency debt, hedging, firm size, leverage, liquidity, and growth opportunities, as well as macroeconomic variables and industry competitive structure (Doukas et al., 2003). In addition, non-MNCs are significantly more exposed to foreign currency exposure than multinational corporations (MNCs) (Adler and Dumas, 1984).

2. The nature of exchange rate volatility

In the previous paragraph, we discussed the differences between foreign exchange rate exposure and risk. This paragraph will focus on foreign exchange rates and currency volatility. Fluctuations in exchange rates are a natural consequence of floating exchange rates, which are found in most major economies. Several factors affect exchange rates, including a country's economic performance, inflation expectations, interest rate differentials, and capital flows, among others. An exchange rate is determined by the strength or weakness of the underlying economy. It is imperative to understand that exchange rates are determined by a combination of several factors. These factors are directly related to the trading relationships between the two countries. Exchange rates are relative, and they are expressed as a comparison of two countries' currencies. Several significant variables impact the exchange rate between two countries. These variables include differences in inflation, interest rates, current account deficits, and public debt. In light of the

fluctuation of real factors in the economy during business cycles, exchange rates are still subject to fluctuation over time. In addition to decreasing international trade and investment flow, destabilizing speculation and overshooting would also amplify these intrinsic fluctuations in exchange rates. There have been frequent instances of excessive volatility in the foreign exchange market over the past decade, making it the largest and most liquid of all international markets. Several businesses have perceived themselves as helpless at times in dealing with the associated risks associated with exporting and importing products and services (Salvatore, 2013). In addition, foreign exchange volatility has the potential to affect cash flow projections, profitability, competitiveness, and the ability to service debt in the future (Shapiro, 2009). Currency demand is influenced by exports, imports, and the trade balance. Increasing trade surpluses increase demand for a country's currency, while a trade deficit weakens it (Allen, 2003). It is important to note that when paying or receiving foreign currency, foreign exchange volatility can have a significant impact on cash flow projections, profitability, competitiveness, and the ability to service debts (Shapiro, 2009). Fixed exchange rates tend to remain fixed for a specified period, unlike floating exchange rates, which fluctuate from one year to the next, week to week, and minute to minute (Clark et al., 2004). The rise and fall of the exchange rate are referred to as devaluations and revaluations during the exchange rate regime (Sadoulet and Janvry, 1995). It is important to note that the impact of exchange rate volatility on trade flows is asymmetric, in the sense that volatility changes of very large or extremely small magnitude have very different effects (Chang et al., 2020). A peg to a currency may result in its overvaluation or currency crises, amplifying the impact of asymmetric shocks on small countries (Edwards, 2011). In small open economies, stable exchange rates offer better protection against nominal shocks (McKinnon, 1963). As a result of exchange rate fluctuations in emerging economies, larger firms with greater foreign involvement were more likely to be affected. In developed economies, the limited availability of hedging instruments led to a greater vulnerability of smaller firms to exchange rate movements (Jeon et al., 2017). In the event of increased volatility in exchange rates, risk-averse agents may minimize their international trade activities if they are not fully prepared for currency movements (Nardis and Vicarelli, 2003). To further clarify, it has been demonstrated through theoretical modeling and empirical evidence that better knowledge of monetary policy objectives decreases exchange

rate volatility (Eichler and Littke, 2018). The volatility of exchange rates is characterized by an increase in risk following a sudden change in the exchange rate, so exporters who fear losing production may reduce output in response to increased volatility (McKenzie, 1999). As a result of volatile exchange rates, exports are reduced and risk-averse traders and exporters are adversely affected. Exchange rate volatility on the exchange markets cannot be ignored as it affects both importers and exporters equally (Côté, 1994).

3. Type of foreign exchange risk and exposure

In the previous paragraph, we discussed the nature of exchange rate volatility. In this section, we will discuss the types of foreign exchange risk and exposure. Exchange rate risk can be divided into three types (Shapiro, 1996; Jeff, 1989). Exchange rate exposure can also be classified into two categories based on how it affects companies: accounting (translational and transactional) and economic (transactional and operating) exposures. (Shapiro, 2009). There are two types of exchange rate risk exposures: short-term exposures and long-term exposures. In other words, exchange rate exposure refers to the extent to which a company is exposed to exchange rate changes. The former involves cash flow management, whereas the latter involves capital investment management. In its simplest form, translation exposure can be defined as the difference between assets and liabilities exposed to translation. (Shapiro, 1996). A firm's value is impacted by exchange rate movements in three distinct ways: transaction exposure (contracts), translation exposure, and competitive exposure (Stulz and Williamson, 2000).

There are three types of foreign exchange risk and exposure: a) transaction risk and exposure; b) translation risk and exposure; and c) economic risk and exposure.

3.1 Transaction risk and exposure

Transaction risk refers to the possibility that the domestic currency value of a payment or receipt denominated in a foreign currency may fluctuate based on changes in exchange rates in the future. Transactions can result in cash flow from

foreign currency debtors, foreign currency creditors, dividends, or loan repayments. The risk associated with transaction items includes both capital items (foreign currency dividends and loan payments) as well as trading items (foreign currency receivables and payables) (Levi, 1990). The effect of changes in exchange rates on receivables and payables (exports and import contracts), as well as dividends returned home, is an important aspect of transaction risk. Firms would be exposed to direct transaction exchange rate risk if the exchange rate for the denominations of such contracts changed. (Shapiro, 1996; Jeff, 1989). In addition, transaction risk is defined as the risk that arises when a foreign-based company engages in financial transactions or sells products on behalf of a foreign-based entity. During the transaction, this risk arises due to fluctuations in the foreign exchange rate. When there is a prolonged period between the date of signing a contract and the date of settlement, this risk may adversely affect the company, resulting in currency fluctuations. (Wagner and Disparte, 2016). Purchasing and selling foreign currencies with foreign currency terms entails transaction risk. The term "transaction exposure" refers to gains and losses incurred as a result of the settlement of transactions in foreign currencies. (Eiteman et al., 2004). Specifically, transaction exposure refers to the changes in cash flows that result from changes in foreign exchange rates affecting a company's contractual obligations. Because cash flows are determined solely by contracts, exposure is equal to the horizon of existing contracts. Accounts receivable and payables, as well as investments and loans denominated in foreign currencies, are the most commonly associated with this case. (Eiteman et al., 2004). A company can be exposed to transaction risks when conducting transactions in a foreign currency (rather than its base currency). If companies make or receive payments in foreign currencies, they are subject to transaction exposure, as exchange rates may fluctuate unexpectedly during these transactions. (Eun and Resnick, 2014). Also, transaction exposure refers to an organization's exposure to all of its specific commercial transactions that have already been booked. An accounting system can measure the exposure resulting from these transactions as a result of establishing a set of terms and settling them at a given time. Furthermore, it is imperative to take into account any implicit or explicit contractual agreements when determining overall rate exposure. Moreover, currency fluctuations can affect the valuations of a company's domestic and foreign

assets and liabilities, resulting in translation exposure (Muller and Verschoor, 2006).

3.2 Translation risk and exposure

The concepts of translation risk and exposure are important in international finance and risk management. Companies often deal with different currencies and operate in multiple countries in global business. Consequently, they may be exposed to translation risk, which refers to the possibility of a company's financial statements being affected by changes in exchange rates. A balance sheet exchange rate risk is essentially a risk associated with exchange rate movements related to the valuation and consolidation of foreign subsidiaries on the parent company's balance sheet. An organization's translation risk is typically measured by the ratio between its net assets (assets minus liabilities) and possible exchange rate movements. According to the accounting regulations affecting the parent company, consolidation financial statements may be translated either at the end of the period's exchange rate or at the average exchange rate. Therefore, while foreign subsidiaries' income statements are usually translated at an average exchange rate over time, their balance sheet exposures are usually translated at an exchange rate based on the current exchange rate at consolidation time. (Shapiro, 1996; Jeff, 1989). The translational risk of exchange rate movements results in revaluations of foreign operations that result in overall profits or losses for the company when the financial statements of the foreign subsidiary are restated in the currency of the parent company when reporting. In an analysis of the translation process of foreign subsidiaries' financial statements, disparities were revealed. During the preparation of the balance sheet, the closing rate is used to translate balance sheet activities, whereas the average exchange rate is used to translate income statement transactions. In contrast, in the United States, income statements are translated based on the most recent closing rate at the end of a fiscal year (Dhanani, 2003). Because earnings and positions of international groups are reported in local currency, they are subject to translation risk (Hagelin, 2003). An assessment of translation exposure (also known as accounting exposure) is necessary to determine the accounting impact of foreign exchange rate changes. These changes are often

the result of converting, for example, subsidiaries' financial statements from foreign currencies to the parent company's reporting currency. (Eiteman et al., 2004). The translation of assets and liabilities at current exchange rates is considered exposed; assets and liabilities translated at historical exchange rates (pre-change) remain unchanged and are therefore considered unaffected. As only the items translated at the current exchange rate are exposed to exchange risk, accounting exposure is determined by determining which items should be translated at which exchange rate. The following translation methods have been identified for translating foreign currencies into home currencies: Current/Non-current Method: All current assets and liabilities are translated at the current exchange rate. Monetary/Non-Monetary Method: All monetary assets and liabilities are translated at current exchange rates. Temporal Method: The method is similar to the monetary/non-monetary method; however, inventory may be translated at the current exchange rate if it is valued at market value. By using the current rate method, all items on the income statement and balance sheet are translated at current exchange rates. Companies that deal with foreign currencies or list foreign assets on their balance sheets are at risk of exchange rate risk. Translation risks are greater the more assets, liabilities, or equity that are denominated in foreign currencies (Bhalla, 2004). In addition, when reporting and consolidating foreign operations' financial statements, translation exposure occurs when the foreign operations' financial statements are converted into the parent company's home currency from the local currencies involved for reporting purposes. In the event of a change in the exchange rate between the previous reporting date and the current reporting date, the parent company will incur a translation gain or loss. Although the gain or loss may appear on paper, it does not represent cash flow and is merely a theoretical concept that does not add value to the company (Shapiro, 1996). To prepare worldwide consolidated financial statements, accounting-derived changes in owners' equity can occur as a result of translating foreign currency financial statements into a single reporting currency for foreign affiliates. To consolidate foreign subsidiaries' accounts (balance sheets and income statements) into parent financial statements, it is necessary to translate the foreign subsidiaries' accounts into the parent currency (Eiteman et al., 2004). Furthermore, accounting conventions are primarily responsible for translating risks. A company may also experience translation difficulties when it conducts business in more than one country or if it has subsidiaries with assets and liabilities

denominated in different currencies (Yeager and Seitz, 1989). It is common for foreign affiliates of an enterprise to keep their books in the local currency of their affiliates, which causes this problem. For purposes of consolidation, this account must be translated into the reporting currency of the parent company by determining an exchange rate for translating the different accounts. Translating the income statements of foreign affiliates is typically accomplished by using a periodic average translation rate, but translating balance sheets presents a greater challenge (Jacque, 1981).

3.3 Economic risk and exposure

Economic risks include changes in exchange rates, which pose a significant threat to the present value of a firm's future operating cash flows. In terms of economic risk, it is important to note that it is predominantly concerned with how exchange rate fluctuations affect revenue (domestic sales and exports) and operating expenses (costs associated with domestic inputs and imports). To determine the risk associated with an economy, a company's parent company, as well as its subsidiaries abroad, typically estimates the present value of its future cash flow operations. It is important to identify the various types of currency risks and their measurement to develop a strategy for managing them. (Shapiro, 1996; Jeff, 1989). Economic exposure (also known as operating, competitive, or strategic exposure) does not have a predetermined horizon. As a result of unexpected changes in exchange rates, the company's current value has now become the key determinant of the company's value. Future costs, prices, and sales volumes are frequently affected by these changes. There is a significant difference between transaction exposure and operating exposure in that the former measures only changes in cash flows that have already been contracted, while the latter measures future changes (Eiteman et al., 2004). Operating exposure refers to a company's vulnerability to currency fluctuations in terms of its operating cash flow in the future. It is important to consider operating exposure when calculating returns on investments since the present value of future cash flows is often used to calculate returns on investments. Economic exposure is often referred to as a combination of transaction exposure and operating exposure (Shapiro and Moles, 2014). A business may be exposed to economic risk due to the possibility that exchange rate fluctuations will adversely

impact the net present value of cash flows in the parent currency. This risk results in a variety of factors being used to assess the long-term health of businesses. As a result of currency fluctuations and economic changes, a company's market value may be adversely affected. These risks are often generated by macroeconomic dynamics such as fluctuations in exchange rates, geopolitical instability, and changes in government regulations and are also referred to as forecast risks. In addition to the increased risk associated with international trade, it also influences the decisions of corporations' shareholders. Whenever unanticipated fluctuations in exchange rates affect a firm's market value, it is considered to be at risk economically (Walker, 1981). Consequently, economic currency risk has a wide-ranging impact on businesses, and it is imperative to assess their long-term viability. To value its assets in the native currency of a firm, economic foreign exchange rate exposure is measured by its sensitivity to changes in foreign exchange rates (Adler and Dumas, 1984). Contrary to transactional exposures, economic exposures focus on the long-term impact of exchange rate fluctuations on a company's cash flow rather than just hedging its currency receivables and payables (Miller and Reuer, 1998). Moreover, a firm's exposure to currency risk will determine the impact of unexpected changes in the exchange rate on the prices of output and inputs. In light of the correlation between prices and exchange rates according to the segmentation of their respective markets, operating exposure varies depending on whether input costs and output prices are derived locally or globally. Foreign exchange rates vary significantly between firms with substantial operating exposures (Carter et al., 2001).

4. Covered interest rate parity

In the previous paragraph, we discussed foreign exchange risks and exposures. In this section, we will discuss covered interest rate parity. In theory, covered interest rate parity describes the situation where interest rates and spot and forward currency values between two countries are in equilibrium. As a result of the covered interest rate parity situation, there is no opportunity to arbitrage using forward contracts, as often occurs between countries with different interest rates. As a result of covered interest rate parity in foreign exchange markets, forward foreign exchange rates may be determined without arbitration. The condition also stipulates

that investors may use forward contracts to hedge their foreign exchange risks, thereby reducing their foreign exchange risk. Consequently, the foreign exchange risk is considered to have been covered. Even though interest rate parity may exist at one time, this does not imply that it will persist in the future. Interest rates and exchange rates are subject to change in the future (Hargrave, 2023). To determine the spread between forward and spot rates, short-term funds move between countries to take advantage of interest differentials. As a result of interest parity theory, two countries should have the same interest rate difference, but with a sign opposite to the spread between forward and spot rates. It is important to note that the forward discount, or premium, is closely related to the interest differential between the two currencies. In a free market, currencies with higher interest rates may be purchased at a discount on the forward market, whereas currencies with lower interest rates would be purchased at a premium on the forward market. As a matter of interest rate parity theory, the difference between a forward rate and a spot rate is the same as the difference between a domestic interest rate and a foreign interest rate (Kim and Kim, 2006). Further, a covered interest differential of zero should occur for an asset denominated in a different currency when it is subject to covered interest parity (CIP), which is a non-arbitrage condition. An automated foreign exchange swap market should be capable of providing investors with the same level of return on the spot market as those receiving returns on the forward market as a means of supporting the non-arbitrage condition. The absence of these inefficiencies would lead to the emergence of riskless arbitrage opportunities in the international capital markets, reflecting a potential for inefficiency (Hong. et al., 2021). A covered interest rate parity relationship is a no-arbitrage relationship between the spot and forward exchange rates and the nominal interest rates associated with these currencies. The interest rate differential between two currencies on international money markets is assumed to correspond to the percentage spread between the forward and spot interest rates of the currencies. Arbitrage is a profitable business if this is not the case. By using forward exchange rates, investors can contract to purchase or sell currencies in the future. To determine the future value of one currency unit, interest rates must be determined for that currency as well. The forward exchange rate, as well as the nominal interest rate in each currency, must have a relationship with each other. It is called interest rate parity when nominal interest rates are denominated in two currencies and spot

and forward exchange rates are parity. In the forward foreign exchange market, foreign exchange risk is eliminated by equalizing returns on comparable money market assets when the forward foreign exchange market is used to eliminate foreign exchange risk. Several factors prevent arbitrage in the interest rate market, including market efficiency and the absence of government controls. If these conditions are not met, covered interest rate arbitrage can result in extraordinary profits. In this case, covered refers to the fact that the investment is not subject to the transaction risk associated with foreign exchange (Bekaert and Hodrick, 2011). There is a theoretical relationship between spot exchange rates, short-term interest rates, and forward exchange rates known as the interest rate parity theorem (IRPT). According to the IRPT, investors realize the same returns whether they invest domestically or abroad through hedging in the forward exchange rate market. No-arbitrage relationships, as their name indicates, are those in which an investor cannot obtain a risk-free return by simultaneously investing in domestic and foreign markets. As a result, hedged dollar returns on foreign investments are approximately equal to the returns on domestic investments. In the future, the IRPT will be equal to the cost of domestic funds (Saunders and Cornett, 2017).

5. Measurement of exchange rate risk

The previous paragraph discussed covered interest rate parity. In this section, we will discuss the measurement of exchange rate risk. Measuring the currency risk of a firm is an essential component of its exchange rate risk management decisions. Particularly, measuring the risks associated with the translation of the exchange rate and the economic environment may prove challenging (Deventer et al., 2004). To mitigate exchange rate risk, companies should measure and manage their exposure to risk so that they are less vulnerable to significant changes in exchange rates that can adversely affect profit margins and asset value (Papaioannou, 2006). The VaR estimate of exchange rate risk is used by trading firms to estimate the riskiness of an exposed foreign exchange position, including a Treasury's exposure, over a specified period (Holton, 2003). A variety of types of risk can be measured using the VaR methodology, which assists firms in managing their risk exposures. In contrast, the VaR fails to define what happens to the exposure at the $(100 - z)$ % level of confidence, i.e., at the worst-case scenario

level. To obtain the maximum level of protection, firms often establish operational limits, such as nominal amounts or stop-loss orders, in addition to VaR limits, as a result of the fact that VaR does not provide 100 percent certainty as to the maximum loss (Papaioannou and Gatzonas, 2002). The calculation of a VaR is based on three parameters: first, the holding period, which specifies the period over which the foreign exchange position is expected to be held. In addition to a typical holding period of one day, there is a second parameter to consider, the degree of confidence at which the estimate is expected. The standard levels of confidence are 99 percent and 95 percent. The final parameter determines the currency unit in which the VaR will be priced. Based on a holding period of x days and a confidence level of $y\%$, the VaR provides information about the maximum loss (i.e., the decrease in market value of the foreign exchange position) over x days. However, if the x -day period is not one of the $(100-y)\%$ of x -day periods that is the worst under normal circumstances. If a foreign exchange position, for example, has a one-day VaR of \$10 million at a 99 percent confidence level, the firm should assume that provided normal conditions are maintained during that one day, the position will not decrease in value more than \$10 million. Therefore, the company should expect that its foreign exchange rate position will decrease by no more than \$10 million on 99 out of 100 usual trading days, or by more than \$10 million on one out of 100 typical trading days. It is therefore possible to calculate the VaR using a variety of models, of which the most widely used ones are: (1) the historical simulation, which assumes that currency returns on foreign exchange positions will exhibit the same distribution as previously; (2) the variance method. (Papaioannou, 2006). As a method for determining transaction exposure, it is necessary to estimate a firm's net cash flows in each currency, currency variability, and currency correlations, as these metrics provide insight into the firm's overall position in each currency and indicate how currencies are moving toward one another. Moreover, the impact of currency exposure on a firm's net cash flow, which can be defined as the flow of cash in different currencies, must also be evaluated. An organization's earnings can be significantly affected by its transaction exposure. Currency fluctuations may fluctuate by as much as 10% in a given year. As a result, export profits could be eliminated. It is important to note that exchange rates have a significant impact on domestic and foreign sales, which is not captured by accounting methods (Madura and Fox, 2007).

CHAPTER 3:

FOREIGN EXCHANGE RISK MANAGEMENT TECHNIQUES

The previous chapter covered the following topics: foreign exchange risk and exposure, nature of exchange rate volatility, types of foreign exchange risk and exposure, covered interest rate parity, and measurement of exchange rate risk. In this chapter, we will discuss the following points: As a first step, we will discuss the concept and importance of managing foreign exchange rate risk. As a next step, we will discuss the conceptual framework for best practices in exchange rate risk management. Lastly, we will describe the types of tools available for managing foreign exchange risks. These include internal tools such as avoidance (doing nothing), invoicing in domestic currency, leading and lagging, diversification, matching, and netting. Furthermore, external tools such as forward contracts, futures contracts, options contracts, swaps contracts, cash pooling, cross-hedging, and money market hedging.

1. The concept and importance of foreign exchange rate risk management.

The purpose of this section is to discuss the concept and importance of foreign exchange rate risk management. Since the collapse of Bretton Woods and the devaluation of the U.S. dollar in 1973, currency risk management has become increasingly important (Papaioannou, 2001). Furthermore, as a result of the unusual occurrence of a large number of currency crises over the last decade, the management of exchange rate risk exposure has become increasingly important. Corporate managers increasingly see currency risk management as a method of reducing a company's vulnerability to major changes in exchange rates (Deventer et al., 2004). Also, risk management is defined as a systematic approach to the identification and assessment of pure loss exposures, as well as selecting and implementing the most appropriate methods to address those exposures. The management of risks consists of three steps: identifying, measuring, and managing (Rejda, 1998). There are several objectives of risk management, such as minimizing foreign exchange losses, reducing the volatility of cash flows, protecting earnings

fluctuations, increasing profitability, and ensuring the survival of the organization (Fatemi and Glaum, 2000). In addition, the company may establish a centralized exchange rate hedge entity within its Treasury to handle the practical aspects of exchange rate hedges. Forecasting exchange rates, developing currency hedge plans, determining currency risk accounting procedures, and establishing benchmarks for currency hedge performance are the responsibilities of the entity. In large multinational corporations, these functions may be handled by a team headed by the chief dealer or, depending on the size of the corporation, by a specialized team headed by the treasurer (Madura, 2002). To mitigate currency risks, a currency strategy is necessary once a firm has identified and calculated its exposure to currency risk. It is necessary to develop a currency hedge strategy that specifies the firm's currency hedging objectives as well as whether or how the firm intends to fully or partially hedge its currency exposures. Furthermore, a comprehensive currency hedge strategy must be implemented. An organization's overall currency risk management strategy should be described at an operational level, including how currency hedging will be implemented, which hedging instruments will be utilized, and the monitoring procedures for currency hedging. The firm may also need to establish a centralized department within its Treasury to handle the practical aspects of exchange rate hedging. Among its responsibilities, the unit forecasts exchange rates develops hedging strategies, establishes accounting procedures, determines the cost of hedging currency risk, and establishes benchmarks for currency hedging performance. A chief dealer can oversee these operations under the direction of a specialized team led by the treasurer of large multinational companies. To implement the plan, a firm would need to develop a set of controls to monitor its exchange rate risk and ensure that it takes the right positions at the appropriate time. It is part of this process to establish position limits for each hedging instrument, to perform daily mark-to-market valuations of all currency positions, and to establish benchmarks for periodically monitoring the performance of currency hedging. Overall, the management of currency risk can be classified according to its source. Techniques that are internally developed fall under the control of the company's financial and regulatory affairs. A second group of instruments is external to the organization, including those that can be used to protect against the negative effects of residual currency risks that have not been eliminated through internal methods (Prindl, 1976). Even though exchange rate fluctuations can adversely affect

earnings, revenues, and value, many companies are unable to manage their foreign exchange exposure actively. Management makes this decision for a variety of reasons, one of which is a lack of understanding of the system. It is their opinion that risk management tools such as forwards, futures, and options are outside their sphere of expertise, that they are speculative, or that they are outside their area of expertise. Even though the company has legitimate concerns regarding the abuse of hedge techniques, refusing to use forwards and other instruments may result in substantial speculative risks for the company. Further, they claim that exposure cannot be measured. Despite the complexity and inability to accurately measure currency exposure, it is not necessary to use imprecision as an excuse for inaction in business situations when managing currency exposure. Lastly, the company has already hedged its trades, and its foreign subsidiaries have financed their operations in their local currencies, thus covering all transactions, including imports and exports. As a result, transaction hedges are a very incomplete strategy because the majority of firm value is derived from uncompleted transactions (Dufey and Giddy, 1978).

2. Exchange rate risk management conceptual framework of best practices

In the previous section, we discussed the concept and importance of foreign exchange rate risk management. In this section, we will explain the conceptual framework of the best practices for managing foreign exchange rate risk.

According to the framework of best practices, the following steps should be followed: Identification of exposure characteristics, gathering information related to exposure, forecasting the path of exchange rate changes, identifying deviations and responding to exposures, and evaluating the outcome of the response based on exposure management objectives (Holland, 1986). Furthermore, the following framework should be followed to achieve exchange rate risk management: The first step is to identify the exchange rate risks that a firm is exposed to and measure those risks. As part of this process, it is imperative to identify which currencies are associated with each type of currency risk. Additionally, it is essential to quantify currency risks when identifying hedge positions by using a variety of models, such as VaR. The second step is to develop an exchange rate management strategy. A

currency strategy must be developed to address currency risks once a firm has identified and evaluated the types and exposures of currency risks, as well as measured its exposures. This strategy must also specify whether a firm intends to fully hedge its currency exposures or partially hedge them, as well as specify its currency hedge objectives. Moreover, currency hedges should be developed in a detailed manner. The company must detail its operational-level strategy for managing currency risk, including the methods for implementing currency hedging, the hedging instruments to be used, and the process for monitoring currency hedging. The third step is to create a centralized exchange rate hedge execution function within the firm's Treasury. As part of its duties, it will forecast exchange rates, establish hedging mechanisms, account for currency risk, establish benchmarks for measuring currency hedging performance, and develop accounting systems. In addition, a set of controls should be developed to monitor an organization's exchange rate risk and ensure that the right positions are taken. This process involves establishing position limits for the various hedging instruments, monitoring positions on a daily (or intraday) basis using mark-to-market valuations of all currency positions, and setting currency hedging benchmarks to monitor performance periodically (usually every month). Finally, it is necessary to establish a risk oversight committee. To approve position limits, hedging instruments, and associated VaR positions, and to review the risk management policy regularly (Allen, 2003; Jacque, 1996).

3. Tools for foreign exchange risk management

Our previous section explained the conceptual framework of the best practices for managing exchange rate risk. As part of this section, we will describe the types of tools that can be used to manage foreign exchange risks. Companies can protect themselves against currency fluctuations using a variety of different tools. The purpose of hedging tools is the same in all instances; currency management instruments provide firms with the capability of taking short or long positions to minimize risk. Hedging tools include forward contracts, futures contracts, options, swaps, and debt, among others. (Giddy, 2009). Several methods can be used to manage foreign exchange risk, which are generally classified as internal or external methods. An internal method, unlike external methods, is part of

a company's financial management and does not require special contractual relationships outside the group of companies involved in their use. Internal methods are not contract-based protection against foreign exchange losses; they are included in the financial management of the firm. A company can manage its foreign currency exposures for short-term cash flows by using a variety of internal methods, including matching, leading and lagging, netting, balance-sheet hedging, and pricing policies. To generate long-term cash flows, international diversification is one of the most effective strategies. Many external methods are available, including forward contracts and derivatives, including currency futures, currency options, and currency swaps (Hakkarainen et al., 1998). Also, companies can minimize foreign exchange risk in a variety of ways by using internal processes. These methods may be incorporated into a company's regulatory, financial, and operational practices. (Demirag and Goddard, 1995). However, these techniques may not be sufficient to reduce all the company's risks, and external methods should be used to cover the remaining risks (Soenen and Madura, 1991).

Among the internal tools used in foreign exchange risk management are the following: a) avoidance (doing nothing); b) invoicing in domestic currency; c) leading and lagging; d) diversification; e) matching; and f) netting. In addition, among the external tools used in foreign exchange risk management are the following: a) forward contracts; b) futures contracts; c) options contracts; d) swaps contracts; e) cash pooling; f) cross-hedging; and g) money market hedging.

3.1 Internal tools:

As a starting point, a key component of navigating the complex international financial market is the use of internal tools to manage foreign exchange risk. Using these tools enables companies to minimize the adverse effects of currency fluctuations and maintain stability in their international operations at all times. Among the internal tools used in foreign exchange risk management are the following: a) avoidance (doing nothing); b) invoicing in domestic currency; c) leading and lagging; d) diversification; e) matching; and f) netting.

In the following paragraphs, we will provide an overview of each tool and its advantages and disadvantages.

3.1.1 Avoidance (Doing Nothing):

The integrated risk management paradigm defines risk avoidance as all actions taken to prevent risks from developing. Risks are avoided when the organization refuses to accept them for even a moment. (Saunders and Cornett, 2008). Because mixed results may be obtained with little evidence supporting this hypothesis, ignoring the exploitation of uncovered transactions may result in high risk in the short term. By taking hedge decisions when the exchange rate is in a favorable direction, a firm reduces its risk of a future loss, thereby preventing further losses. Because market conditions are uncertain, it is difficult to forecast fluctuations in exchange rates. (Moosa, 2010). For example, the UK firm invoiced the Canadian firm for \$2.2 million, waited three months, and then converted it into sterling at the current spot rate. Based on the exchange rate, a gain may be realized or a loss may be incurred. To avoid fees and other transaction costs associated with some hedging strategies, many firms adopt this policy and take a 'win some, lose some' approach to their hedging strategies. It may be acceptable to do nothing if it were anticipated that the Canadian dollar would appreciate during the next three months. Predicting exchange rates is a tricky business, and several 'experts' have made serious mistakes. (Arnold, 2008).

3.1.2 Invoicing in Domestic Currency

Having all foreign customers pay in your currency and your firm pay for all imports in your home currency is one way to avoid exchange-rate risk. As an example, if the Canadian importer is required to send \$1 million within three months, it is important to note that the exchange rate risk has not disappeared; it has simply been transferred to the customer. It is obvious that such a policy has several drawbacks: your customers may dislike it, your products' marketability is reduced, and your customers may seek out other sources of supplies. For monopolistic suppliers, this policy may be appropriate; however, for most firms, it is unlikely to be successful (Arnold, 2008). In addition, it is important to note that invoices in any currency will always be affected by fluctuations in exchange rates, regardless of the currency chosen by the company. If the producer's currency is chosen for export, the demand for the products will fluctuate as the exchange rate fluctuates.

Consequently, once an order has been placed, the exporting company can be confident of the amount of profit it will generate. Alternatively, exporters who set their prices in the currency of their importers will ensure that demand for their products remains constant. Due to fluctuating exchange rates, profits from placing orders will be uncertain as well. Also, the choice of vehicle currency affects the demand for the exporter's products and the amount of profit. As a result, the exporting company will likely set its prices in the local currency of the importing company in cases where foreign exchange rates are subject to a great deal of volatility (Wilander, 2006). Moreover, in companies with a low level of product differentiation, the choice of currency is of great importance. This is because they are most adversely affected by it. Due to the easy substitution of products by consumers for those of competitors, exporting companies experience large fluctuations in their traded quantities as a result. Therefore, prices will change in the event of changes in exchange rates relative to those of competitors (Goldberg and Tille, 2008). It has been demonstrated by many that invoice currencies are greatly influenced by their relative size. Exporting companies should price products in the local currency of the importing country when the importing company is large and industrialized. As a result, the firm is less likely to lose its competitive advantage compared to domestic firms. (Wilander, 2006). The use of this tool may benefit a business since it can establish a more competitive position in the market and maximize profits by analyzing the industry and selecting the appropriate currency (Oi et al., 2004).

3.1.3 Leading and Lagging

The concept of leading implies that the payment of a debt is brought forward from the original due date, whereas the concept of lagging implies that the payment is deferred beyond its original due date. It may be prudent to delay or accelerate your payments if you anticipate substantial changes in exchange rates between now and the deadline. As an example, a UK exporter may attempt to obtain payment immediately and convert the Canadian dollar at the spot rate at the spot rate if it invoices a Canadian company for C\$2.2m on a three-month credit contract and expects the Canadian dollar to drop during the next three months. There is no doubt that the Canadian firm will require an incentive to pay early, and this may be

achieved by offering a discount for immediate payment. It is possible for the importer of goods who must pay in a currency whose value is expected to decline to delay payment as long as possible, either through an agreement or by exceeding the credit terms stipulated in the invoice. (Arnold, 2008). Also, the concept of leading and lagging refers to adjusting the timing of payment requests or disbursements to accommodate future currency fluctuations. As part of leading strategies, foreign currency receivables are collected as soon as possible when a foreign currency is expected to depreciate, and foreign currency payables are paid as soon as possible when a foreign currency is expected to appreciate. Lag strategies involve delaying the collection of foreign currency receivables during periods of appreciation and delaying the collection of foreign currency payables during periods of depreciation (Shapiro, 2009). As a result of leading and lagging, payment flows from countries with weak currencies to countries with strong currencies are accelerated, and inflows from countries with strong currencies are delayed. The firm must be in a position to control payment terms to be able to exercise some control over them. A zero-sum game occurs when one party is in the lead or lagging, meaning that if one party benefits, the counterpart is losing, which can result in a loss of business opportunities for the other party. It is possible to adjust transfer prices or dividend payments to adjust leading or lagging, to tighten or extend credit, to settle inter-subordinate accounts early or late, to reinvest or repatriate funds, or to tighten or extend credit to achieve leading or lagging (Madura and Fox, 2007). The advantages of leading and lagging strategies are numerous. One of the most significant benefits is their ease of implementation (Mathur, 1985). Furthermore, in contrast with direct intercompany loans, there is no requirement for a formal statement of debt with leading and lagging amounts since the length and shortening of the transaction terms are all that are necessary to adjust credit amounts up or down (Shapiro, 1996). Additionally, leading and lagging can be utilized in group tax planning to facilitate the transfer of intracompany funds and, therefore, maximize overall profitability (Parkinson and Walker, 1978). It is important to note that, while there are certain advantages to this strategy, there are also some disadvantages. Due to the zero-sum nature of this strategy, it comes at the cost of losing business, which may outweigh the advantages of taking advantage of exchange rate movements (Hill, 2001). The entire strategy is also dependent on anticipating market changes, so there can be no assurance that the risk exposure will be limited (Mathur, 1985). In some countries,

this method cannot be used as it is restricted by government regulations. Governments typically regulate intercompany credit terms; therefore, leading and lagging may differ from country to country (Shapiro, 1996).

3.1.4 Diversification

Diversification across a broad range of assets and liabilities can reduce portfolio return risk and fund costs. As long as domestic and foreign interest rates or stock returns do not move closely together over time, a foreign asset-liability portfolio diversification strategy could be effective in reducing the risk of mismatches in individual currency asset-liability positions. The position of multicurrency foreign assets and liabilities is held by a large number of financial institutions, including banks, mutual funds, and pension funds. Diversification of multicurrency trading portfolios across various asset and liability markets can reduce the risk and cost of portfolio returns. The diversification of asset-liability portfolios may be beneficial in minimizing the risk of a mismatch between individual currency assets and liabilities in cases where interest rates or stock returns do not change similarly during a given period (Saunders and Cornett, 2008).

3.1.5 Matching

Matching can eliminate foreign exchange exposure only when cash flows are relatively predictable and constant (Kallianiotis, 2013). The matching method, as opposed to netting, applies to both intragroup and third-party transactions. Therefore, the company must only handle an unmatched portion of the total transactions on the forex markets. The company matches inflows and outflows as a result of trade, etc. As an example, if the Canadian importer is not a member of a group and the UK firm purchases raw materials worth C\$2 million from another Canadian firm, only C\$200,000 of the imports will need to be hedged. (Arnold, 2008).

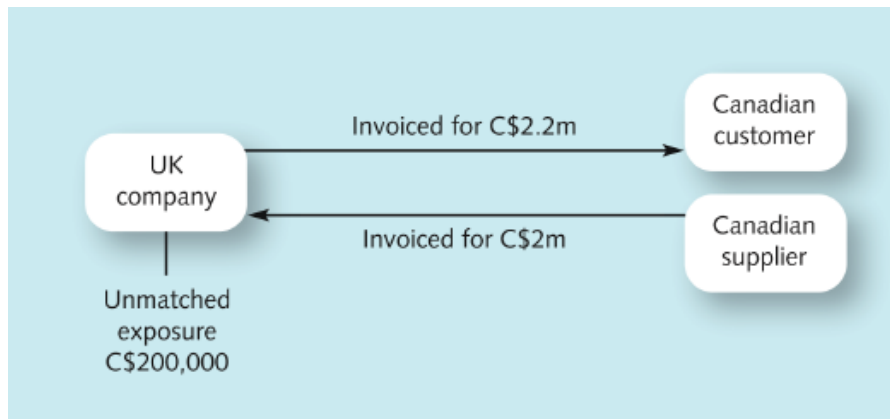


Figure 1: Example of Matching (Arnold, 2008)

3.1.6 Netting

The subsidiaries of multinational companies operate in a variety of countries and can supply other members of their organization with their products. When netting occurs, intra-organizational currency debts are settled for the net amount due rather than the gross amount owed. Using the same currency to offset inflows and outflows reduces the size of the currency flows, resulting in a smaller amount of net exposure that needs to be hedged. Additionally, it reduces the transaction costs associated with currency transfers in terms of fees and commissions. Netting comes in two categories. 1) Bilateral netting: It involves two companies within a group and is extremely simple to operate without the involvement of the central Treasury. 2) Multilateral netting: A central Treasury is usually required for organizations with a matrix of currency liabilities spanning numerous subsidiaries located throughout the world to maintain a clear understanding of their overall exposure at any one time. Upon netting out intra-company debts, subsidiaries are required to inform the group's Treasury about their overseas transactions so that payments can be coordinated by the group. As a result, significant savings can be made in bank transfer fees for the group. (Arnold, 2008). A company can use exposure netting to offset a long position in a particular currency by holding both a long and a short position in that currency. If a company holds a long position in one currency and has a short position in another currency, the company can offset the position by holding a short position in the other currency. The use of short- or long-term positions as a means of balancing each other may be appropriate if there is a negative correlation between currency movements. Therefore, multinational

corporations are forced to organize their cash management in a centralized manner to minimize international transactions to a net amount for fund transfers between affiliates. It is therefore possible to minimize or eliminate measurable costs associated with inter-affiliate cash transfers, including foreign exchange purchases, float opportunities, and other transaction costs. Multilateral netted systems can deliver substantial benefits relative to their expense (Shapiro, 1996). An exposure in one currency could be offset by exposures in another currency, or by exposures in the same currency, by using this method. It is therefore possible to set off and cancel out a positive and a negative value using this method. In this scenario, losses or gains on one currency exposure should be offset by gains or losses on the other currency exposures, assuming the exchange rate is expected to move in this direction. (Kallianiotis, 2013). For example, if a British company owns a Canadian subsidiary and sells goods on credit to the subsidiary while owing the subsidiary C\$1.5 million, rather than transferring a total of C\$3.7 million to the intragroup transfer, a net transfer would be C\$700,000 (Arnold, 2008).

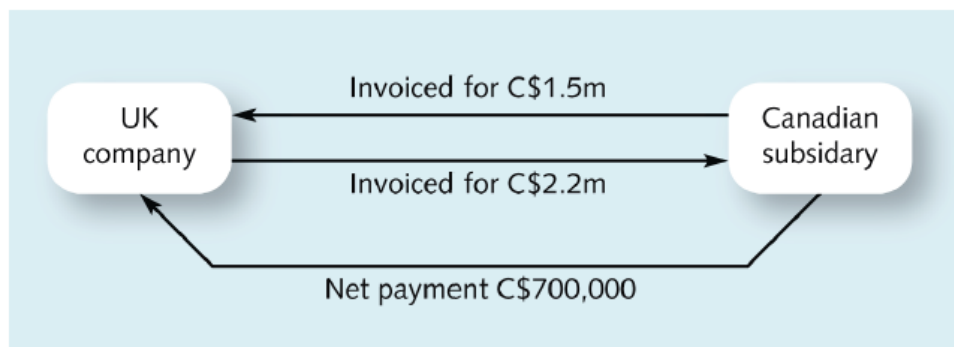


Figure 2: Example of Netting (Arnold, 2008)

Netting has numerous advantages, including offsetting intergroup transactions and reducing transfer costs (Arnold, 2008). In addition, by centralizing risk assessment and management, unnecessarily excessive hedging can be avoided, thus reducing unnecessary expenses. Despite the advantages, there are also certain disadvantages. In many cases, appropriate products are not available in the foreign country, which poses a liability problem. Furthermore, other risks are sometimes created during the process (Miller and Waller, 2003).

3.2 External tools:

External tools are often utilized by businesses to effectively manage foreign exchange risk. These tools provide a means of mitigating the potential negative impacts of currency fluctuations on financial outcomes. By employing these external tools, companies can better navigate the volatility of foreign exchange markets and protect their bottom line. Among the external tools used in foreign exchange risk management are the following: a) forward contracts; b) futures contracts; c) options contracts; d) swaps contracts; e) cash pooling; f) cross-hedging; and g) money market hedging.

The following paragraphs provide an overview of each tool as well as its advantages and disadvantages.

3.2.1 Forward Contracts

Forward contracts are agreements to purchase or sell an asset at a predetermined price at a specified future date (Cox et al., 1981). In forward contracts, the parties agree to exchange two currencies at a specific rate at a fixed date in the future. As an example, if the three-month forward rate is 2.25 Canadian dollars per pound, the UK exporter can lock in receipts of £977,778 in three months by selling forward C\$2.2 million. (Arnold, 2008). In addition, the forward price is set at a value at which advance payments are not required when a contract between a buyer and seller is entered into. The forward-exchange market involves exchanging one currency for another at a fixed rate at a future date to hedge transaction exposure. When you purchase forward contracts, you reduce the uncertainty associated with foreign exchange risk by substituting a known cost for a known cost as a result of the possible devaluation of one currency against another. Even though forward contracts typically provide a lower cost than uncertain costs, fluctuations in foreign exchange rates do not always guarantee the lowest cost. With forward contracts, the uncertainty caused by changes in foreign exchange rates is eliminated by fixing this cost in advance. As an example, an American company with an import bill payable in nine months may be able to cover this risk by purchasing euros at a certain price for the same date forward as the credit maturity date (Kim and Kim, 2006). Moreover, over-the-counter forward contracts are traded

between two financial institutions or between a financial institution and a client (Hull, 2014). Further, forward contracts are traded on OTC markets; the maturities of these contracts are typically 30, 60, 90, 180, and 360 days (Hopper, 1995). Due to their operational similarities, forward contracts and futures contracts both involve an agreement to purchase and sell an underlying asset at an agreed-upon future date. Future contracts and forward contracts differ primarily in that future contracts are exchange-traded while forward contracts are traded over the counter (Reilly and Brown, 2005). The most common method of hedging foreign currency transactions is through forward contracts. One drawback of forward contracts, however, is that they require future performance, and one party is sometimes unable to fulfill the agreement. Due to this default risk, many companies are unable to fully hedge their exchange exposures. As a result, the hedge disappears, sometimes at a high cost to the hedger (Adler and Dumas, 1984).

3.2.2 Futures Contracts

Futures contracts on foreign currencies involve the exchange of a specific amount of one currency for another at a fixed price at a future date agreed upon. A single futures contract can be purchased at the Chicago Mercantile Exchange (CME) or ICE Futures USA for a particular amount of currency; for example, a sterling futures contract can be purchased for £62,500. In exchange for £62,500, the buyer agrees to deliver a certain quantity of US dollars (Arnold, 2008). The Wall Street Journal summarizes the previous day's trading on its financial pages. Future contracts do not, in the majority of cases, result in delivery on maturity dates. Future contracts, for example, are standardized and are regularly reported in the press as part of financial reporting (Hull, 2014). Additionally, it is common for future contracts to converge with the spot prices of underlying assets as they mature, resulting in an arbitrage opportunity that would not exist if this convergence had not occurred. During the delivery period, if the futures price exceeds the spot price, the contract may be shortened, the asset purchased, and the asset delivered. When the futures price exceeds the spot price during delivery, traders can take a long position and wait for delivery to earn a higher futures price. As a result, futures prices fall due to arbitrage opportunities (Hull, 2014). On the trading floor of a futures exchange, currency futures contracts are legally binding agreements between two

parties for the purchase or sale of a particular currency against another currency at a specified exchange rate for delivery at a specific future date (Hull, 2007). Futures contracts, like forward contracts, are agreements to buy or sell assets at a predetermined price in the future. Although futures contracts are settled daily, forward contracts are settled upon maturity (Cox et al., 1981). In contrast to forward contracts, futures contracts are standardized in quality and quantity to facilitate trading on futures exchanges (Hirsa and Neftci, 2013). Also, the exchange will be required to specify the terms and conditions of a futures contract as part of the development process of the contract, as well as the underlying asset, contract size, and exchange location and date. Although the position does not require daily cash transactions, margin calls from financial service providers are considered undesirable by many investors (Cornell and Reinganum, 1981). At the expiration date of the futures contract, the buyer must buy the underlying asset. The seller must provide the underlying asset at that time. (Liu and Wang, 2019). Because futures contracts are settled daily, they are generally runnier than forwards; therefore, this correlation is relatively small in short-lived contracts. Futures contracts are traded on exchanges, which makes them more standardized than forwards, but forwards can be customized to meet a specific need. Futures contracts require daily market marking, so corporations often find them inefficient or burdensome (Brooks et al., 2001).

3.2.3 Options contracts

According to the option contract, the holder has the right to exchange the currency for another currency at an agreed-upon price; however, he or she is not obliged to exchange it. It is referred to as a strike price, a call price, a buy price, and a sell price. An option right entails the payment of a fee referred to as an option premium when the owner acquires it. Once the option seller has received the premium, the option seller will be required to deliver (or take) the option at the agreed price when the buyer (holder) exercises it. The holder of an American option may exercise the option before expiration, whereas the holder of a European option may exercise the option only at the expiration date. A buy call is an option in which you have acquired the right to purchase at a specified price; a sell call is an option in which you have sold the right to purchase at a specified price; a buy put is an option

in which you have bought the right to sell at a specified price; and a sell put is an option in which you have sold that right. (Hull, 2014). It is possible for companies that have foreign receivables or payables in foreign currencies to protect themselves from exchange rate fluctuations by purchasing options market hedges. Foreign currency exchange rate fluctuations can be mitigated by purchasing a call option on the foreign currency to lock in a maximum dollar price for receivables in foreign currencies. It is anticipated that, by purchasing a put option on the foreign currency, the company will be able to secure a minimum dollar price for its foreign currency receivables. A forward market hedge or money market hedge may backfire or even prove costly if the currency of an account payable or account receivable depreciates or appreciates over the hedged period. This may allow the uncovered strategy to perform better than the money market hedge or forward market hedge under these conditions. Thus, the options market hedge provides the company with a flexible option against transaction exposure while simultaneously benefiting the company from favorable exchange rate movements. To illustrate the flexibility of currency options, let us consider Boeing exporting a DC 10 to British Airways and billing them £10 million over one year. If Boeing purchases a put option on £10 million, it has the right, but not the obligation, to sell up to £10 million at a fixed exchange rate, regardless of the future spot exchange rate. As a result of the weakening of the pound, Boeing has the option to exercise its put option but will also benefit from letting the option expire unexercised as a result of the strengthening of the pound (Kim and Kim, 2006). FX options do not have to be exercised by a company; rather, they may be exercised if the company finds them beneficial. Although the company is required to pay an option premium, it is not required to exercise the option. The option premium must be determined by the volatility of exchange rates. Option premiums increase as volatility increases, as it indicates how the market perceives the volatility of the exchange rate. Therefore, options are most costly during periods when protection is most necessary (Horcher, 2005). Additionally, the price of call options should be considered *ceteris paribus* at first, since call options become less valuable as the strike price increases, while call options become more valuable as the underlying asset price increases. By allowing the holder to benefit from favorable movements while limiting downside risks, increased volatility increases the value of call options. In a similar fashion to the effect of value, time has a similar effect, since a longer maturation period means more potential events before

the maturity date. An increase in foreign risk-free rates decreases the value of a call option, while an increase in domestic risk-free rates increases the value of a call option. Put options increase in value when the strike price increases, whereas put options decrease in value when the underlying price increases. A holder of a put or call option has three options before the expiration date: sell the option back to the market and close out the position, exercise the option, or retain the option. A low price indicates that a shorter period will decrease the value of the security; low prices indicate that a longer period will decrease its value. A higher price indicates that the security will be valued more over a longer period. A call reverses the effects of interest rates (Cox and Rubinstein, 1985). The option can be purchased and sold either over the counter, where prices, dates, and sizes are determined by negotiations between parties, or through the trading markets, which provide fixed prices and standard sizes with definite purchase and sale dates. Options are considered appropriate hedge instruments because of their flexibility and avoidance of loss. Futures and options differ in that futures carry upside and downside risks, while options are only one-sided bets and are limited in risk. Futures can lose value, while options do not (Dawson and Rodney, 1994). A major advantage of options is their effectiveness in hedging risk based on options, such as prepayment risks, on balance sheets. Options have a disadvantage in that they have a premium associated with them. The use of futures and forwards is more suitable for hedges of linear risks (Kyte, 2002). In addition to protecting the company from foreign exchange losses, currency options allow the firm to take advantage of favorable changes in exchange rates (Glaum, 2005).

3.2.4 Swaps Contracts

A currency swap involves the exchange of local currency for hard currency at a future date between two parties. In this case, a company buys a specified amount of local currency on the foreign exchange market and simultaneously purchases forward contracts to convert the amount of local currency into hard currency at a later date. To understand the difference between a forward and a spot transaction, it is necessary to distinguish between them. This arrangement results in both a spot and a forward transaction. The company can recoup its foreign exchange

at a predetermined exchange rate as a result of this arrangement. Consider the case of a US parent company that wishes to avoid foreign exchange fluctuations by lending British pounds to its British subsidiary as an example of how a currency swap works. Purchasing pounds on the spot market and lending them to subsidiaries would be the responsibility of parent companies. In addition, the parent company will also trade the same amount of pounds for dollars on the forward market during the loan term. Upon maturity of the forward contracts, the parent company will receive a return of the loan from the subsidiary in the form of pounds, which will be exchanged for dollars at maturity by the parent company. It could also be possible to enter into a swap agreement with a foreign exchange dealer, under which the parent swaps dollars for pounds now and pounds for dollars at maturity. (Kim and Kim, 2006). In addition, a swap agreement is an agreement between two companies in which future cash flows are exchanged for future cash flows. It specifies when the future cash flows will be paid and the method for calculating them. Interest rates, exchange rates, or other market variables are often considered in determining cash flow. However, despite their similarities, forward contracts and swap agreements differ in that forward contracts typically exchange cash flows at only one future date, whereas swap agreements typically exchange cash flows at multiple future dates as well. Furthermore, the firm receives a fixed rate of foreign currency in addition to receiving a fixed rate of domestic currency and paying a fixed rate of foreign currency each year. In exchange for the specified amount of foreign currency, the firm exchanges the specified amount of domestic currency for the specified amount of foreign currency. Currency swaps may also be used to exchange floating interest rates between two currencies. Additionally, floating interest rates may be exchanged for fixed interest rates, and vice versa, by utilizing these instruments (Hull, 2014). Using the swaps tool has several advantages, including the fact that once a counterparty is identified, it can be completed relatively quickly, requires little maintenance, and does not require significant capital to operate (Beenhakker and Damanpour, 1995). Furthermore, it reduces company costs and fluctuations by leveraging one another's comparative advantages, which results in a reduction in company costs (Janabi, 2006). A comparative advantage exists between parties with different credit ratings, which results in interest rate swaps. There is a quality spread differential between short- and long-term credit markets because of the difference in interest rates.

Furthermore, companies may use swaps to borrow money in any market they wish, regardless of their credit rating. Furthermore, swaps allow companies to restructure their existing debt cost-effectively and straightforwardly. As an alternative to paying off an existing loan and obtaining a new loan, which is likely to incur additional costs, the company may be able to swap the current loan for one that meets the desired specifications as far as length, interest rate, and currency are concerned (Helliard, 2004). In addition to their advantages, swaps have some disadvantages. It is difficult to create an ideal swap transaction. Finding parties who agree on many factors can be challenging. Swaps fluctuate in value according to changes in interest rates, requiring dynamic hedging and a thorough understanding of the contract (Chorafas, 2008). Moreover, it is possible that since the last swap contracts were concluded, the market has changed negatively, resulting in less favorable conditions for the parties. It is more expensive to terminate a contract if one party wishes to than to terminate a future contract (Loeys, 1985). It is also important to note that, despite the simplicity of the swap method, discounting a future stream of cash flows can be challenging (Ho et al., 1998).

3.2.5 Cash pooling

Cash pooling can be used in two main ways: The first method is physical pooling, which involves regularly moving the balances of all accounts within it into a central account and out of it. A master account serves as the target account where surplus balances within the pool are swept or funds are transferred if debt must be paid. The master account is designated as the target account for all surplus balances within the pool. As opposed to physical pooling, nominal pooling does not involve any physical movement of cash. It involves concentrating the balances of accounts to maximize interest rates. Therefore, there is no need for a master account in this case since no physical transaction occurs (Wielen et al., 2006). Nevertheless, to obtain net interest, a master account is necessary if notional pooling is chosen by the company. Banks can either automatically pool the surpluses from specific company accounts into a central account at the end of each day or the firm's management may instruct the bank to do so by instructing the bank to make the necessary transfers (Graham and Coyle, 2000). As a result of cash pooling, several advantages are available. Most companies that utilize this method establish an entity that collects

and disburses funds through a single bank account. All excess funds are retained by the parent company and transferred to a pool by the subsidiaries. The parent company is only required to manage its required cash balances and transfer excess capital to its parent company. When various units require capital and are relatively independent of one another, centralized cash management at headquarters can provide equivalent levels of protection with fewer cash reserves. As a result of the constant flow of cash into the pool, the parent company may be able to borrow money less frequently because money is readily available as a result of the constant flow of cash. A corporation as a whole can invest the money brought into the pool by the parent company when it has excess money. This reduces interest expenses or increases investment income. A larger pool of funds makes it more likely for companies to acquire expertise in cash management. In addition, foreign currency cash balances can be centrally managed through pooling, which decreases the company's overall risk exposure (Shapiro, 1996). There are disadvantages to cash pooling in addition to its advantages. Local managers may experience motivational difficulties if they are given control over a subsidiary company's excess cash. The employee may not feel motivated to work as hard as they used to after receiving excess funds if they must transfer those funds to the parent company and are not trusted to manage the funds themselves after receiving excess funds. This will result in managers in the local market being unmotivated to take advantage of opportunities that might be unique to them (Shapiro, 1996).

3.2.6 Cross Hedging

A cross-hedge technique involves hedging exposure to one currency with futures contracts or other contracts on another currency that are correlated to the first currency. In the absence of underlying currencies, multinational companies may be able to substitute proxies or substitute substitutes if an underlying currency is not available. MNCs use cross-hedging to hedge their exposure if they cannot find forward contracts on a currency to which they are exposed (Kim and Kim, 2006). It may be necessary to utilize futures contracts on another currency that has a strong correlation to the interest currency to achieve cross-hedging due to certain circumstances that prevent the application of common hedging techniques to the first currency. While cross-hedging does not provide the best protection, it can

significantly reduce exposure (Shapiro, 2009). In addition, the firm develops a strategy that will be most effective when the currency pairs are highly correlated by identifying a currency that can be hedged and determining its correlation to a currency that cannot be hedged (Madura and Fox, 2007).

3.2.7 Money Market Hedging

As a money market hedge, a loan contract is established, and funds are provided for the execution of the contract to hedge exposure to transactions. The American company, for example, has an import due in 90 days that is payable in British pounds. The American company may hedge its transaction exposure by borrowing in dollars (loan contract), converting the proceeds into British pounds, purchasing a 90-day Treasury bill, and then paying the import bill with the proceeds of the Treasury bill. If the import bill is due, the British pounds may be purchased on the foreign exchange spot market. However, this approach entails a certain level of transaction risk. Money market hedges and forward market hedges are similar in that the price for a money market hedge is determined by differential interest rates, whereas the price for a forward market hedge is determined by the forward premium. The forward market approach incurs the same costs as the money market approach when the foreign exchange market and money market are in equilibrium (Kim and Kim, 2006). A money market hedge makes use of borrowing in the currency to which the company is exposed rather than using forwards or futures (Eiteman et al., 1986). It is important to note that money market hedges are accompanied by a contract and a source of funds in addition to the loan agreement. Money market (balance sheet) hedges are generally used to control translation risk; however, they can also be used to control transaction risk. For a company to achieve financial success, its net financial assets and its net financial liabilities should be exactly equal in each currency. (Yeager and Seitz, 1989). An important hedging tool for foreign exchange is the use of debt, a hedging tool similar to forward contracts in structure. Foreign exchange payments can be offset by companies borrowing in the currency to which they are exposed or investing in interest-bearing assets. In the case of a German company sending equipment to a company in Calgary, Canada, the exporter's treasurer purchased Canadian dollars forward as a safeguard against

the decline in the Canadian currency. A similar goal could also have been achieved by borrowing Canadian dollars, converting them into Euros on the spot market, and depositing the Euros in a two-month Euro deposit. In a money market hedge, the customer pays in Canadian dollars, uses the proceeds to repay the Canadian dollar debt, and uses the proceeds to secure the loan. The company could have achieved the same result by utilizing the borrowing market. As a result, the hedged cost is determined by the difference in interest rates paid in Canadian dollars versus interest rates earned in euros. A forward exchange premium represents the difference between the forward rate and the spot rate and thus equals the interest differential, which is equal to the forward exchange premium. A forward exchange premium equals the interest differential according to the interest rate parity theorem. Unless the company has a significant advantage in one of the two markets, money market hedges should be priced at the same level as forward and futures market hedges. In many cases, companies choose to use the money market as a means of hedge against currency risk since they will be required to borrow regardless, so their debts can be issued in the currency to which they are exposed. Taking a money market hedge for its own sake, as in the example above, results in a loss on the spread for the firm. The process is costly, so taking a forward hedge in this situation is probably more beneficial unless the company is required to borrow on an ongoing basis (Giddy, 2009).

CHAPTER 4:

OVERVIEW OF THE EMPIRICAL LITERATURE ON THE USE OF FOREIGN EXCHANGE MANAGEMENT TOOLS

In the preceding chapter, we explained the nature of foreign exchange risk in theory and strategies for managing foreign exchange risk. This chapter aims to provide a summary of the findings from a sample of 14 empirical studies conducted by other researchers focused on foreign exchange risk management, shedding light on their significance and implications for businesses operating in the global marketplace. Examining other scholars' research can provide us with valuable insights. First, it provides valuable insights into the benefits and limitations of foreign exchange risk management tools. Furthermore, it provides valuable insights into foreign exchange management practices. Finally, it provides organizations with guidance in making informed decisions regarding foreign exchange management.

Through the collection, analysis, and summary of empirical studies conducted by other researchers, this chapter seeks to gain a better understanding of the different perspectives regarding foreign exchange risk management tools and practices. To accomplish this, a sample of 14 empirical studies from different countries was selected. This list of studies was selected with the consideration that they provide adequate information regarding the tools and practices used to manage foreign exchange risk. Even though the empirical studies in our sample were conducted in different periods, the focus will be on more recent studies. More specifically, empirical studies of the sample were conducted in the following countries: one from the United States, two from Germany, two from France, two from the United Kingdom, one from Jordan, one from China, one from Japan, one from Norway, and two from India.

Jacque (1981) conducted a literature review study on foreign exchange risk management (FERM), which burgeoned during 1970–1980. Based on the study's findings, the following conclusions were drawn: First, the most important factor causing the need to develop exchange risk management tools and practices was the demise of the quasi-fixed exchange rate international monetary system that had

prevailed until March 1973 under the Bretton Woods agreement (1944–1971) and, later, under the Smithsonian agreement (1971–1973). In its place, a somewhat chaotic system of floating exchange rates has been substituted. As a consequence, multinational corporations have experienced an adverse effect on their foreign income streams as a result of increased volatility in currency prices. Additionally, the implementation of FASB Statement No. 8 has been controversial and inflexible. As a result, the apparent erratic pattern of earnings has been further exacerbated by eliminating the practice of reserving foreign exchange gains and losses and by requiring multinational corporations to disclose foreign exchange gains and losses periodically, even when there have been no cash flows.

Duangploy et al. (1997) examined the management of foreign exchange risk in US multinational enterprises. Taking a sample of 22 industrial companies located in 10 major cities in the west and southwest of the United States, these companies were selected because of their significant degree of international involvement. Based on the study's findings, the following conclusions were drawn: First, the majority of the companies in the sample reported that their foreign exchange risk management strategies focused on managing their day-to-day transaction exposure. Secondly, MNEs interviewed are willing to take measures to control their accounting exposures under certain circumstances, even when they are not actively managing them, as they closely monitor their accounting exposures. Despite being a paper adjustment, MNEs are still sensitive to debt/equity ratios and earnings per share, despite the translation adjustment being only a paper adjustment. Third, among the 21 MNEs interviewed, 17 used cash flow forecasts for managing their foreign exchange risks. The forecasts differed significantly in sophistication and time frame. They also manage their economic exposures, transaction risks, and translation risks. Foreign exchange risk management is typically managed either through operational or financial policies, or both at the same time. Finally, among the most commonly used innovative financial instruments, forward contracts have been the most widely used, followed by options. In addition to upfront costs, a lack of understanding of options is a hindrance to their utilization. The absence of FASB standards for innovative financial instruments has been raised as a concern.

Glaum (2002) examined the determinants of selective exchange risk management practices among German non-financial corporations. A questionnaire

study was conducted in late 1998 and early 1999, with 74 companies responding. Based on the study's findings, the following conclusions were drawn: First, a majority of large non-financial companies in Germany reported using derivative financial instruments. Although these companies employed many risk management strategies, most reported using selective hedging strategies, in which currency forecasts have a significant impact on hedging decisions. Moreover, approximately 11% of companies do not hedge their foreign exchange risks at all. Second, the most common instruments used by firms include foreign exchange forward contracts, interest rate swaps, currency swaps, caps and floors, forward rate agreements, and OTC currency options. Moreover, the risk management practices of companies utilizing derivatives differ significantly, with the majority using profit-oriented and forecast-based strategies for selective hedges. Finally, approximately twenty percent of firms reported that they had hedged all open positions immediately; 12% had a fixed policy of hedging a portion of their exposure (which remained unhedged) by using forward and/or option contracts. 54% of firms in this category implement selective hedging strategies. There is an estimate that one-third of firms in this category hedge a certain percentage of their exposures continuously, while the remaining half hedge or unhedged their exposures by their predicted exchange rates. Two-thirds of the firms had the option of leaving up to 100% of their positions unhedged at their discretion.

Glaum (2005) conducted an empirical study to examine the management practices of large non-financial corporations in Germany that deal with foreign exchange risks by taking a sample of 74 companies. Based on the study's findings, the following conclusions were drawn: First, the management of transaction exposure is a concern for firms. It is also notable that only a small minority of firms do not hedge foreign exchange risk at all, and that only a small minority of firms hedge their transaction exposure completely. Furthermore, the majority of firms have adopted an exchange rate-based hedge strategy. As a final point, more than half of the firms manage their exchange positions using micro-hedges instead of taking into account cash inflows and outflows as a way of determining the net exposure of the firm.

Albouy and Dupuy (2017) examined the use of derivatives by French non-financial firms to manage foreign exchange risks. A questionnaire study was

conducted using two e-mail surveys (the first sent in 2010 received 211 responses, and the second sent in 2015 received 152). In addition, 48 firms were interviewed individually in 2012. Based on the study's findings, the following conclusions were drawn: First, based on the questionnaires used in the two surveys and interviews, no significant differences were detected between the three samples. Second, French companies hedge more effectively than their foreign counterparts. In addition, smaller companies tend to hedge more selectively than larger ones. In addition, a highly indebted company tends to hedge more selectively, with other financial factors not playing a significant role. Moreover, firms of all sizes experience high hedge costs owing to their inability to effectively assess the risks they are hedging against. Furthermore, there are many derivative instruments available on the financial markets for FX management, including simple forwards, swaps, and futures, as well as over-the-counter options and exchange-traded derivatives that are highly sophisticated. However, French firms tend to prefer simpler derivatives instruments, as OTC currency forwards represent the most critical instruments that they use for risk management. Finally, a point that is worth mentioning is that while smaller firms tend to hedge less than the larger ones around the world, there is a small difference in hedge ratios between the two groups in France.

Clark and Mefteh (2010) examined whether the use of foreign currency derivatives is associated with firm value. Furthermore, the firms' exposure profile impacts the relationship between derivatives use and firm value. A sample of 176 large, non-financial French firms was examined using annual reports and financial information for the fiscal year 2004. Based on the study's findings, the following conclusions were drawn: First, derivative use in French firms is a significant predictor of firm value, particularly among the largest firms. In addition, the impact of derivative use is sensitive to the firm's exposure profile. It is also important to note that the value effect of derivative use is 1.5 times greater and more significant for larger firms compared with smaller firms, where it does not exist at any conventional level. Finally, depreciation-experienced firms exhibit a significant value effect, almost six times greater than firms experiencing euro appreciation. Based on the results, it is evident that FC derivatives are more effective at creating value during periods of depreciation than other derivatives.

Bradley and Moles (2002) investigated the extent to which large, publicly-held firms in the UK apply strategic approaches to the management of exchange rate risks, but it also indicates considerable differences between companies and industry sectors regarding the application of operational techniques. A questionnaire study was conducted using surveys. Based on the study's findings, the following conclusions were drawn: First, a significant portion of UK firms are willing to manage long-term exchange rate exposures using operational and strategic techniques. Second, a firm's sales volume, profit margins, and input costs are likely to be more sensitive to exchange rate fluctuations as a result of operational hedging techniques. In addition, foreign exchange rate management falls within the realm of financial functions, suggesting a preference for the hybrid financial/operating technique of foreign currency-denominated debt. However, when it comes to determining operational strategies, companies consider exchange rate effects, including marketing, production, and purchasing. Finally, although UK firms use a variety of hedging methods, they do report that significant barriers exist to a fully flexible approach to business operations.

Zhou and Wang (2013) examined the impact of derivatives used by large UK non-financial firms in managing foreign exchange risk, as well as the relevance of FRS 13. A questionnaire study was conducted using surveys. Based on the study's findings, the following conclusions were drawn: First, it was demonstrated that UK non-financial firms use financial derivatives to hedge foreign exchange exposure associated with their international business activities — foreign sales and imports — thereby reducing foreign exchange exposures. Second, FRS 13 is value-relevant in that it provides important information regarding the derivatives that firms use, which investors respond positively to, resulting in firms reducing their capital costs and increasing their value. Moreover, the number of firms that are positively exposed to foreign exchange is substantially smaller, indicating that imports dominate the non-financial sector in general. A firm's positive exposure is positively proportional to foreign sales. However, if there is no relevant information, imports are assumed to have increased their negative exposure, thus implying that foreign sales contributed to the firms' negative exposure. Finally, larger firms are more likely to face foreign exchange risk as well as underhedge their foreign currency positions when precise hedging is not feasible. Foreign exchange

derivatives have been shown to reduce firms' foreign exchange exposures, regardless of whether those exposures are positive or negative, as evidenced by research.

Al-Momani and Gharaibeh (2008) conducted an in-depth analysis of foreign exchange risk management practices by Jordanian non-financial firms. By taking a sample of 73 non-financial companies listed as major taxpayers by Jordan's Income and Sales Tax Department, based on the study's findings, the following conclusions were drawn: First, approximately 66% of companies manage foreign exchange risk. Second, Jordanian companies do not use more sophisticated hedging techniques, such as financial derivatives, and rely primarily on natural hedging measures. In addition, the study indicates that hedge operations require a significant amount of resources, which is costly and risky because managers and other staff members do not possess sufficient knowledge of these techniques. Additionally, there was a significant correlation between a company's various sectors and its hedging strategies, with manufacturing firms showing a more positive attitude toward hedging strategies. A significant relationship was also found between a firm's legal structure and its management of economic exposure. Fifth, hedge techniques were positively correlated with a firm's international level of involvement and management practices. In contrast, firm size was negatively correlated with management practices. Finally, large companies may engage in long-term contracts that are based on the volatility of foreign exchange rates.

Luo and Wang (2018) examined the relationship between foreign currency derivatives and corporate value to hedge currency risk among Chinese companies. By examining quarterly data from 2000 to 2013 for nearly 70,000 firm-quarters. Based on the study's findings, the following conclusions were drawn: First, Chinese firms that reduce their foreign exchange exposure through hedge practices with derivatives tend to be more valuable than those that do not. Second, firms that are more profitable and have better investment opportunities are more likely to experience these adverse effects. Third, when the exchange rate depreciates and the economy is booming, the use of foreign currency derivatives has a greater impact on the firm's value. Fourth, the relationship between the use of derivatives and firm value, however, weakens during crisis periods. Fifth, there are a variety of factors that influence the value-enhancing effect of a firm, including its characteristics and

macroeconomic conditions. Also, small firms are found to achieve higher value-enhancing premiums than large corporations. Finally, by hedging foreign exchange risk with currency derivatives, companies with higher profits and greater investment opportunities gain a greater benefit. In addition, when exchange rates depreciate or the economy expands, the value enhancement effect is prominent.

Ito et al. (2016) examined Japanese firms' exchange rate exposure and exchange rate risk management impact. A questionnaire survey was sent to all Tokyo Stock Exchange-listed companies in 2009. Based on the study's findings, the following conclusions were drawn: First, exchange rate exposure varies widely across industries, and Japanese manufacturing industries are highly exposed to exchange rates. Second, firms that are more dependent on foreign sales are more likely to be exposed to foreign exchange risk. Third, the greater the amount of US dollars in the invoice, the greater the exposure to foreign exchange, which can be reduced both through financial hedging and operational hedging measures. As a final point, Japanese companies implement operational and financial hedging strategies, as well as price revision policies, based on the currency for which they issue invoices. Japanese exporters must promote yen invoicing to effectively manage exchange risk.

Davies et al. (2006) investigated the determinants of Norwegian exporters' foreign exchange (FX) hedging decisions. Using a sample of 81 companies that are listed either on the Oslo Stock Exchange's main index (HOV) or small index (SMB), representing 76% of Kompass Norge AS' classification as exporters. Based on the study's findings, the following conclusions were drawn: First, among the 81 exporters surveyed, 70% hedge their foreign exchange rate risk using one or more of the hedging instruments—internal or external. Second, the most frequently utilized internal and external techniques were matching/netting and currency forward contracts. Norwegian exporting firms use external instruments more frequently than internal instruments, and currency futures are the only derivative not commonly used by Norwegian exporting firms. Third, the largest companies listed on HOV hedge more extensively (79%) than the smaller companies listed on SMB (57%). Among the most extensively used hedging techniques within and outside the company are matching/netting and currency forwards (53% and 38%, respectively). Fourth, Norwegian exporters hedge their foreign exchange exposure through

internal and external instruments. Exporters exhibit a higher market-to-book ratio as an indicator of promising growth opportunities compared to non-hedging exporters. Fifth, evidence regarding the relationship between firm characteristics and hedge decisions has not been demonstrated to be consistent for internal and external hedgers, nor for individual hedge instruments. Finally, Norwegian firms do not support the hypothesis that avoiding financial distress and using external capital markets is a significant determinant of hedge decisions.

Basanna and Vittala (2019) examined various foreign exchange risk management techniques used in the Indian pharmaceutical industry and their effects on exchange gains and losses. By using a sample of 10 Indian pharmaceutical industries, based on the study's findings, the following conclusions were drawn: First, the 10 sample companies denominate their transactions in 13 currencies in total. Second, there are two common currencies among all 10 companies, namely USD and EUR, and seven companies are using GBP. Thus, USD and EUR are overwhelmingly used in the forex market, while other currencies are relatively insignificant. Third, all ten companies selected for the study utilized forward contracts as a method of mitigating foreign exchange risk. In contrast, only three companies (Cadila, Dr Reddy, and Sun Pharma) utilized currency swaps, two companies (Dr Reddy and Sun Pharma) utilized option contracts, and none of the pharmaceutical companies used future contracts. Fourth, all selected companies were exposed to foreign exchange, regardless of their size. Fifth, currency derivatives and multi-currency invoicing are not effective at reducing foreign exchange losses significantly. As a final note, currency derivatives affect net exposure, exchange gains and losses, and the number of currencies used in international transactions.

Vij (2009) examined the foreign exchange exposure management practices of Indian firms. A survey study of 11 questions was conducted by mail in 2008 among 250 chief financial officers of Indian companies. 98 respondents answered the survey. Based on the study's findings, the following conclusions were drawn: First, a majority of the companies (65%) agreed that netting, leading, and lagging techniques were completely or substantially relevant in the current economic climate. Second, hedge techniques were employed by the responding companies as follows: short-dated forward exchange contracts (48%), long-dated forward

exchange contracts (40%), swaps (30%), currency options (19%), currency futures (6%), money market hedges (4%), inter-company net netting (3%), leading and lagging (2%), and matching systems (1%). Third, since there is uncertainty regarding currency exposure over a long period, some companies may view these contracts as speculation and may not consider them to be attractive. Fourth, the majority of the companies surveyed have a clear understanding of translation, transaction, and economic exposure. Only 13% of companies are completely protected from all three types of exposure, while 50% are substantially protected. Approximately 15 percent of firms indicated that they hedged against both translation and economic exposure. However, 64% of firms covered themselves substantially or partially. As little as 20% of firms do not hedge their foreign exchange exposure. Finally, companies place a great deal of importance on hedging their foreign exchange exposure and are aware that hedging is fundamental to their long-term survival.

Table 4.1: A summary of the empirical studies of the sample.

Study	Type of firm	Summary of procedures and tools used in managing exchange rate risk
(Jacque, 1981)	Globally, all types of firms	Increasing the use and development of exchange risk management tools and practices of all types. As a result of replacing the quasi-fixed exchange rate international monetary system with the chaotic floating exchange rate system.
(Duangploy et al., 1997)	US Multinational Enterprises	The majority of US companies manage their transaction exposure on a day-to-day basis. Additionally, US MNEs managed their economic and translation risks. According to the results, forward contracts have been the most widely used innovative financial instruments, followed by options.
(Glaum, 2002)	Non-financial German corporations	In Germany, 89% of large non-financial companies reported using derivative financial instruments for hedging purposes. Among the most commonly used instruments are forward contracts, interest rate swaps, currency swaps, caps and floors, forward rate agreements, and OTC currency options.
(Glaum, 2005)	Non-financial German corporations	There has been an increase in the use of selective hedge strategies by German non-financial companies based on forecasts of exchange rates. In addition, more than half of the firms manage their exchange positions using micro-hedges rather than taking into account cash inflows and outflows to determine their net exposure.
(Albouy and Dupuy, 2017)	Non-financial French firms	French corporations are more effective at hedging than their foreign counterparts. In terms of risk management, French firms tend to prefer simpler derivative instruments, such as OTC currency forwards, as these constitute the most critical instruments. Furthermore, there is a slight difference in hedge ratios between small and large companies in France.
(Clark and Mefteh, 2010)	Non-financial French firms	The use of derivatives in French firms is a significant predictor of firm value, particularly among the largest firms. Furthermore, there is a 1.5 times greater value effect of derivative use in larger firms as compared to smaller firms.
(Bradley and Moles, 2002)	Large UK public companies	A significant proportion of UK firms are willing to implement operational and strategic approaches to managing long-term exchange rate exposures. Regardless of the use of different hedging methods by UK firms, they report that significant barriers remain to fully implement a flexible business model.

Table 4.1: Continued - A summary of the empirical studies of the sample.

(Zhou and Wang, 2013)	Large non-financial UK companies	UK non-financial firms have been shown to reduce their foreign exchange exposure through the use of foreign exchange derivatives, regardless of whether the exposure is positive or negative. In addition, as FRS 13 discloses important information about the derivatives used by firms, investors are likely to respond positively.
(Al-Momani and Gharaibeh, 2008)	Non-financial Jordanian firms	Non-financial Jordanian firms rely primarily on natural hedge techniques rather than more sophisticated hedge schemes, such as financial derivatives. In addition, there was a positive correlation between international involvement and risk management practices as well as hedge techniques. However, there was a negative correlation between firm size and risk management practices.
(Luo and Wang, 2018)	Chinese companies	The use of foreign currency derivatives has a greater impact on the firm's value when the exchange rate depreciates and when the economy is on a roll. However, it weakens during times of economic crisis. Additionally, small firms can achieve higher value-enhancing premiums than large firms.
(Ito et al., 2016)	Japanese firms	Japanese companies engage in operational and financial hedging strategies and price revision policies depending on the currencies in which they issue invoices. Furthermore, Japanese exporters need to promote yen invoicing, as it contributes to their ability to manage exchange risk more effectively.
(Davies et al., 2006)	Norwegian firms	Matching/netting and currency forwards are the most widely used hedging techniques within and outside of the company (53% and 38%, respectively). Moreover, the largest companies listed on HOV hedge more extensively than the smaller companies listed on SMB.
(Basanna and Vittala, 2019)	India's pharmaceutical industry	Among the ten companies studied, all used forward contracts to reduce foreign exchange risk. In contrast, only three used currency swaps, two used option contracts, and none of the pharmaceutical companies used futures contracts as a method of mitigating foreign exchange risk.
(Vij, 2009)	Indian Firms	The majority of respondents (65%) agree that netting, leading, and lagging techniques are completely or substantially applicable. In addition, hedge techniques were employed by the responding companies as follows: short-dated forward exchange contracts (48%), long-dated forward exchange contracts (40%), swaps (30%), currency options (19%), currency futures (6%), money market hedges (4%), inter-company net netting (3%), leading and lagging (2%), and matching systems (1%).

Based on Table 4.1, the following key conclusions can be drawn: First, since the implementation of the chaotic floating exchange rate system in 1973, the majority of companies that have an international business tend to use tools and practices for managing foreign exchange risks. Second, observations have shown that large companies tend to use more complex and varied tools and practices to manage foreign exchange risk, while small companies tend to use simple tools and practices. Third, studies indicate that the three most commonly used internal tools are matching, netting, and leading and lagging, while the three most widely used external tools are forward contracts, options contracts, and currency swaps. Fourth, studies indicate that the practices and tools used in foreign exchange risk management by companies are different according to their country of origin. Fifth, observations have shown that many companies prefer selective hedging strategies, where currency forecasts significantly impact hedging decisions. Finally, besides tools and practices, it has been demonstrated that the knowledge and experience of managers and other staff members involved in foreign exchange risk management are crucial to curbing risk.

CHAPTER 5:

AN EMPIRICAL STUDY OF THE FOREIGN EXCHANGE RISK MANAGEMENT TOOLS EMPLOYED BY UK, FRENCH, AND GERMAN MULTINATIONAL COMPANIES

The preceding chapter provided an overview of the empirical literature on using foreign exchange management tools and practices carried out by other researchers for a better understanding of companies' strategies to manage foreign exchange risks. Further, this chapter will present an empirical study of foreign exchange risk management tools used by small, medium, and large companies in the United Kingdom, France, and Germany.

The use of foreign exchange rate risk management tools is becoming increasingly popular in the business world as a way of reducing the adverse effects of foreign exchange rate fluctuations. These tools can be used to help companies protect themselves from losses due to exchange rate movements as well as take advantage of potential gains. Given the highly volatile nature of foreign exchange rates, organizations must be well-equipped with the necessary resources and strategies to manage the associated risks. The use of foreign exchange rate risk management tools in practice is a critical issue for any organization operating in an international context.

The following section outlines the research methodology, the data, the sample, and the data analysis.

1. The research methodology and data

The study aims to identify, comprehend, and detect the various risk management tools companies utilize to protect themselves against foreign exchange fluctuations. Then, all these tools will be compared to determine the most commonly used tools and practices used by companies based on their size and country of origin. In addition, exploring the correlation between the use of foreign

exchange risk management tools and the size as well as the country of origin of the companies

To achieve the objectives, the first step will be to use averages to determine the most commonly used foreign exchange risk management tools by companies. Secondly, we will conduct a regression analysis to analyze the data to determine the regression relationship for various foreign exchange rate management tools regarding the size of the company and the country of origin of the company.

The sample was selected based on several criteria, including the size of the company, its public listing on the foreign exchange market, and its involvement in significant foreign exchange transactions. Based on the study's sample, data was gathered from companies located in the United Kingdom, France, and Germany. To provide a more comprehensive picture of the foreign exchange risk management processes. Furthermore, the companies in the sample are of three sizes (small, medium, and large) to obtain a more accurate picture of foreign exchange risk management. In the selection process, the reports of a large number of multinational companies were reviewed and examined. Consequently, a sample of 27 multinational companies that provided sufficient information regarding foreign exchange rate risk management was selected.

The sample consisted of the following: Eight companies were from France, four of which were large, three medium, and one small. There were nine companies from Germany, consisting of four large, three medium, and two small. In addition, there were ten companies in the United Kingdom: four large, three medium, and three small. The companies selected were listed on the Frankfurt Stock Exchange, Euronext Paris, or the London Stock Exchange. In addition, our empirical study excluded micro-sized companies due to the limited information and data provided by the companies.

Using Table 5.1, we selected companies based on their size for our sample:

Table 5.1: Enterprise category (Anon., 2023)

Enterprise category	Headcount	Turnover or Balance sheet total	
Medium-sized	< 250	≤ 50 million euro	≤ 43 million euro
Small	< 50	≤ 10 million euro	≤ 10 million euro
Micro	< 10	≤ 2 million euro	≤ 2 million euro

We collected data and information from financial statements, annual reports, and financial institutions for the selected companies. Afterward, the data was categorized based on the common characteristics of the companies, such as their industry, size, type of risk, and tools used.

For evaluating the relative use of various tools, we assigned a value to the use of each tool by companies in their foreign exchange hedging process. Additionally, we rated the degree of use of a hedging tool by giving values 0 to 4 to show zero to high levels of use. The methodology applied is described in Table 5.2.

Table 5.2: Methodology for assigning value.

Tool usage level (tool importance level)	The value of the tool
Extreme-used tool (extreme importance)	= 4
High-used tool (high importance)	= 3
Medium-used tool (moderate importance)	= 2
Low-used tool (low importance)	= 1
Unused tool	= 0 or -

The methodology was as follows:

- A) In case the company classifies the used tools by reporting the amount of derivative products in its annual report. We followed its classification as follows: If the company reports the use of only one foreign exchange risk management tool, the value "4" is assigned to it. Furthermore, if the company reports the use of two tools, then the tool with the higher

reported amount will be assigned the value "4" and the tool with the lower amount will be assigned the value "3". Moreover, in the case that a company relies on three or more tools, the value will be assigned according to the order of the amount (from high (4) to low (1)).

- B) In case the company classifies the used tools by stating the relative frequency of the use of derivative products in its annual report rather than by reporting the amount. We followed its classification as follows: If the company reports the use of only one foreign exchange risk management tool, the value "4" is assigned to it. Furthermore, if the company reports the use of two tools, then if it is stated that a specific tool is mainly used, it will be assigned a value of "4", and if the second tool is used less frequently, it will be assigned a value of "3". Moreover, in the case that a company relies on three or four tools, the value will be assigned according to the stated order of frequency (from always (4) to rarely (1)).
- C) In case the company doesn't mention the amount of derivative tools used or doesn't state the relative frequency of the use of derivative products in its annual report, it means that the company uses all derivative products at the same level of importance. We followed its classification as follows: If the company reports the use of only one foreign exchange risk management tool, the value "4" is assigned to it. In addition, if the company relies on two tools, then both tools will be assigned the value "3". Moreover, if the company relies on three tools, then the three tools will be assigned the value "2". If the company relies on four tools, then the four tools will be assigned the value "1".

Among the information and data used in the analysis were the following: the names of the companies, their location, their industry, their number of full-time employees, and the tools employed to minimize foreign exchange risk. Furthermore, it is crucial to note that the data used to generate Tables 5.3 and 5.4 was taken from the annual reports of companies for 2022. In addition, the tools were employed by the group during that period. Further, among the 27 companies in our sample, six are small, nine are medium-sized, and twelve are large. They were from France, Germany, and the United Kingdom.

Table 5.3: Detailed information about the sample companies

NO.	COMPANIES NAME	COUNTRY OF ORIGIN	INDUSTRY	NO. OF EMPLOYEES	SIZE
1	Aelis Farma SA	France	Biotechnology	22	Small
2	Epigenomics AG	Germany	Diagnostics & Research	26	Small
3	Deutsche Rohstoff AG	Germany	Oil & Gas E&P	28	Small
4	Wentworth Resources plc	UK	Oil & Gas E&P	16	Small
5	Nanoco Group plc	UK	Semiconductor Equipment & Materials	46	Small
6	Pharos Energy plc	UK	Oil & Gas E&P	36	Small
7	AFYREN SA	France	Specialty Chemicals	103	Medium
8	Malteries Franco Belges SA	France	Beverages—Brewers	106	Medium
9	Gaumont SA	France	Entertainment	231	Medium
10	Cliq Digital AG	Germany	Entertainment	143	Medium
11	Dierig Holding AG	Germany	Textile Manufacturing	145	Medium
12	Delticom AG	Germany	Auto Parts	178	Medium
13	Warpaint London PLC	UK	Household & Personal Products	125	Medium
14	Polar Capital Holdings plc	UK	Asset Management	191	Medium
15	3i Group plc	UK	Corporate finance	241	Medium
16	Soitec SA	France	Semiconductor Equipment & Materials	1,986	Large
17	Kering SA	France	Luxury Goods	47,227	Large
18	Schneider Electric S.E	France	Specialty Industrial Machinery	135,000	Large
19	Vinci SA	France	Engineering & Construction	265,303	Large
20	Aurubis AG	Germany	Metal Fabrication	6,982	Large
21	Sartorius AG	Germany	Medical Instruments & Supplies	15,048	Large
22	Beiersdorf AG	Germany	Household & Personal Products	21,401	Large
23	Bayer Aktiengesellschaft	Germany	Drug Manufacturers	101,735	Large
24	DS Smith Plc	UK	Packaging & Containers	29,519	Large
25	Frasers Group plc	UK	Specialty Retail	30,000	Large
26	AstraZeneca PLC	UK	Drug Manufacturers	83,500	Large
27	Tesco PLC	UK	Grocery Stores	330,000	Large

It is essential to assign a value to the information and data before moving on to perform statistical analysis. The following values were assigned according to the size of the companies: Small "1", Medium "2", and Large "3". As for the country of origin of the companies, values were given according to population and GDP from small to large, as follows: UK "1", France "2", and Germany "3". As shown in Table 5.4, sample data is presented, including values that were assigned to the size and the country of origin, as well as tools that were used to limit foreign exchange risk.

Table 5.4: Information and tools that are actively used by the sample companies for statistical purposes

NO.	SIZE OF COMPANIES	COUNTRY OF ORIGIN OF COMPANIES	THE TOOLS THAT BEEN USED TO LIMITATION OF THE RISK						
			MATCHING CURRENCY	NETTING	FORWARD CONTRACTS	FUTURES CONTRACTS	OPTIONS CONTRACTS	CROSS-CURRENCY SWAPS	MONEY MARKET HEDGING
1	1	2	3	0	0	0	4	0	0
2	1	3	0	4	3	0	0	0	0
3	1	3	0	4	2	3	0	0	0
4	1	1	0	3	0	0	0	0	4
5	1	1	0	4	0	0	0	0	0
6	1	1	0	4	0	0	0	0	3
7	2	2	0	3	0	0	0	0	4
8	2	2	0	0	4	0	3	0	2
9	2	2	0	2	3	0	4	0	0
10	2	3	0	3	4	0	0	0	0
11	2	3	0	0	4	0	0	0	0
12	2	3	0	3	4	0	0	0	0
13	2	1	0	2	3	0	4	0	0
14	2	1	0	0	4	0	0	0	0
15	2	1	4	0	3	0	0	0	0
16	3	2	0	0	4	0	3	0	0
17	3	2	1	0	4	0	2	3	0
18	3	2	0	3	4	0	0	0	2
19	3	2	0	4	2	0	0	3	0
20	3	3	4	0	3	2	1	0	0
21	3	3	3	0	4	0	0	0	0
22	3	3	4	0	3	0	0	0	0
23	3	3	4	0	3	0	2	1	0
24	3	1	1	0	2	0	0	3	4
25	3	1	1	0	4	0	3	2	0
26	3	1	0	0	2	0	0	4	3
27	3	1	2	0	3	0	0	4	0

2. Descriptive statistics

To determine which foreign exchange risk management tools are most commonly used by sample companies according to their size and country of origin, an average was calculated as shown in Tables 5.5 and 5.6:

Table 5.5: The average use of various hedge tools, according to the size of the sample firms.

	Matching currency	Netting	Forward Contracts	Futures Contracts	Options Contracts	cross- currency swaps	Money Market Hedging
Small	0.50	3.17	0.83	0.50	0.67	0.00	1.17
Medium	0.44	1.44	3.22	0.00	1.22	0.00	0.67
Large	1.67	0.58	3.17	0.17	0.92	1.67	0.75

Table 5.5 shows the relative average use of various hedge tools by the selected firms, according to their size. The key conclusion resulting from the table is that firms with different sizes show significant differences in their choice of hedge tools. In particular, large firms rely more heavily on forward, matching currency, and cross-currency swaps compared to other firms. Medium firms rely more heavily on options relative to other firms, but they also show high use of forward contracts and netting. Small firms rely mostly on netting, but they also show higher use of futures and money market hedges relative to the rest.

Table 5.6: The average use of various hedge tools, according to the countries of origin of the sample firms.

	Matching currency	Netting	Forward Contracts	Futures Contracts	Options Contracts	cross- currency swaps	Money Market Hedging
United Kingdom	0.80	1.30	2.10	0.00	0.70	1.30	1.40
France	0.50	1.50	2.63	0.00	2.00	0.75	1.00
Germany	1.67	1.56	3.33	0.56	0.33	0.11	0.00

Table 5.6 shows the relative average use of various hedge tools by the selected firms, according to their country of origin. The key conclusion resulting from the table is that firms from different countries show significant differences in their choice of hedge tools. In particular, German firms rely more heavily on matching currencies, forwards, and futures contracts compared to other firms. French firms rely more heavily on options relative to other firms, but they also show high use of forward contracts and netting. UK firms rely mostly on forward

contracts, but they also show higher use of swaps and money market hedges relative to the rest.

3. Empirical investigation of the impact of firm size and country of origin on the degree of the use of foreign exchange rate management instruments.

In the sections that follow, we attempt to statistically evaluate the impact of firms' size and firms' country of origin on the use of each separate hedging tool examined. For this purpose, we used dummy variables to capture firms' size and firms' country of origin. The empirical model used for this purpose is described by equation 1 below:

$$Y = a + b_1X_1 + b_2X_2 + u \quad (1)$$

Y= The degree of the use of various foreign exchange rate management tools (which is the dependent variable).

X1= The size of the company, which is represented by a dummy variable, takes the values of 1, 2, and 3, in the case of small, medium, and large companies respectively, as shown in Table 5.4.

X2=The country of origin of the company, which is represented by a dummy variable, takes the values of 1, 2, and 3, in the case of the UK, France, and Germany respectively.

a= The intercept.

bi= Beta coefficients, denoting the slope of the explanatory variables.

u=The regression residual term.

NOTE: It is important to mention that there are alternative estimation methodologies, such as ordinary least squares (OLS), that could be applied to determine the extent to which impact firm size and country of origin have on the degree of the use of foreign exchange rate management instruments. However, the purpose of this study is to determine if there is an impact of firm size and country of origin on the degree of use of foreign exchange rate risk management instruments. To determine whether the impact of firm size and country of origin is considered to

be a significant or insignificant determinant of the use of various foreign exchange rate risk management tools.

3.1 The use of the matching currency tool

Firstly, we will examine the impact of the size and the country of origin of the companies on the use of the matching currency tool by estimating equation (1) using OLS estimation and the data shown in Table 5.4. The estimation results are shown in Table 5.7. According to the results, the R-square of the regression is 0.161, which indicates that 16.1% of the variation in usage of the matching currency tool can be explained by the size and the country of origin variables. By looking at the estimated slope coefficients, we may conclude that the dummy "country" does not show any statistical significance (p value = 0.272). On the other hand, the size shows some (weak) significance since it is statistically significant; although rejected at the 5% level, it cannot be rejected at the 10% level (i.e., p = 0.093). The coefficient of the dummy "size" is positive, suggesting that the use of the matching currency tool increases with firm size.

Table 5.7: Regression output for the use of the matching currency tool.

<i>Regression Statistics</i>		<i>Standard</i>				
		<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	
Multiple R	0.402	Intercept	-1.153	1.046	-1.102	0.281
R Square	0.161	D Size	0.632	0.361	1.749	0.093
Adjusted R Square	0.091	D Country	0.381	0.339	1.125	0.272
F	2.308					
Significance F	0.121					

3.2 The use of the netting tool

Secondly, we will examine the impact of the size and the country of origin of the companies on the use of the netting tool by estimating equation (1) using OLS estimation and the data shown in Table 5.4. The estimation results are shown in Table 5.8. According to the results, the R-square of the regression is 0.345, which indicates that 34.5% of the variation in usage of the netting tool can be explained by the size and the country of origin variables. Additionally, the resulting F statistic shows the overall significance of the model at a 5% level (F stat, p-value = 0.006). By looking at the estimated slope coefficients, we may conclude that the dummy

"country" does not show any statistical significance ($p = 0.535$). On the other hand, the size shows statistical significance at the 5% level (i.e., $p = 0.002$). The coefficient of the dummy "size" is negative, suggesting that the use of the netting tool decreases as the firm size increases.

Table 5.8: Regression output for the use of the netting currency tool.

<i>Regression Statistics</i>		<i>Standard</i>				
		<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	
Multiple R	0.587	Intercept	3.822	1.028	3.719	0.001
R Square	0.345	D Size	-1.255	0.355	-3.535	0.002
Adjusted R Square	0.291	D Country	0.210	0.333	0.630	0.535
F	6.323					
Significance F	0.006					

3.3 The use of the forward contract tool

Thirdly, we will examine the impact of the size and the country of origin of the companies on the use of the forward contract tool by estimating equation (1) using OLS estimation and the data shown in Table 5.4. The estimation results are shown in Table 5.9. According to the results, the R-square of the regression is 0.412, which indicates that 41.2% of the variation in usage of the forward contract tool can be explained by the size and the country of origin variables. Additionally, the resulting F statistic shows the overall significance of the model at a 5% level (F stat, p -value = 0.002). By looking at the estimated slope coefficients, we may conclude that the dummy "country" does show some (weak) significance since it is statistically significant; although rejected at the 5% level, it cannot be rejected at the 10% level (i.e., $p = 0.052$). On the other hand, the size shows statistical significance at the 5% level (i.e., $p = 0.002$). The coefficient of the dummy "size" is positive, suggesting that the use of the forward contract tool increases with firm size.

Table 5.9: Regression output for the use of the forward contract tool.

<i>Regression Statistics</i>		<i>Standard</i>				
		<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	
Multiple R	0.642	Intercept	-0.594	0.832	-0.714	0.482
R Square	0.412	D Size	0.980	0.288	3.407	0.002
Adjusted R Square	0.363	D Country	0.552	0.270	2.048	0.052
F	8.421					
Significance F	0.002					

3.4 The use of the Futures Contract tool

Fourthly, we will examine the impact of the size and the country of origin of the companies on the use of the futures contracts tool by estimating equation (1) using OLS estimation and the data shown in Table 5.4. The estimation results are shown in Table 5.10. According to the results, the R-square of the regression is 0.147, which indicates that 14.7% of the variation in usage of the futures contract tool can be explained by the size and the country of origin variables. By looking at the estimated slope coefficients, we may conclude that the dummy "country" does show some (weak) significance since it is statistically significant and, although rejected at the 5% level, it cannot be rejected at the 10% level (i.e., $p = 0.073$). On the other hand, the size shows statistical insignificance (i.e., $p = 0.368$). The coefficient of the dummy "size" is negative, suggesting that the use of the futures contract tool decreases as firm size increases.

Table 5.10: Regression output for the use of the futures Contract tool.

<i>Regression Statistics</i>		<i>Standard</i>				
		<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	
Multiple R	0.384	Intercept	-0.043	0.465	-0.092	0.928
R Square	0.147	D Size	-0.147	0.161	-0.917	0.368
Adjusted R Square	0.076	D Country	0.283	0.151	1.877	0.073
F	2.073					
Significance F	0.148					

3.5 The use of the options contract tool

Fifth, we will examine the impact of the size and the country of origin of the companies on the use of the options contracts tool by estimating equation (1) using OLS estimation and the data shown in Table 5.4. The estimation results are shown in Table 5.11. The analysis showed that the model intercept for the dummy "size" and the dummy "country" is insignificant. This means there is no relationship between the use of the options contracts tool and the dummy variables examined.

Table 5.11: Regression output for the use of the options Contract tool.

<i>Regression Statistics</i>		<i>Standard</i>				
		<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	
Multiple R	0.102	Intercept	1.098	1.108	0.991	0.332
R Square	0.010	D Size	0.085	0.383	0.223	0.825
Adjusted R Square	-0.072	D Country	-0.166	0.359	-0.462	0.649
F	0.125					
Significance F	0.883					

3.6 The use of the cross-currency swap tool

Sixth, we will examine the impact of the size and the country of origin of the companies on the use of the cross-currency swap tool by estimating equation (1) using OLS estimation and the data shown in Table 5.4. The estimation results are shown in Table 5.12. According to the results, the R-square of the regression is 0.461, which indicates that 46.1% of the variation in usage of the cross-currency swap tool can be explained by the size and the country of origin variables. Additionally, the resulting F statistic shows the overall significance of the model at a 5% level (F stat, p-value = 0.001). By looking at the estimated slope coefficients, we may conclude that the dummy "size" shows statistical significance at the 5% level (i.e., $p = 0.001$). Also, the dummy "country" shows statistical significance at the 5% level (i.e., $p = 0.012$). The coefficient of the dummy "size" is positive, suggesting that the use of the cross-currency swap tool increases with firm size.

Table 5.12: Regression output for the use of the cross-currency swap tool.

<i>Regression Statistics</i>		<i>Standard</i>				
		<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	
Multiple R	0.679	Intercept	-0.151	0.747	-0.202	0.842
R Square	0.461	D Size	0.982	0.258	3.803	0.001
Adjusted R Square	0.416	D Country	-0.657	0.242	-2.715	0.012
F	10.256					
Significance F	0.001					

3.7 The use of the money market hedging tool

Seventh, we will examine the impact of the size and the country of origin of the companies on the use of the money market hedging tool by estimating equation (1) using OLS estimation and the data shown in Table 5.4. The estimation results

are shown in Table 5.13. According to the results, the R-square of the regression is 0.168, which indicates that 16.8% of the variation in usage of the money market hedging tool can be explained by the size and the country of origin variables. By looking at the estimated slope coefficients, we may conclude that the dummy "country" does show significance since it is statistically significant at the 5% level (i.e., $p = 0.043$). On the other hand, the size shows statistical insignificance (i.e., $p = 0.723$). The coefficient of the dummy "size" is negative, suggesting that the use of money market hedging tools decreases as firm size increases.

Table 5.13: Regression output for the use of the money market hedging tool.

<i>Regression Statistics</i>		<i>Standard</i>				
		<i>Coefficients</i>	<i>Error</i>	<i>t Stat</i>	<i>P-value</i>	
Multiple R	0.410	Intercept	2.437	0.991	2.460	0.021
R Square	0.168	D Size	-0.123	0.342	-0.359	0.723
Adjusted R Square	0.099	D Country	-0.687	0.321	-2.142	0.043
F	2.422					
Significance F	0.110					

According to the results of the regression analysis, the following conclusions can be drawn: First, the size of the company is the most significant determinant of the use of a matching currency tool, netting tool, forward contract tool, and cross-currency swap tool. Second, there is a positive correlation between the size of the company and the use of a matching currency tool, a forward contract tool, and a cross-currency swap tool. This means that the use of these tools increases with firm size. On the other hand, we found there is a negative correlation between the size of the company and the use of a netting tool, a futures contract tool, and a money market hedge tool. This means that the use of these tools decreases as firm size increases. Lastly, the country of origin is the most important determinant of the use of forward contract tools, futures contract tools, cross-currency swap tools, and money market hedging tools.

CONCLUSION

The purpose of this study is to discuss the use of various foreign exchange risk management tools by multinational firms in practice. To determine the best practices, determine the most commonly used tools, and explore the impact of firm size and country of origin on the degree of the use of foreign exchange rate management instruments. To this end, we presented a theoretical discussion and a review of empirical evidence on the relative use of various foreign exchange risk management tools. Then, we employed a simple empirical model to test whether foreign exchange risk management techniques differ according to firm size or the country of origin. The empirical work presented here has led to the following conclusions regarding the use of foreign exchange risk management tools and practices: First, it has been observed that all the selected firms in our study use a wide variety of internal and external tools, as well as other practices, to manage foreign exchange rate risk. This conforms with the findings of Jacque's (1981) study, which found that since the implementation of the chaotic floating exchange rate system in 1973, the majority of companies involved in international business tend to use tools and practices for managing foreign exchange risks. As well, our findings agree with the findings of other empirical studies presented in Chapter 4, which indicate that foreign exchange risk management practices can aim at full hedging, partial hedging, or not hedging at all. Second, many empirical studies have indicated that the use of each internal and external tool depends on the size of the company and the country of origin. The empirical study presented here concludes that the size of the company is considered to be a significant determinant of the use of various tools, such as matching currency, netting, forward contracts, and cross-currency swaps. In addition, the country of origin of the company is considered to be a significant determinant of the use of various tools, such as forward contracts, futures contracts, cross-currency swaps, and money market hedging. Third, our study findings indicate in particular that large firms rely more heavily on forward contracts, matching currency, and cross-currency swaps compared to other firms. In contrast, medium-sized firms rely more heavily on options relative to other firms, but they also show high use of forward contracts and netting. Conversely, small firms rely mostly on netting, but they also show higher use of futures and money

market hedges relative to the rest. Fourth, our study findings indicate that, in particular, German firms rely more heavily on matching currencies and forward and futures contracts compared to other firms. In contrast, French firms rely more heavily on options relative to other firms, but they also show high use of forward contracts and netting. This is in line with the findings of Albouy and Dupuy (2017) that French firms tend to prefer simpler derivative instruments such as OTC currency forwards, etc. Conversely, UK firms rely mostly on forward contracts, but they also show higher use of swaps and money market hedges relative to the rest. In addition, based on an analysis of other empirical studies presented in Chapter 4, observations have shown that, in general, large companies tend to use more complex and varied tools and practices to manage foreign exchange risk, while small companies tend to use simple tools and practices. Additionally, besides tools and practices, it has been demonstrated that the knowledge and experience of managers and other staff members involved in foreign exchange risk management are crucial to curbing risk. Finally, it has to be noted that the study has certain limitations: the empirical study relies on data collected merely from published annual reports obtained from companies' websites. Moreover, the evaluation of the relative use of firms' risk management tools was done by the author, using quantitative and qualitative information provided by these annual reports. Ideally, more specific information could be gathered using questionnaires, surveys, or interviews with company officials. However, the time constraint of the research for this thesis did not allow for the use of such tools. Therefore, it would be interesting for someone to empirically investigate the research questions exploited in this study, using a more comprehensive methodology, such as the one described above.

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