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Management of the Foreign Exchange Rate Risk in a Chinese Company

Řízení měnového rizika v čínské společnosti

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Declaration of Utilisation of Results from the Diploma Thesis

List of Annexes

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References:

- COPELAND, Laurence S. *Exchange Rates and International Finance*. 5th ed. Harlow: Financial Times Prentice Hall, 2008. ISBN 978-0-273-71027-1.
- KRUGMAN, P. R., M. OBSTFELD and M. J. MELITZ. *International Economics: Theory and Policy*. 9th ed. Harlow: Pearson Addison-Wesley, 2012. ISBN 978-0-273-75409-1.
- MOOSA, A. Imad and Razzaque, H. BHATTI. *The Theory and Empirics of Exchange Rates*. Singapore: World Scientific, 2010. ISBN 978-981-283-953-4.

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The declaration

“Herewith I declare that I elaborated the entire thesis, including all annexes, independently.”

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1 Introduction

With the changes of times, China's exchange rate system is changing and gradually improving. The foreign exchange price of each transaction is determined by the major trader with the foreign exchange supply and demand relationship and its position, and the range of exchange rate activities becomes more flexible. The central bank indirectly intervenes in the foreign exchange market through major trader systems. The main dealers conduct transactions and market adjustments under the indirect control of the Central Bank to meet the marketization requirements and they are more in line with International Convention. This change proves that the CNY exchange rate system is gradually being transformed into a floating exchange rate system.

The central bank of China will allow the market's power to determine the trend of the CNY exchange rate, the market currently is expected to further increase the CNY fluctuations. These multiple factors, to some extent, increase the exchange rate risks faced by Chinese enterprises.

Encouraged by the needs of enterprises' transformation and upgrade and the "going out" policy of the country, more and more Chinese enterprises are entering the global markets, however, whether it is an overseas acquisition or the capital operation, enterprises are facing with the foreign exchange risk, and they have to start with the management of the foreign exchange risk. Like enterprises from different countries, the significant influence of government and domestic rules also must be taken into consideration.

Hence, in this thesis, we will study and discuss the impact of foreign exchange risk and how it will influence Chinese enterprises. And we will choose Huawei as our case object.

The aim of this thesis is to analyze and manage the foreign exchange exposure of the chosen company in China, to do this, it is necessary to research the foreign exchange rate, foreign exchange system and foreign exchange risk, and analyze the impact of

foreign exchange risk on Chinese enterprises combining with China's exchange rate system. And through case study, it will be shown that how to manage the exposure of foreign exchange, so that Chinese enterprises can make better financial managements with foreign exchange risk.

The first chapter is introduction, the aim of this thesis and contents of each chapter will be explained in it. The second chapter is the theoretical part, including definition and development of exchange rate, types of exchange rate system, foreign exchange risk and how to manage it. China's exchange rate system will be introduced in the third chapter, showing how it changes and reforms in different periods, and what characteristics it has. The fourth chapter is application part of foreign exchange rate risk and its management in Chinese company, in this chapter, we will briefly introduce the company, such as its history, corporate affairs, and achievements. Then we will use this company as our case object to analyze its foreign exchange exposure and its management. In the last part of this chapter, some methods and suggestions will be put forward about how to manage the foreign transaction exposure for this company. Finally, we will make a conclusion in the fifth chapter.

2 Theory of exchange rate and exchange rate system

This chapter is the theoretical part, we will introduce the theory of exchange rate, including the definition, development, and its related theoretical content, then is exchange rate system and finally is the foreign exchange risk and management of FX (foreign exchange) risk.

2.1 Definition of the exchange rate

Exchange rate theory is the external price of currency - the theoretical model of the decision and change of the exchange rate, also known as exchange rate determination theory. Its main idea is - exchange rate is determined by foreign exchange supply and demand.

“In finance, an exchange rate is the rate at which one currency will be exchanged for another. It is also regarded as the value of one country’s currency in relation to another currency.” (Wikipedia, 2018)

For example, each 6.3 CNY will be exchanged for each 1 US dollar, or that 1 US dollar can be exchanged for each 6.3 CNY.

Exchange rate theory is complex and complicated. There are numerous schools of thought, including traditional exchange rate theory and modern exchange rate theory. There are arguments for determining exchange rates, also instruction that shows the change of exchange rate. As part of financial theory, exchange rate theory has evolved from an adjunct theory into an independent theory accompanied by a simple to complex process of exchange rate system experience.

2.2 Appearance and development of exchange rate

The appearance and development of exchange rate theory is closely related to the development of a commodity economy. In the Middle Ages, the commodity economy

of various countries had developed greatly, the monetary system was relatively sound, and currency exchange began to be regularized, so people began to pay attention to the issue of exchange rates. From then on, the monetary system has gone through the precious metal standard, the metal exchange standard system and the credit banknote currency standard system, from which we can trace the development of exchange rate theory.

2.2.1 Appearance of exchange rate

As early as the early fourteenth century, there were some theories proposed that changes in exchange rates are mainly affected by risk and psychological factors. Some scholars believed that the exchange rate is determined by the supply and demand of the currencies of the two countries, and this supply and demand depends on people's public evaluation of the currencies of the two countries. The first half of the 17th century, mercantilist's studies on exchange rate issues had been systematic.

2.2.2 Development of the exchange rate

With the development of the capitalist economy and the expansion of foreign trade, the exchange rate theory has been greatly developed, and many classical economists have devoted special discussions.

In the 17th century, the English philosopher and economist Locke described his exchange rate theory in his article <The consequence of reducing interest and raising monetary value> (John Locke, 1962). This theory is based on his theory of quantity of money. He believed there are two factors that determine the exchange rate: First, how much precious metals (silver) each country owns. Countries with large amounts of silver have high commodity prices and low silver values; countries with low silver content have low commodity prices and silver values are high. The currency of a country with a high silver value can convert more currency of a country with low value of silver. The second is balance of the trade. If the export is greater than the import, silver will be withdrawn. If the import is greater than the export, silver will be paid. In

the market, more money demand for countries with favorable balance of trade, the exchange rate will increase, relatively speaking, the currency exchange rate of countries with balance of trade deficit will decline. If a business man of country that is with favorable balance of trade, places money for export goods in the importing country without repatriating it, it will not affect the exchange rate between the two countries.

Montesquieu, a representative of the French Enlightenment in the 18th century, made a detailed analysis of the currency conversion ratio issue. He gave the concept of absolute value and relative value of currency. He believed that the monarch can specify the following aspects: the ratio between the amount of silver as metal and the silver as currency; the proportion of various metals used as money; the weight and fineness of each currency; given each currency the imaginary value mentioned above. He called the value of money in these four relationships as absolute value. The value of each country's currency when compared to the currency of other countries is called the relative value. The relative value is based on the absolute value and is established through exchange. It is based on the most extensive valuation of business men. Therefore, the currency exchange rate determines the current temporary value of the currency.

In the middle and late 18th century, British economist Hume put forward the theory of "coin mechanism". The implication is that the exchange rate is determined by the international balance of payments, and the international balance of payments deficit will cause a country's currency exchange rate to fall. If it exceeds a certain limit (coin point), it will cause gold output, thus inducing the price flow mechanism, which will make commodity prices lower and stimulate exports. When the exchange rate rises above a certain height, it will lead to the import of gold, which will increase domestic prices and stimulate exports.

Muller also discussed exchange rates in the <Principles of Political Economy>. He believed that changes in the exchange rate under the gold standard can modulate small imbalances in trade balances, but when there is a large imbalance between the two

countries, changes in exchange rates can only restore equilibrium by indirectly affecting the flow of international coinage and domestic prices. At the same time, he also believed that the internal devaluation of currency and the external devaluation of occur at the same time and in the same direction. Therefore, exchange rate devaluation cannot stimulate exports, nor can it inhibit imports. (Dr. Müller, 2006)

So far, the era in which the exchange rate theory is introduced is that countries generally implement the precious metal standard system, with the gold standard being the most typical. Under this system, the ratio of the gold content between the currencies of the two countries, that is, the mint parity, is generally considered to be the basis of the currency exchange rate between the two countries. The exchange rate theory of this period was almost mint parity theory. The differences between the various theoretical factions are only reflected in the interpretation of exchange rate changes.

From the latter half of the 19th century to the 1930s, the capitalist economy has gone through two stages. The previous stage was sustained economic growth, the latter stage was during the two world wars. This was exactly the period when capitalism transitions from free competition to monopoly. The exchange rate study during this period combined the gold standard system and the non-convertible paper currency system. There are five economists' studies worthy of attention, they are G.J. Goschen, Léon Walras, Keynes and so on.

The book <Theory of Foreign Exchange> published by G.J. Goschen in 1861, is the first book to systematically research foreign exchange theory. In this book, he expressed his views on the exchange rate decision: the exchange rate depends on the ratio of foreign currency demand and foreign currency supply. If a country's external income increases and external expenditure decreases, then the supply of foreign currency will exceed the demand for foreign currency, and the national currency will appreciate; otherwise, it will depreciate. The supply of foreign currency and the demand for foreign currency are governed by the international lending relationship between the two countries. Hence, international lending is the main determinant factor of exchange

rate changes. This kind of lending relationship can be caused by the input and output of commodities. It can also be caused by the sale of stocks, bonds, the payment of profits and donations, and capital transactions. Only borrowings that enter the payment phase have a direct impact on exchange rate movements.

Léon Walras analyzed the exchange rate determination problem using a general equilibrium approach. Through analysis, it was found that the exchange rate was inversely proportional to the remittances that were made and the two are reciprocal. This is because the exchange rate is essentially a unit of currency in any one region or a certain amount of money in other regions. He also pointed out that the exchange rate has a fixed limit, which is the transportation cost of unit gold. He gave a general equilibrium condition for the exchange rate, when the foreign exchange rate in any one region against any other region is equal to the ratio between each region's foreign exchange for any third region, it will be possible to achieve an overall balance between exchange rates, when the overall balance is disturbed, it will be rebalanced through arbitrage activities.

In 1927, the French economist A. Aftalion explained the exchange rate determination and the reasons for its change in the book <Money Price and Exchange> (A. Aftalion, 1927) based on the value theory of marginal utility. He believed that the exchange rate depends on the supply of foreign currency and the demand for foreign currency, while the individual's demand for foreign currency stems from some desire and foreign goods and services, which is determined by the subjective evaluation of the individual. Market evaluation is a synthesis of individual evaluations and has an impact on the equilibrium price of foreign exchange. Therefore, desire is the basis for the value of foreign currency, subjective evaluation is the decisive factor of the value of foreign currency. This is the utility principle of the exchange rate decision, also known as the exchange rate psychological theory or subjective evaluation theory.

The other most influential exchange rate theory is the theory of purchasing power parity, this was systematically described by Swedish economist Gustav Cassel in 1922,

in his masterpiece <Currency and Foreign Exchange Theory After 1914> (Gustav Cassel, 1922). The basic idea is that the reason why natives need foreign currency and foreigners need their own currency is because both currencies have purchasing power over commodities in each issuing country, so the price of money depends on its purchasing power over commodities. Currency exchange rates between the two countries is determined by the purchasing power ratio (purchase power parity) of the currencies of the two countries. The change in exchange rate lies in the change in purchasing power, and the change in purchasing power is due to price changes. The exchange rate is ultimately determined by the change in the ratio of price levels in the two countries. Cassel first expressed the exchange rate as the ratio between the domestic and foreign currency purchasing power or price level. This is the absolute parity theory of purchasing power. The premise of this theory is that free trade and regulation are basically the same.

After World War I due to the fact that foreign countries issued banknotes that were not honored during the war led to inflation and rising prices. Cassel revised his absolute parity theory of purchasing power. He regarded the relative change in the purchasing power of the currencies of different countries as a decisive factor in the exchange rate fluctuations, resulting in the theory of relative parity of purchasing power. The relative purchasing power parity is obtained by multiplying the base-period exchange rate and the price index ratio between the two countries. The base period should be the period when the market exchange rate is in equilibrium over a long period of time. It can be calculated using absolute purchasing power parity, or it can use the selected real market exchange rate. Some economists later criticized the theory of purchasing power parity and advocated replacing the purchasing power parity with cost parity. Because price parity only treats exchange rates as a function of prices and does not take into account the counteraction of exchange rates on prices, the effect of exchange rates on changes in costs is much smaller than the impact on price changes, so the use of cost parity is much better; Moreover, prices include profits, profits are volatile variables, and the level of exchange rate calculated in this way fluctuates. With cost levels, it can better

reflect the changing trend of long-term exchange rates.

The theory of purchasing power parity actually determines the exchange rate from the level of value represented by the currency, which captures the main aspects of exchange rate determination. However, this theory uses the price level as the basis for purchasing power, leaving room for further discussion. Another drawback of the theory of purchasing power parity is that it focuses too much on trade relations while ignoring the impact of international capital flows on exchange rate decisions, which promotes the development of the theory of interest rate parity. The idea of interest rate parity can be traced back to the Middle Ages, but the real formation of the interest rate parity theory is John Maynard Keynes' s <Currency Reform> completed in 1923 (Keynes, 1923). At that time, frequent exchange rate fluctuations, currency depreciation, and changes in the gold standard caused great changes in the international currency.

After the Second World War, the research on exchange rate determination theory examined more and more influencing factors. The main points of purchasing power parity theory, interest rate parity theory, exchange psychology theory, and rational expectation theory have begun to be integrated. Keynesian economists formed Keynesian exchange rate theory based on the Keynesian theory, which is the long-term dominant exchange rate theory after the war. The theory holds that the market exchange rate is only a kind of price, and it is also determined by the power of the supply and demand sides of the market; the supply and demand of foreign exchange is derived from the balance of payments, especially the revenue and expenditure of goods and services. Therefore, the exchange rate actually depends on the balance of payments of a country, this is similar to Goschen's theory.

In 1981, the economist V. Argy improved and deepened the theory of the original Keynesianism and formed the new Keynesian exchange rate theory. Argy believed that the equilibrium exchange rate level is determined by domestic monetary policy, fiscal policy, currency wage rate, foreign national income, price level, interest rate level, and expectations of currency exchange rates between the two countries. He divided the

exchange rate expectations into three categories: The first is the adaptive expectation, that is, the expected value of the exchange rate is equal to the actual value of the past several exchange rates; the second kind of expectation is the extrapolation expectation, that is, the exchange rate's expected value is equal to the current exchange rate adjusted according to the actual change of the exchange rate; the third kind of expectation is a reasonable expectation, which is that people can make a reasonable expectation based on all the information they can get, and it is consistent with the forecast of interest rate. On this basis, he further analyzed the impact of foreign national income changes, changes in foreign price levels, and changes in domestic currency on exchange rate changes.

By the early 1970s, the Monetarist school established a monetarist exchange rate theory. The main assumption of this theory is: a highly developed capital market, that is, full liquidity of capital and sufficient substitution between domestic and foreign assets. An efficient commodity market, so that prices of the same commodity in different parts of the world are the same in the futures currency; in an efficient foreign exchange market, market participants can make reasonable expectations based on all information, and their expectations can strongly influence the exchange rate in the market. Under strict assumptions, they came to a theoretical conclusion:

(1) When the stock of money in a country increases, the exchange rate of the domestic currency falls. When the actual national income of a country increases, the exchange rate of the domestic currency rises. When the nominal interest rate of a country rises, the exchange rate of the domestic currency falls. When the supply of foreign currency rises, the exchange rate of the domestic currency rises. When foreign national income rises, the exchange rate of the domestic currency falls. When the nominal foreign interest rate rises, the exchange rate of the domestic currency rises.

(2) The expected inflation rate has an important impact on the currency exchange rate, especially in the short-term. If the country's expected inflation rate falls, the exchange rate of the domestic currency will rise; if the foreign inflation rate falls, the exchange

rate of the domestic currency will fall.

The theory of exchange rate determination developed with the development of the economic situation and western economic theories. It mainly includes traditional exchange rate determination theory, modern exchange rate determination theory and equilibrium exchange rate theory.

The theory of modern exchange rate determination is the exchange rate decision theory developed after the 1960s and 1970s. It is characterized by a general equilibrium analysis method to explore the equilibrium nominal exchange rate and focuses on the asset market analysis. Before the 1970s, the dominant exchange rate determination model was the Keynesian model under the open economy. The important difference between modern exchange rate theory and traditional theory during and after the 1970s was when studying exchange rate decisions, consider the balance of reserves in the international financial market.

2.2.3 Modern theory of exchange rate

There are some chosen models to introduce:

(A) Elastic price currency model

In the 1970s, Frank Moussa assumed that the price adjustment in the commodity market was timely and complete, and the capital market was highly developed and fully mobile. Therefore, purchasing power parity was established, and at the same time interest rate parity was established, and then the typical monetarist analysis method was used. The exchange rate decision model between two countries under the conditions of complete elasticity of commodity prices. The model highlights the role of the currency factor in exchange rate determination and movement. However, the assumption that the model is completely flexible about commodity prices is also not in line with reality, so the model cannot pass the test on many occasions.

(B) Sticky price currency model

In 1976, Dornbusch proposed a sticky price currency model. He assumed that the capital market is completely mobile, and assets can be completely replaced. In the short term, the adjustment of commodity prices is not fully flexible, so purchasing power parity can only be established in the long term. In the short-term, the exchange rate can deviate from the long-term equilibrium value, and the degree of deviation is influenced by factors such as the market's first imbalance in the currency market and expectations. According to the model, the capital market reacts instantaneously to various internal and external shocks in the economy, and the product price is sticky. This explains to some extent the short-term exchange rate deviation is a long-term equilibrium exchange rate determined by purchasing power parity. This model is therefore also referred to as the "dynamic Mundell-Fleming model." Unfortunately, on many occasions, its forecast and interpretation of the real exchange rate still shows a large deviation.

(C) REDUX model

In the 1980s, one of the major achievements of macroeconomics was the construction of a dynamic general equilibrium model with a solid microscopic foundation, thus creating a "new open economy macroeconomics". In 1995, Obstfeld and Rogoff jointly proposed the REDUX model, which is an Intertemporal equilibrium analysis model. The model assumes that all product prices follow the law of one price so that domestic and foreign price indices have a purchasing power parity relationship, and then the individual utility function in microeconomics is extended to the typical domestic home use function, consumption function, and price index. Through the balance of optimal consumption, output, and currency holdings to ensure the maximization of household utility, a steady state value is finally sought through an intertemporal analysis, and the market equilibrium value of the nominal exchange rate is obtained. According to the model, the equilibrium nominal exchange rate is determined by the difference between the two countries' (in the logarithmic form) of their respective equilibrium money supply and their respective equilibrium consumer demand. After the REDUX model has been improved by later generations, it has a certain degree of accuracy in the prediction of short-term exchange rates, and it

concludes that "in the long-term, the currency-neutral and over-regulated exchange rates will gradually converge towards long-term equilibrium values." The exchange rate trend also has some explanatory power. But in general, the explanatory power of the model for exchange rate movements is still not satisfactory.

It is not difficult to see that the above modern exchange rate determination theoretical model is more and more inclined to use general equilibrium analysis instead of partial equilibrium analysis, and dynamic analysis is used instead of static analysis, and emphasis is placed on inventory analysis instead of flow analysis. Assuming that the premise is closer and closer to reality, the explanatory power and predictability of the nominal exchange rate are becoming stronger and stronger. However, it is regrettable that, in general, the modern exchange rate determination theory still has relatively large errors in explaining and predicting the nominal exchange rate.

2.3 Related theory of exchange rate

Purchasing power parity

Purchasing power parity is a theory of exchange rate determination proposed by Swedish economist Gustav Cassel. The central idea of the theory of purchasing power parity is that in a certain period of time, the exchange rate of the two currencies is determined by the comparison of the purchasing power of the currencies of the two countries, and the purchasing power of the two currencies can be expressed in terms of their respective price levels. That is, the exchange rate of the currencies of the two countries is determined by the ratio of the commodity prices of the two countries.

Cassel's purchasing power parity theory was divided into absolute purchasing power parity and relative purchasing power parity. Absolute purchasing power parity means that, at a certain point in time, the exchange rate of the two currencies is determined by the ratio of the purchasing power of the two currencies, thus the exchange rate of two countries "determines the ratio of the general price level of two countries".

$$R = P_A / P_B \quad (2.1)$$

Where R is the exchange rate under absolute purchasing power parity;

P_A is the general price level of Country A;

P_B is the general price level of Country B.

Cassel further pointed out that, “when inflation occurs in both currencies, their nominal exchange rates equal to their past exchange rates multiplied by the ratio of inflation in the two countries”. Formulated as:

$$R_1 = R_0 (I_A / I_B) \quad (2.2)$$

Among them:

R_1 represents the new exchange rate between the two currencies after inflation;

R_0 represents the exchange rate of the two currencies before the inflation of the two countries, also known as the base period exchange rate;

I_A represents the inflation rate of country A,

I_B represents the inflation rate of country B.

Equilibrium exchange rate theory

In 1934, the British economist T. E. Gregory first proposed the concept of equilibrium exchange rate. He pointed out that the equilibrium exchange rate should be fixed or pinned to a certain level, and it can meet the following three conditions in the coming years: First, under the conditions of existing natural resources, equipment, technology, costs, and normal employment levels and tariffs, both at domestic and abroad, the international balance of payments will not be subjected to inappropriate pressure for a certain period of time. Second, the country’s willingness and ability to obtain long-term loans from abroad or make long-term loans abroad are not subject to undue pressure. Third, there is no massive outflow of gold. 1945, American economist Ragner Nurkse gave a more concise definition of the equilibrium exchange rate, that is,

"the equilibrium exchange rate is such an exchange rate. It maintains balance of international payments for a certain period of time without causing changes in the net international reserves." The equilibrium exchange rate is an exchange rate that maintains the equilibrium balance of payments of a country's international balance of payments without causing massive unemployment or recourse to trade controls in a period of around three years.

Keynesian exchange rate theory

The theory holds that the market exchange rate is just a market price, and it is also determined by the power of the supply and demand sides of the market. The supply and demand of foreign exchange is caused by the balance of payments, especially the revenue and expenditure of goods and services (the main part of the current account). The balance of supply and demand is in fact the balance of international payments. Therefore, it can be inferred that the exchange rate is determined by the balance of payments, especially the current account income and expenditure, while the current account income and expenditure situation depends on the state of a country's national income.

New Keynesian exchange rate theory

The theory holds that the exchange rate is determined by the supply and demand of foreign exchange, and changes in the current account are the most important factors in determining the supply and demand of foreign exchange. However, unlike Keynesian exchange rate theory, Argy believed that current account changes are affected by the national income of the two countries, the price level of the two countries, and the currency exchange rate of the two countries themselves. Domestic exports mainly depend on the exchange rate, the relative price levels of the two countries, and the impact of foreign national income. The accumulation of foreign assets of the residents of the country is mainly affected by the difference in interest rates between the two countries and the expected future exchange rate changes.

According to the Keynesian exchange rate theory, when $K_A = C_A$, foreign exchange supply and demand balance, at this time the exchange rate is at a balanced exchange rate level. The equilibrium exchange rate level is determined by the domestic monetary policy, fiscal policy, currency wage rate, foreign national income, price level, interest rate level, and expectations of currency exchange rates between the two countries.

Asset portfolio balance theory

The theory of asset portfolio balance was developed in the mid-1970s by economists such as W. Branson, R. Dornbusch, and Frenkel. The theory holds that the various assets (between domestic assets and foreign assets) are not completely replaceable, so there is a difference in the rate of return on assets.

What people generally prefer to choose are three types of assets: national currency, domestic bonds, and foreign bonds. The proportion of these three kinds of assets in the total wealth of each investor depends on: 1. The size of various asset returns. 2. The size of the total amount of wealth.

The exchange rate is determined when the stock market in the process of relative capital flows between two countries reaches equilibrium. All factors that affect the return on assets will determine the exchange rate level and its changes by affecting the portfolio of assets on the stock market.

2.4 Exchange rate system

“An exchange-rate regime is the way an authority manages its currency in relation to other currencies and the foreign exchange market. It is closely related to monetary policy and the two are generally dependent on many of the same factors.

The basic types are a floating exchange rate, where the economy dictates movements in the exchange rate; a pegged float, where a central bank keeps the rate

from deviating too far from a target band or value; and a fixed exchange rate, which ties the currency to another currency, mostly reserve currencies such as the U.S. dollar or the euro or a basket of currencies.” (Wikipedia, 2018)

Traditionally, according to the magnitude of exchange rate changes, the exchange rate system is divided into two major types: the fixed exchange rate system and the floating exchange rate system.

Western countries implemented fixed exchange before the 1970s. Later, due to the US dollar crisis, the Bretton Woods system collapsed, and countries began to adopt a floating exchange rate system.

2.4.1 Fixed exchange rate system

The fixed exchange rate system refers to an exchange rate system in which the exchange rate is relatively stable, using the local currency itself or the legal deposit amount as the basis for determining the exchange rate. There are different fixed exchange rate systems under different monetary systems.

Bretton Woods system:

(1) "Double hook" is implemented, that is, the US dollar is linked to gold, and the currencies of other countries are linked to the US dollar.

(2) On the basis of "double hook", the <International Monetary Fund Association> stipulates that the exchange rate of each currency against the U.S. dollar can generally only fluctuate within a range of $\pm 1\%$ of exchange rate parity, and countries must cooperate with the IMF (International Monetary Fund) and take appropriate measures. The measures guarantee that the fluctuation of the exchange rate does not exceed this limit.

Cause this kind of exchange rate system implements “double hook”, the volatility is small and can be adjusted appropriately. Therefore, the system also refers to a fixed exchange rate system centered on the US dollar, or an adjustable pegged exchange rate

system.

In general, the adjustable pegging exchange rate system focuses on coordinating and supervising the adjustment of foreign economies, especially exchange rate policies, and the balance of payments adjustments, avoiding devaluation “races” in the 1930s, and the economic growth of post-war countries. Stability and other aspects have played an active role.

But, it has some flaws:

- (1) Because of the lack of flexibility in exchange rate changes, its adjustment to the balance of payments is quite limited.
- (2) Cause destructive speculation.
- (3) The United States was overwhelmed and the "double hook" foundation was impacted.

2.4.2 Floating exchange rate system

The floating exchange rate system means that a country does not stipulate the boundary between the local currency and the foreign currency's gold parity and exchange rate fluctuations. The monetary authorities are no longer responsible for maintaining the limits of exchange rate fluctuations, an exchange rate system in which exchange rates freely move up and down with changes in the supply and demand relationship in the foreign exchange market.

The system has existed in history for a long time, but the real popularity is after 1972 - the debacle of US dollar-centered fixed exchange rate system.

2.4.3 Contents of the exchange rate system

And the contents of the exchange rate system include the following aspects:

1. The principle and basis for determining the exchange rate. For example, based on the value of the currency itself or based on the value of the legal representative.

2. Ways to maintain and adjust exchange rates. For example, whether to use publicly statutory appreciation or devaluation, or whether to allow it to float or have official limited intervention;
3. Regulations, systems, and policies that regulate exchange rates. For example, regulations on exchange rates and their scope of application in foreign exchange control in various countries.
4. Institutions that establish, maintain, and manage exchange rates, such as the SAFE, the Foreign Exchange Stabilization Fund Committee, etc.

The research of exchange rate system includes two basic perspectives: How does the exchange rate system form and be decided? And how to choose the exchange rate system? The former is an empirical issue and the latter is a normative analysis.

The classification of the exchange rate system is the basis for the research of the strengths and weaknesses of the exchange rate system and the choice of the exchange rate system. The first consideration of the relationship between the exchange rate system and macroeconomics lies in the classification of the exchange rate system. Because different classifications may have different conclusions, the choice of the exchange rate system becomes the most controversial issue in the macroeconomic field.

2.5 Related theory of exchange rate risk

2.5.1 Exchange rate risk

Exchange rate risk, refers to assets and liabilities, income, and expenses that are determined or measured by foreign entities in foreign currencies, and the possibility that the future operating activities are expected to generate cash flow in the local currency value due to changes in currency exchange rates. The reason why it is called a risk is that this loss is only a possibility and it is not inevitable.

It can be divided into some types: transaction risk, conversion risk (accounting risk),

economic risk (business risk).

Transaction exchange rate risk: In transactions that using foreign currencies for valuation and payment, the possibility that economic entities may suffer losses due to changes in foreign exchange rates. Trading risks mainly occur in the following situations:

- (1) Risks in the import and export of goods and services.
- (2) The risk of capital input and output.
- (3) The risk of foreign exchange positions held by foreign exchange banks.

Translation risk, also known as accounting risk, refers to the possibility that when an economic entity converts a functional currency into a bookkeeping currency in the accounting treatment of the balance sheet, the book loss maybe caused by changes in the exchange rate.

Functional currency refers to the various currencies used by economic entities and used in operating activities. The bookkeeping currency refers to the reporting currency used when preparing the consolidated financial statements, which is usually the domestic currency.

Economic risk, also known as operational risk, it refers to a potential loss caused by unanticipated exchange rate changes that affect the company's production, sales volume, price, and cost, resulting in a reduction in the company's future revenue or cash flow during a certain period of time.

And what factors may affect the exchange rate fluctuations? There are four basic factors as following:

1. International Balance of Payments and Foreign Exchange Reserves

The so-called balance of payments is the comparison of the total monetary income of a country with the total monetary expenditure paid to other countries. If the total amount of money income is greater than the total amount of expenditure, there will be

a surplus in international payments, on the contrary, it is the balance of payments deficit. The balance of payments can have a direct impact on the change in the exchange rate of a country. The occurrence of a surplus in international payments will increase the foreign exchange rate of the country's currency; on the contrary, the currency exchange rate of the country will fall.

2. Interest rates

Interest rate, as a basic reflection of the state of a country's lending, plays a decisive role in exchange rate fluctuations. The level of interest rates directly affects international capital flows. Capital inflows occur in countries with high interest rates. Capital outflows occur in countries with low interest rates. Capital flows can cause changes in the supply and demand relationship in the foreign exchange market, thus affecting the fluctuation of foreign exchange rates. In general, an increase in the interest rate of a country will lead to the appreciation of the country's currency. In contrast, the country's currency depreciates.

3. Inflation

In general, inflation will cause the exchange rate of the domestic currency to fall. The remission of inflation will increase the exchange rate. The inflation affects the value of domestic currency and purchasing power, and it will lead to a weakening of the competitiveness of imported goods and an increase in exports, as well as a psychological impact on the foreign exchange market and weaken the local currency's credit status in the international market. The influence of all three impacts will result in a devaluation of the domestic currency.

4. Political situation

Changes in the political situation between a country and the world will have an impact on the foreign exchange market. Political situation changes generally include political conflicts, military conflicts, elections, and changes in political power. These

political factors sometimes have a large impact on the exchange rate, but the time limits of impact are generally very short.

2.5.2 Exchange rate risk management

Foreign exchange risk management means that foreign currency asset holders can prevent, avoid, transfer, or eliminate risks in foreign exchange business operations through risk identification, risk measurement, and risk control, thereby reducing or avoiding possible economic losses and achieving certain risks. Maximize the return under conditions or minimize the risk under certain conditions of income.

There are some principles in management of exchange rate risk:

(1) Guarantee of macroeconomic principle

In dealing with the microeconomic benefits of enterprises and departments and the overall macroeconomic benefits of the country, the corporate sector usually minimizes or avoids the loss of foreign exchange risk and passes it on to banks, insurance companies, and even the state finances. In actual operations, the two benefits should be combined as well as possible to jointly prevent risk losses.

(2) Classification prevention principle

For foreign exchange rate risk losses of different types and different delivery mechanisms, different applicable methods should be adopted to classify and prevent, in order to be effective. For settlement risk of the transaction, the main prevention method should be selected by the selected settlement currency, supplemented by other methods; for the exchange rate risk of bond investment, various prevention methods should be taken, mainly in preserving value; for the risk of foreign exchange reserves, we should focus on the diversification of the reserve structure, and we should also implement foreign exchange coverage.

(3) Safe precautionary principle

From the perspective of its practical application, the principle includes three aspects: to make the risk disappear; to shift risk; to avoid profits from risks. In particular, the last one is the ideal goal pursued by people.

The process of foreign exchange risk management includes: identify risks, then measure risks, at last avoid risks. When enterprises determine their avoidance strategies, there are two broad categories of alternative hedging methods: One is trade negotiations combined with business strategies to avoid exchange rate risks; the other is the use of financial derivatives to avoid trading risks, mainly including: foreign exchange, futures, options and other financial derivatives. Different methods correspond to different operations, but the purpose is to make "uncertainty" determined in order to avoid risks.

When managing exchange rate risk, here are some strategies to help avoid risks (Thomas A. Pugel, 2009):

1. Full coverage strategy: that is, various measures are taken to eliminate the foreign exchange exposure and fix the expected return or fixed cost so as to achieve the purpose of avoiding risks. For a bank or a company, it means that all the foreign exchange positions are held. Under normal circumstances, the use of this strategy is relatively safe, especially for thin and weak, foreign-related inexperience, inaccurate market information, and large exchange rate fluctuations.
2. Partial coverage strategy: that is to take measures to clear part of the amount of exposure, retain part of the amount of risk, try to leave part of the opportunity to make money, of course, also left part of the possibility of losing money.
3. No coverage strategy: that is to say, the amount of foreign exchange exposure is exposed to foreign exchange risk. This situation is suitable for situations where the exchange rate fluctuation is not large, and the amount of foreign exchange business is small. In the face of low-risk, high-yield, foreign exchange rates bullish, companies can easily choose this strategy.

3 Development of exchange rate system in China

In this chapter, there is an analysis of the development of exchange rate system in China, how it was established, and how it changes according to different situation with different time series.

3.1 Brief introduction of exchange rate system

The CNY exchange rate system is a managed floating exchange rate system based on market supply and demand, with reference to a basket of currencies for adjustment. Since July 21, 2005, China has begun to manage a floating exchange rate system.

The new CNY exchange rate system uses the market exchange rate as the only value standard for the CNY against other countries' currencies. This makes the foreign exchange market's supply and demand of foreign exchange become the main basis for determining the CNY exchange rate.

The main contents of the reform of the exchange rate mechanism implemented at that time included three aspects: First is the way of exchange rate regulation. Second one is the determination of the middle price and the daily floating range. The third one is the adjustment of the initial exchange rate.

3.2 The forming background

Before 1994, the CNY rate formed the mechanism; between the founding of the People's Republic of China and the reform and opening up, the CNY exchange rate was strictly managed and controlled by the state under the traditional planned economy system.

According to the needs of economic development in different periods, before the reform and opening up, China's exchange rate system experienced a single floating exchange rate system in the early days of the founding of New China (1949–1952), a

single fixed exchange rate system in the 1950s and 1960s (1953-1972). After the Bretton Woods system, a single floating exchange rate calculated using "basket of currencies" (1973-1980).

3.3 Reform and development

3.3.1 Early stage

The first stage was the coexistence of the internal settlement price of CNY and the official exchange rate (1981-1984). Before the reform, the exchange rate of CNY was lower than the cost of foreign exchange through export for a long period of time, but it was higher than the ratio of consumer prices at home and abroad.

In order to expand exports, the CNY needed to be devalued, but depreciation of the CNY is detrimental to non-trade foreign exchange earnings. From the need to balance both trade and non-trade, in August 1979, the government decided to implement the internal trade settlement rate outside the official exchange rate from January 1, 1981. It was calculated based on the average exchange cost of exports and a certain margin of profit, which is significantly lower than the official exchange rate.

The second stage was canceling the internal settlement rate and entering the period - coexistence of official exchange rate and adjusted market foreign exchange rate (1985-1993). The dual exchange rate system has obviously mobilized the enthusiasm of export enterprises, and the country's foreign exchange reserves have also increased.

However, there are obvious problems with this arrangement: First, from the perspective of external relations, the IMF regards the double exchange rate as a government subsidy for exports, and the developed countries threaten to impose a subsidy tax on China's export commodities. Second, from the domestic point of view, the double exchange rate caused confusion in foreign exchange management work, and it remained in the foreign trade sector. However, eating large pots cannot effectively curb imports. Therefore, starting from January 1, 1985, the internal settlement price was

cancelled, and the CNY was restored to a single exchange rate price.

In order to cooperate with foreign trade reform and implement contracting system, China gradually canceled financial subsidies, increased foreign exchange retention ratio since 1988, a foreign exchange adjustment center was generally established to liberalize the exchange rate of the market, formed the situation where the official exchange rate and the adjusted market exchange rate coexisted.

3.3.2 Mid-term

The first stage was the period of managed floating exchange rate (from July 1994 to July 2005). The overall objective of the reform of the country's foreign exchange system in 1994 was "to reform the foreign exchange management system, establish a single, managed floating exchange rate system based on market supply and demand, and a unified and standardized foreign exchange market, gradually making the CNY a convertible currency." Specific measures include: First, the implementation of a single, managed floating exchange rate based on market supply and demand. On January 1, 1994, the official CNY exchange rate was adjusted to the foreign exchange adjustment price. Second, implement the bank's foreign exchange settlement system and cancel the foreign exchange retention and payment. Third, to establish a unified and standardized interbank foreign exchange market, the central bank manages the CNY exchange rate through participation in the market transactions. The CNY exchange rate being announced to the public is the exchange rate that formed in the market. In December 1996, China realized the convertibility of CNY's current account, which achieved an important step in the free exchange of CNY.

After 1994, China implemented a managed floating exchange rate system based on market supply and demand. However, the nominal exchange rate of the CNY against the US dollar remained relatively stable for the rest of the year, except for a small appreciation during the period from January 1994 to August 1995. After the Asian financial crisis, as the decoupling of the CNY from the US dollar may cause the CNY

to appreciate, which was not conducive to export growth, the Chinese government further narrowed the floating range of the CNY exchange rate. In 1999, the IMF's division of China's exchange rate system also changed from "managed floating" to fixed pegged exchange rate system".

As for the second stage, on July 21, 2005, China made reforms to improve the CNY exchange rate formation mechanism. The CNY exchange rate was no longer fixed on single US dollar. Instead, it selected several major currencies to form a basket of currencies, and at the same time refer to a basket of currencies, to calculate the changes of the CNY's multilateral exchange rate index. China implemented a managed floating exchange rate system based on market supply and demand, with reference to a basket of currencies for adjustment. Since the reform of the CNY exchange rate formation mechanism, based on market supply and demand, the CNY had appreciated slightly overall.

After the reform of the CNY exchange rate formation mechanism on July 21, 2005, the People's Bank of China announced the closing price of the CNY exchange rate for currencies such as the US dollar on the interbank foreign exchange market after the closing of each working day, as for the middle price of the currency traded on the CNY as the next business day.

From January 4, 2006, the People's Bank of China authorized the China Foreign Exchange Trading Center to announce the exchange rate of the CNY against the US dollar, the euro, and the Hong Kong dollar on every working day's 9:15 am and use it as the middle price of the interbank spot foreign exchange market (including OTC method) and the bank counter exchange rate.

From January 4, 2007, the People's Bank of China began to set the daily CNY intermediate exchange rate and authorized the China Foreign Exchange Trading Center to publish it. In May 2007, the People's Bank of China expanded the daily trading range of the CNY against the US dollar from the previous median price of 0.3% to 0.5%.

The stable implementation of the new CNY exchange rate system that maintained a stable CNY exchange rate at a reasonable and balanced level has fully proved that the "managed floating exchange rate system based on market supply and demand, with reference to a basket of currencies" is in line with the requirements of the initiative, controllability, and gradualness of China's exchange reform. The CNY exchange rate will be based on market supply and demand and with reference to a basket of currencies, it will remain basically stable at a reasonable and balanced level.

3.3.3 Recent period

After the emergence of the Lehman crisis in September 2008, China returned to the pegged exchange rate system until the exchange reform was resumed in June 2010.

On April 14, 2012, the People's Bank of China decided to increase the fluctuation of the exchange rate of the CNY against the US dollar in the foreign exchange market from April 16. In the inter-bank spot foreign exchange market, the fluctuation of the trading price of the CNY against the US dollar was expanded from 0.5% to 1%. The designated foreign exchange bank should provide the customer with the difference between the highest US dollar spot exchange rate and the lowest spot exchange bid price on that day. The exchange rate shall not exceed the midpoint of the exchange rate on that day from 1% to 2%.

The People's Bank of China decided that since March 17, 2014, the floating range of the trading price of CNY against the US dollar in the inter-bank spot foreign exchange market has been expanded from 1% to 2%, that is, the trading price of CNY against the US dollar in the daily inter-bank spot foreign exchange market may fluctuate within the range of 2% above or below the midpoint of the CNY exchange rate against the US dollar announced by the China Foreign Exchange Trading Center on that day. The designated foreign exchange bank shall provide the customer with the difference between the highest dollar spot exchange rate and the lowest spot exchange rate on that day. The exchange rate shall not exceed the middle price of the exchange rate on that

day from 2% to 3%. Other regulations were still in compliance with the <Notice of the People's Bank of China on Issues Concerning the Management of Exchange Rates on Interbank Foreign Exchange Markets and the Administration of Listed Exchange Rates of Foreign Exchange Banks> (No.325 of the People's Bank of China, 2010)

3.4 Characteristics of China's exchange rate system

The current CNY exchange rate system in China is facing many problems, and the reform of the exchange rate system is progressing steadily. A reasonable exchange rate system is essential to maintain macroeconomic stability and to build an orderly financial system to achieve financial sustainable development. The flexibility of the CNY exchange rate will increase the difficulty of the central bank's management of the foreign exchange market; further develop and improve the foreign exchange market and use derivative financial instruments to avoid exchange rate risks.

There are four main characteristics of China's CNY exchange rate system:

1. With the gradual formation of the market-oriented mechanism for the exchange rate of the CNY, the exchange rate of the CNY also shows a higher degree of flexibility. The People's Bank of China reformed the CNY exchange rate system in July 2005 and formed a clear CNY elasticity mechanism, not just the US dollar. The CNY exchange rate has fully played its fundamental role in market supply and demand.

2. The People's Bank of China conducted a follow-up survey on 1,121 sample companies' economic instruments to circumvent or manage exchange rate risks. The results show that: The main hedge methods used by enterprises include forward exchange sales and foreign exchange swaps, overseas NDF(non-deliverable forward), trade finance, changing the trade settlement method and settlement in CNY, the foreign exchange forward has become the main tool for the management of exchange rate risk of enterprises, and has enhanced the ability of enterprises to adapt to the floating exchange rate system. It has played a positive role in promoting China's foreign trade development and economic restructuring. Companies that use foreign exchange

forwards and swaps to hedge are more than 40% at most.

3. After the reform of the exchange rate system, China's foreign exchange market has gradually formed a structural system in which the foreign exchange market between banks and banks and the counter market of banks and customers are interdependent. The inter-bank market is an important market for CNY exchange rates. Market transactions supplement the foreign exchange positions of designated foreign exchange banks. Transactions are mainly conducted between banks designated by foreign exchange.

4. The price of each foreign exchange transaction in foreign exchange transactions is determined by the primary dealers by virtue of the foreign exchange supply and demand relationship and their positions, and the range of exchange rate activities is more flexible. The central bank indirectly intervenes in the foreign exchange market through the primary trader system. The primary trader conducts transactions and market adjustments under the indirect control of the central bank, so that the marketization needs are met, more in line with international conventions, and market interventions are direct to indirect. The change proves that the CNY exchange rate is gradually changing to a floating exchange rate system.

4 Analysis of foreign exchange rate risk management in Chinese company

In this chapter, we will study how to manage the foreign exchange rate risk effectively and reasonably through analyzing a specific company in China. We will focus on the case of Huawei as an example to discuss the current status of foreign exchange risk management. Through analyzing, at last, we will put forward some suggestions and countermeasures to help company have better strategy with various types of foreign exchange risk.

4.1 Company introduction

In this chapter, we will briefly introduce the Huawei Company, Huawei has a very good development in European and other foreign regions, therefore, we want to analyze its foreign exchange risk and explore risk management methods.



4.1.1 Brief introduction

HUAWEI Technologies Co., Ltd. is a private communication technology company that produces and sells communication equipment. It was officially incorporated in 1987 and is headquartered in Huatian, Shenzhen, China.

Huawei is the global leading solution supplier in information communications technology (ICT). The company focus on the ICT field, adhere to stable operation,

continuous innovation, open cooperation, and build end-to-end solution advantages in telecom operators, enterprises, terminals, and cloud computing.

And it provides competitive ICT solutions, products, and services for carrier customers, enterprise customers, and consumers, and are committed to enabling the future information society and building a better-connected world.

In 2013, Huawei first time surpassed Ericsson - the world's largest telecommunications equipment supplier and ranked 315th among “Fortune Global 500” in Fortune Magazine.

In 2017, Fortune Magazine released the latest issue of the Fortune Global 500 list. Huawei entered the top 100 for the first time with an operating revenue of 78.518 billion US dollar, ranked at 83rd.

4.1.2 History of the company

In 1987, the company was founded in Shenzhen, and became a sales agent for Hong Kong companies that produce private branch exchanges (PBXs). Then in 1989, the company started to exploit PBX independently.

In 1994, C&C08 digital program-controlled switches were introduced. Its sales reached 1.5 billion yuan in 1995, and mainly from the Chinese rural market. The company established the ministry of intellectual property and the Beijing R&D (research and development) Center and passed the CMM4 certification in 2003. Here is a picture of Huawei’s headquarters:



Since 1998, Huawei has explored the world's core markets in Europe and America. Although the first contract was only US\$38, by 2001, Huawei had signed tens of millions of US dollars in GSM equipment supply contracts with the Russian national telecommunications sector.

At the end of 2002, Huawei obtained an order of 3,797 kilometers of ultra-long-distance national optical transmission lines. By 2003, Huawei's sales were more than 300 million U.S. dollars in the Commonwealth of Independent States (CIS), ranking among the top international equipment suppliers in the CIS market.

Huawei's global competence center, financial center, and risk control center are all located in Europe. From the perspective of sales revenue contribution, Europe is even more important.

Afterwards, Huawei began the company's transformation plan and the global joint venture kicked off.

In 2000, Huawei adopted IBM (Integrated Supply Chain Management), which adjusted the company's organizational structure and established a unified supply chain management department, which includes manufacturing, procurement, customer service, and global logistics.

In 2008, Huawei submitted a total of 1,737 PCT patent applications throughout the year. According to statistics of the World Intellectual Property Organization, in 2008, it ranked the first in ranking list of the number of patent application companies (persons); LTE patents accounted for more than 10% of the world's total.

On February 26, 2012, the first mobile phone "Ascend D quad" equipped with a self-developed four-core mobile central processor K3V2 was released at the WMC2012 exhibition in Barcelona. The processor is developed by Hass, a subsidiary of Huawei, and is the smallest quad-core processor ever packaged. At the same time, Huawei has become the first mobile phone manufacturer in China to launch a self-developed mobile

phone mobile central processor, which is of great significance for breaking the monopoly of mobile phone CPUs by Qualcomm, Texas Instruments TI and Nvidia.

According to IDC, in July 2012, Huawei became the third largest smartphone manufacturer in the world, second only to Samsung and Apple.

In 2013, the Global Financial Risk Control Center was established in London, England to supervise Huawei's global financial operation risks and ensure that the financial business operates in a standardized, efficient, and low-risk manner. The European logistics center was officially put into operation in Hungary and radiated to Europe, Central Asia, Middle East and Africa.

In 2013, Huawei mainly had three major business segments, including communications network equipment (operators), corporate networks, and consumer electronics. Among them, the consumer electronics business has developed rapidly, and Huawei's mobile phone sales have jumped to the third place in the world, by preceded only by Apple and Samsung.

4.1.3 Products and services

Huawei's most important revenue comes from the telecom operators' business, it also provides products and services used by enterprises and individuals. Huawei's products and solutions have been used in more than 170 countries around the world, serving 45 of the world's top 50 operators and 1/3 of the world's population. Specifically includes the following ten aspects: 1. Wireless access, 2. fixed access, 3. core network, 4. transport network, 5. data communications, 6. energy and infrastructure, 7. services and software. 8. OSS, 9. secure storage, 10. Huawei terminal.

Wireless access: including base station equipment such as GSM, Universal Mobile Telecommunications System (UMTS), and LTE

Fixed access: Includes traditional fixed network access (MSAN, DSLAM), fiber-optic broadband access (FTTx), ODN, and wiring (ODN and MDF)

Core Network: NGN, 3G/4G Core Network

Transport network: WDM/OTN, MSTP/Hybrid MSTP, microwave systems, etc.

Data Communication: Routers, Switches, etc.

Network energy

Business and Software: Intelligent Network, Call Center, Network Analysis Tools, etc.

OSS server: network planning, IP operation and maintenance, resource management, service provisioning and activation, line diagnosis, system architecture, and end-to-end professional services in telecommunications network and operation and maintenance transformation

Storage and Network Security

Terminals: mobile phones, internet cards, gateways, modems, set-top boxes, etc.

4.1.4 Corporate affairs

Huawei has a basic law called the "Huawei Basic Law", it lasted two years, and were finally completed in March 1998. The full text consists of 103 chapters, covering more than 16,000 words, including Huawei's core values and general management policies. It stipulates Huawei's basic organizational goals and management principles and is the origin of all systems. The first chapter describes the purpose of the company. The other parts are some specific guiding principles for the design of the system, such as basic management policies, organizational policies, human resources policies, and control policies.

As for its corporate value, Huawei has following aspects: serving customers is the only reason Huawei exists, customer demand is the driving force behind Huawei's development; besides, arduous struggle; self-criticism; open and enterprising; sincere and trustworthy; and teamwork.

Huawei's social responsibility: As a global corporate citizen, Huawei takes the common development with the local community as an important social responsibility. Huawei fully integrates the advantages and experience of ICT technologies and

conducts public welfare activities with governments, customers and non-profit organizations in various countries, including supporting ICT innovation and start-up companies, supporting community environmental protection activities, cultural and sports activities and traditional activities, supporting personnel training and education, and Non-profit organizations provide support and care for vulnerable groups.

4.1.5 Achievements of the company

Huawei's Intellectual Property Department was founded as early as 1995. Since 2000, Huawei's domestic patent applications have doubled each year, with more than 2,000 in 2004. In respect of foreign patent applications, there have been more than 600 cumulative PCT (Patent Cooperation Treaty) applications or foreign patent applications, and more than 600 applications for domestic and foreign trademarks. On June 30, 2017, Huawei Technologies Co., Ltd. won the Madrid Trademark International Registration Special Award for the Chinese Trademark Gold Award.

As of the end of 2014, 665 core standards for network communications were successfully proposed, accounting for 1/4 of the world's total, ranking first in the industry. It also created industry alliances such as ETSI ISG mWT, SDN, eLTE, disaster recovery technology, and Internet Finance Authentication Alliance (IFAA) and etc.

In August 2016, the China Federation of Industry and Commerce released the “Top 500 Chinese Private Enterprises in 2016” list. Huawei ranked 1st with annual operating income of 395.09 billion yuan.

On June 6, 2017, "Brand Z Most Valuable Global Brands Top 100 in 2017" announced that Huawei ranked 49th.

In 2017, Fortune Magazine released the latest issue of the Fortune Global Top 500 list. Huawei came into the top 100 for the first time with an operating revenue of 78.518 billion U.S. dollars, ranking 83rd.

4.2 Case study

With the rapid development of the two-way flow of international trade and international costs, the foreign exchange of multinational corporations has also shown strong performance.

In recent years, with the increase of foreign trade, China's large multinational companies have gradually realized the importance of foreign exchange risk management, gradually strengthened the construction of foreign exchange risk management system, raised foreign exchange risk management to the level of strategic management, and helped companies have better response measures to various types of foreign exchange risks.

4.2.1 Huawei's exchange gain and loss analysis

According to the annual report of HUAWEI in 2017, Huawei's overall sales reached a historic amount - USD 92.549 billion (equivalent to CNY 603.621 billion), an increase of 15.7% year-on-year, and cash flow from operating activities was as high as CNY 96.3 billion.

And in 2017, Huawei's sales gross profit margin was 39.5%, which was a decrease of 0.8 percentage point from 40.3% in the previous year.

Compared with financial reports of previous years, the operator's business is still the area that contributes most to Huawei's overall revenue.

In 2016, Huawei's profit growth was almost stagnant. Compared with less than 0.5% growth in 2016, the strategy of prioritizing profit in 2017 was effective.

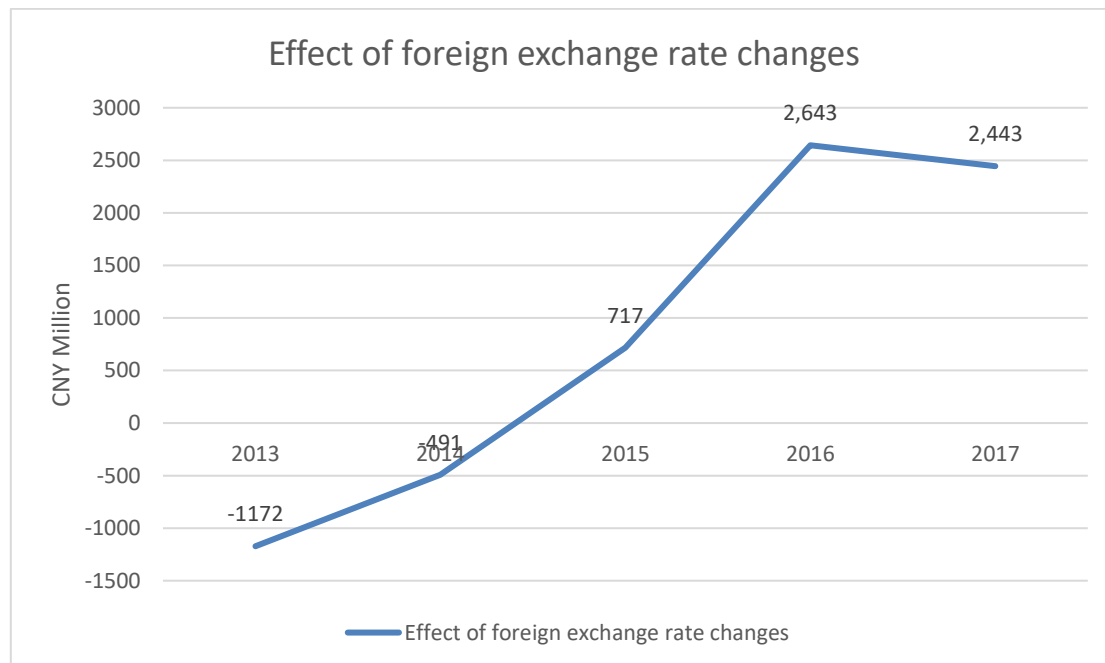
The increase in profits this time came mainly from the increase in scale, the improvement of operational efficiency, and the reduction of exchange losses.

Table 4.1 *Effect of FX rate changes of Huawei in recent 5 years*

	2013	2014	2015	2016	2017
Effect of foreign exchange rate changes	-1172	-491	717	2,643	2,443

(Source: annual report of Huawei in 2017)

Chart 4.1 *Effect of FX rate changes of Huawei in recent 5 years*



(Source: based on company's data from annual report of Huawei)

We can see from the table and chart 4.1, is the effect of foreign exchange rate changes during 2013 to 2017, these five years. It is not difficult to find that the change fluctuation in FX gain and loss was large.

4.2.2 Sales in different regions

Based on ongoing 4G network rollout, sustained growth in the smartphone sector, and the growing capabilities in enterprise and industry solutions, Huawei earned CNY305,092 million in revenue from the Chinese market in 2017, up 29.0% year-on-year.

Table 4.2 Sales of Huawei in different regions in 2016 and 2017

Sales (Revenues) (in millions of CNY)		
	2016	2017
CHINA	236,512	305,092
Europe	156,509	163,854
Asia Pacific	67,500	74,427
America	44,082	39,285
Other	16,971	20,963
Total sales	521,574	603,621

(Source: annual report of Huawei in 2016 and 2017)

We can see sales of Huawei in different regions from the previous table 4.2. From the data, we can easily find that the European market is a very important part of the sales source for Huawei.

Due to the accelerated pace of digital transformation amongst enterprises and a growing share of the smartphone market, we earned CNY163,854 million in revenue from Europe, the Middle East, and Africa (EMEA), up 4.7% year-on-year. (Annual report, 2017)

4.2.3 Revenues and expenditures in USD and EUR

Then we choose USD and EUR, these two main foreign currencies as main object of our analysis.

Table 4.3 Revenues of America and Europe

Sales (Revenues) (in millions of CNY)		
	2016	2017
America	44,082	39,285
Europe	156,509	163,854

(Source: annual report of Huawei in 2016 and 2017)

According to the growth trend, we assume and estimate that the total revenues of Huawei in 2018 and 2019 are 780,000 and 990,000 million CNY (they are forecasted); then through the share of the revenues from U.S. and European, 5% and 25%, we obtain results of the revenues in U.S. and Europe in 2018 and 2019, are 195,000 and 247,500 million CNY respectively.

Table 4.4 *Revenues of America and Europe in 2018 and 2019*

Sales (Revenues) (in millions of CNY)				
(* forecast)	2016	2017	2018*	2019*
America	44,082	39,285	39,000	49,500
Europe	156,509	163,854	195,000	247,500

(Source: own calculation)

Then we assume that the expenditures account for 20% of revenues, thus we get Huawei's expenditures in the US market and the European market in table 4.5 and 4.6.

Table 4.5 *Revenues and expenditures in America*

Revenues and expenditures in America (in millions of CNY)				
(* forecast)	2016	2017	2018*	2019*
Revenues	44,082	39,285	39,000	49,500
Expenditures	8,816	7,857	7,800	9,900

(Source: own calculation)

Table 4.5 *Revenues and expenditures in Europe*

Revenues and expenditures in Europe (in millions of CNY)				
(* forecast)	2016	2017	2018*	2019*
Revenues	156,509	163,854	195,000	247,500
Expenditures	31,302	32,771	39,000	49,500

(Source: own calculation)

We can see that revenues and expenditures are all shown in the form of CNY, thus, in next step, we will convert the CNY into US dollars (USD) and Euros (EUR). The exchange rates for 2016 and 2017 are already known in Huawei's annual report, by using the closing rate at the end of the year, CNY/USD were 6.9448 and 6.5222, CNY/EUR were 7.8067 and 7.3034. However, the exchange rates in 2018 and 2019, we do not know, so we need to find the forward exchange rate, which is used to calculate the amount of revenues and expenditures in USD and EUR for 2018 and 2019.

The forward exchange rate, in general, it can be searched on the Internet, due to China's exchange rate system is not completely flexible, hence, we could not find it and we will calculate the forward exchange rate by ourselves.

The formula of forward exchange rate is:

$$F = S \cdot \frac{(1 + i_d)}{(1 + i_f)} \quad (4.1)$$

F is the forward exchange rate, S is the current spot exchange rate, i_d is the interest rate in domestic currency (base currency), i_f is the interest rate in foreign currency (quoted currency).

Spot exchange rates for CNY/USD and CNY/EUR are searched in the website of Bloomberg, current spot exchange rates are 6.28 CNY/USD and 7.76 CNY/EUR. (Bloomberg, 2018)

As for interest rates of China, America and Europe are searched in the website called TRADING ECONOMICS, they are 4.35% p.a., 1.75% p.a. and 0.00% p.a. (TRADING ECONOMICS, 2018)

Given the various data above, then we can calculate the forward exchange rates for 2018 and 2019. For example, CNY/USD forward exchange rate of 2018 is:

$$F_{2018} = 6.28 \cdot \frac{(1 + 0.0435)}{(1 + 0.0175)} = 6.4405 \text{ CNY / USD}$$

And we can see all results of calculation in the following table:

Table 4.6 *Forward exchange rates of 2018 and 2019*

Forward exchange rates (one year)		
	2018	2019
CNY/USD	6.4405	6.6050
CNY/EUR	8.0976	8.4498

(Source: own calculation)

Finally, we can convert revenues and expenditures that in CNY into USD and EUR by using historical exchange rate of 2016 and 2017 and forward exchange rates of 2018 and 2019. The historical exchange rate we have mentioned in previous paragraph. Here come the results of calculation in the table 4.7:

Table 4.7 *Revenues and expenditures in USD and EUR*

Revenues and expenditures (in millions)				
(* forecast)	2016	2017	2018*	2019*
USD Revenues	6,347	6,023	6,055	7,494
USD Expenditures	1,269	1,205	1,211	1,499
EUR Revenues	20,048	22,435	24,081	29,291
EUR Expenditures	4,010	4,487	4,816	5,858

(Source: own calculation)

From the results, it is easy for us to find that Huawei have foreign exchange rate risk now and, in the future, therefore we need to manage foreign exchange risks of Huawei.

4.3 Foreign exchange risk management status and reasons

In this sub-chapter, we will analyze the current status of the foreign exchange management and reasons why Huawei faces foreign exchange risk.

In order to reduce the impact of foreign exchange risks on the company's business development, Huawei has strengthened foreign exchange risk management in recent years. During a long period of development in the past, Huawei's awareness of foreign currency risk was relatively weak, it focused on market development as the core concept and ignored the actual foreign exchange risks and operating benefits. In recent years, with the positive development of the company's business development, the company gradually realized the necessity of foreign exchange risk management, and thus strengthened the risk management in this area.

“On the one hand, it strengthens the application of scientific forecasting financial instruments, constantly pays attention to the macroeconomic policies of different countries and the trend of the world economic and political situation and enhances the accuracy and breadth of foreign exchange forecasting. On the other hand, financial management and contract management in foreign trade have been strengthened. When signing a foreign exchange transaction contract, as far as possible, negotiate with the other party to increase foreign currency protection terms or adopt a fixed exchange rate, so as to ensure that the company's earnings will not be affected by the exchange rate fluctuation.” (Source: annual report of Huawei in 2017)

In addition, in order to ensure that the company is in a relatively advantageous position in foreign exchange transactions, the company has also strengthened the training of relevant business leaders, gradually increased its foreign exchange risk management level, and can promptly launch corresponding countermeasures. At the same time, the company also passed various types of credit transactions and reasonable production arrangements to reasonably disperse and transfer some of the exchange risks, making the company out of a favorable position in foreign exchange transactions in

recent years.

The chart 4.2 shows the changes' trend of exchange rate between EUR and CNY in recent four years.

Chart 4.2 Exchange rate changes' trend of CNY/EUR between 2014 to 2018



(Source: Bloomberg, 2018)

We can find that exchange rate between the euro and the yuan fell sharply in 2015, from more than eight to less than 6 CNY/EUR, fell quiet a lot. And from 2016, it started to recovery steadily. This year, the exchange rate is roughly higher than 7.5 CNY/EUR and close to 8 CNY/EUR.

Then we take a look at the exchange rate movement between the U.S. dollar and the yuan. The chart 4.3 shows that the changes in the US dollar against the yuan fluctuated considerably, from the beginning of 2017, it has been showing a downward trend. The most recent exchange rate is approximately 6.2 ~ 6.3 CNY/USD.

Chart 4.3 Exchange rate changes' trend of CNY/USD between 2014 to 2018



(Source: Bloomberg, 2018)

Huawei has foreign currency exposure related to buying, selling, and financing in currencies other than CNY, mainly USD and EUR. According to the Group's foreign exchange risk management policy, material foreign exchange exposures are hedged unless hedging is uneconomical due to market liquidity and/or hedging costs. The Group has developed a complete set of foreign exchange management policies, processes, and instructions. These include: natural hedging and financial hedging.

“Natural hedging: The Group structures its operations to match currencies between procurement and sales transactions, to the greatest extent possible. Financial hedging: for certain currencies where natural hedging does not fully offset the foreign currency position, the Group hedges through forward foreign exchange transactions. In countries where local currencies depreciate sharply or in those with strict foreign exchange controls, the Group manages foreign exchange exposures using different measures, including pricing in USD. The Group also accelerates customer payment and promptly transfers cash out of these countries to mitigate risks.” (Annual report of Huawei, 2017)

4.4 Managing transaction exposure for Huawei

As we have analyzed and found in the previous chapter that Huawei has the risk of foreign exchange indeed, hence, in this part, we will discuss how Huawei can avoid, reduce, or transfer the risks of foreign exchange through effective strategies or some methods. And in this part, we will focus on managing the transaction exposure of Huawei.

We will use the foreign currency EUR as our object of analysis. As we have calculated in the chapter 4.2, the revenues and expenditures in EUR. Then we will calculate the foreign exchange exposure, it is the difference between revenues and expenditures. Because the foreign exchange exposure is of one year, therefore we need to make the difference divided by twelve, then we will get the monthly exposure in table 4.8. Monthly exposure means that all bills will be paid in one month (30 days).

Table 4.8 *Foreign exchange exposure in millions of EUR*

	2,016	2,017	2,018*	2,019*
Revenues	20,048	22,435	24,081	29,291
Expenditures	4,010	4,487	4,816	5,858
Open exposure	16,038	17,948	19,265	23,432
Monthly exposure	1,337	1,496	1,605	1,953

(Source: own calculation)

To hedge or not to hedge foreign currency investment exposure, that is a question posed repeatedly by investors. Some may advise to hedge fully, some advises to hedge partially with a currency covering, and others may advise that investors embrace the naked foreign exposure in full, enjoy it as much as possible and eventually profit from it.

It is clear, these ways are all depends on the investors' understanding and tolerance of foreign currency risk, so there is no accurate answer and we will experiment and deal

with these in various scenarios. First one, there is no hedging, then it is external hedging with forward contract, at the last is the internal hedging.

4.4.1 No hedging

No hedging means that investors embrace the naked foreign exposure in full and enjoy it as much as possible and eventually profit from it or they face all possible losses. When we use this way of managing transaction exposure, we need to compute the calculation of the profits or losses using the following formula, CF means cash flow, the difference between revenues and expenditures:

$$S_{t+1} \cdot CF - S_t \cdot CF = Profit / Loss \quad (4.2)$$

Spot exchange rates in 2016 and 2017 of CNY/EUR are from the website called Investing (Investing, 2018). They are all shown in the table 4.9:

Table 4.9 *Spot exchange rate of CNY/EUR*

	2016	2017
January	7.1487	7.4308
February	7.1316	7.2640
March	7.3390	7.3369
April	7.4167	7.5118
May	7.3281	7.6569
June	7.3830	7.7478
July	7.4166	7.9656
August	7.4534	7.8486
September	7.4996	7.8604
October	7.4405	7.7270
November	7.2918	7.8718
December	7.3034	7.8067

(Source: Investing, 2018)

According to the formula, we use monthly exposure (cash flow) and the spot exchange rate, then we can calculate the profit or losses in every month of 2016 and 2017, finally to sum them up to see the whole year's situation.

Table 4.10 *Profit/Loss with no hedging in millions of CNY*

	2016	2017
January	-22.85	-249.48
February	277.20	109.04
March	103.85	261.60
April	-118.42	217.02
May	73.38	135.96
June	44.91	325.76
July	49.18	-175.00
August	61.75	17.65
September	-78.99	-199.52
October	-198.74	216.58
November	15.50	-97.37
December	170.27	7.03
Total	377.04	569.26

(Source: own calculation)

It is clear to see from the table 4.10, with no hedging, there are profits rather than loss in 2016 and 2017, it is because the EUR appreciated in these two years.

4.4.2 External hedging

As for the external hedging, we choose to manage the transaction exposure with the forward contract, and in this case, we use the forward contract to hedge 75% or 25% of company's exposure.

First, we use forward contract to do the hedging of 75% of the exposure. The

formulation is:

$$(F_{M,t} \cdot 0.75 \cdot CF_{EUR} + S_{t+1} \cdot 0.25 \cdot CF_{EUR}) - S_t \cdot CF_{EUR} = Profit / Loss \quad (4.3)$$

Thus, we need to calculate the forward exchange rate of every month, for example, the forward exchange rate of January 2016 that equals to:

$$F = 7.1487 \cdot \frac{(1 + 0.0435 \cdot \frac{1}{12})}{(1 + 0 \cdot \frac{1}{12})} = 7.1746 \text{ CNY / EUR}$$

Then, we get the forward exchange rate of every month of 2016 and 2017 in following table 4.11:

Table 4.11 *Spot and forward exchange rate of CNY/EUR (monthly)*

	2016		2017	
	Spot	Forward	Spot	Forward
January	7.1487	7.0752	7.4308	7.3299
February	7.1316	7.1746	7.2640	7.4577
March	7.3390	7.1575	7.3369	7.2903
April	7.4167	7.3656	7.5118	7.3635
May	7.3281	7.4436	7.6569	7.5390
June	7.3830	7.3547	7.7478	7.6847
July	7.4166	7.4098	7.9656	7.7759
August	7.4534	7.4435	7.8486	7.9945
September	7.4996	7.4804	7.8604	7.8771
October	7.4405	7.5268	7.7270	7.8889
November	7.2918	7.4675	7.8718	7.7550
December	7.3034	7.3182	7.8067	7.9003

(Source: own calculation)

And after the calculation of forward contract to do the hedging of 75% of the exposure, we get the following results of profits or losses:

Table 4.12 Profit/Loss with external hedging with forward contract (75%) in millions of CNY

	2016	2017
January	-79.39	-175.58
February	112.42	244.59
March	-156.02	13.16
April	-80.82	-112.11
May	134.11	-98.23
June	-17.18	10.61
July	5.44	-256.56
August	5.50	168.05
September	-38.97	-31.20
October	36.81	235.75
November	179.97	-155.35
December	57.44	106.79
Total	159.30	-50.09

(Source: own calculation)

From the table 4.12, we find that the profits that being calculated with forward contract hedging in 2016 are lower than with no hedging, and there are losses in 2017, because the forward exchange rate is lower than spot exchange rate. But the exchange rate is changing, so having the forward contract is protection against bigger losses.

Next, we use forward contract with 25% to do the hedging and the formulation is:

$$(F_{M,t} \cdot 0.25 \cdot CF_{EUR} + S_{t+1} \cdot 0.75 \cdot CF_{EUR}) - S_t \cdot CF_{EUR} = Profit / Loss \quad (4.4)$$

Table 4.13 Profit/Loss with external hedging with forward contract (25%) in millions of CNY

	2016	2017
January	-41.70	-224.85

February	222.27	154.22
March	17.23	178.78
April	-105.89	107.31
May	93.62	57.89
June	24.21	220.71
July	34.60	-202.18
August	43.00	67.78
September	-65.65	-143.42
October	-120.23	222.97
November	70.33	-116.70
December	132.66	40.28
Total	304.46	362.81

(Source: own calculation)

When using 25% of forward contract to do the hedging, the results are all profits. Its amounts are lower than doing with no hedging, hedging reduces the variability of expected cash flows about the mean of the distribution. This reduction of distribution variance is a reduction of risk.

4.4.3 Internal hedging

Expect the way of external hedging, Huawei can also use some other ways to reduce the transaction exposure through internal hedging. The company is already using some internal hedging, that is reduction of exposure through buying some inputs in foreign currencies in general. But the internal hedging must be much bigger, to buy more inputs abroad to lower the transaction exposure. And there are some new proposals for internal hedging.

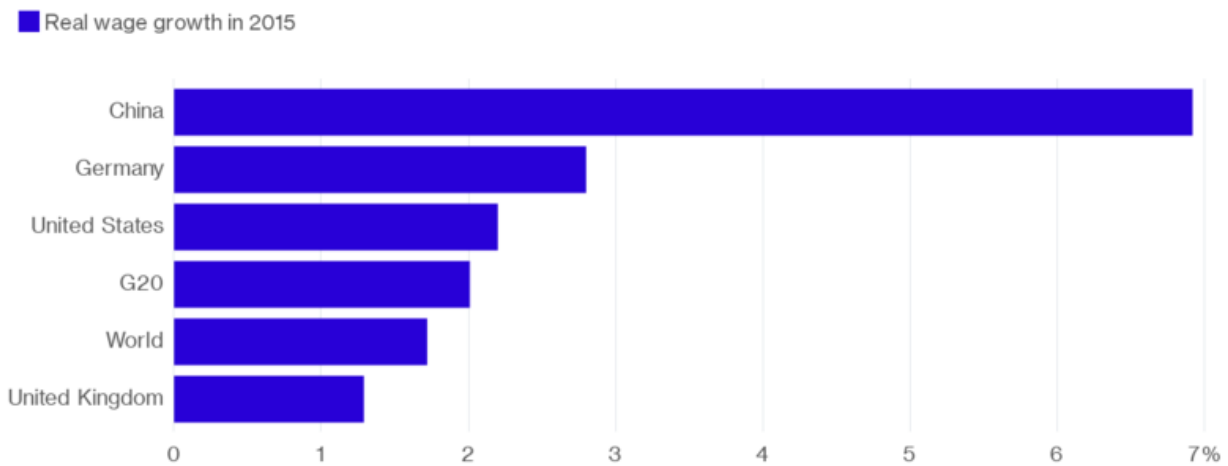
4.4.3.1 Reduction of labor costs

The first one is reduction of labor costs. The labors are much cheaper abroad than in China. The Huawei company can reduce their costs of labor force or wages, or to

increase the technology of the production. As we have mentioned in the introduction of the company that main revenues of Huawei mostly come from the carrier business. Therefore, reducing the costs of wages and labor force seem to be good way for Huawei to reduce the transaction exposure.

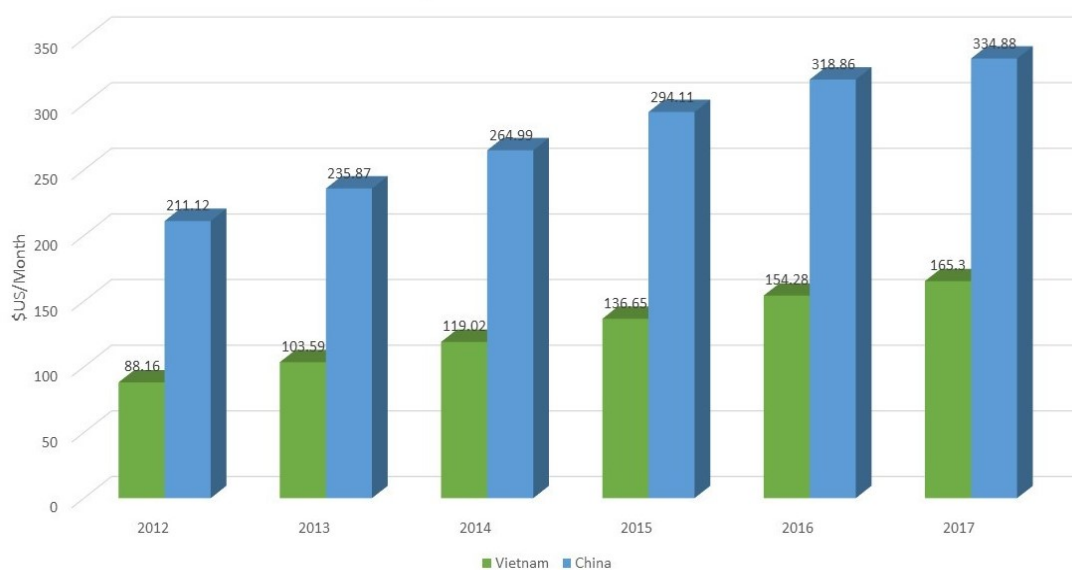
So, in the part, we will mainly discuss measures to reduce costs in terms of labor force and wages. We will discuss whether Huawei can reduce the cost of production through comparing different levels of wages and labor force among different countries. Let's look at the following pictures:

Chart 4.4 *Real wage growth in 2015*



(Source: Bloomberg, 2018)

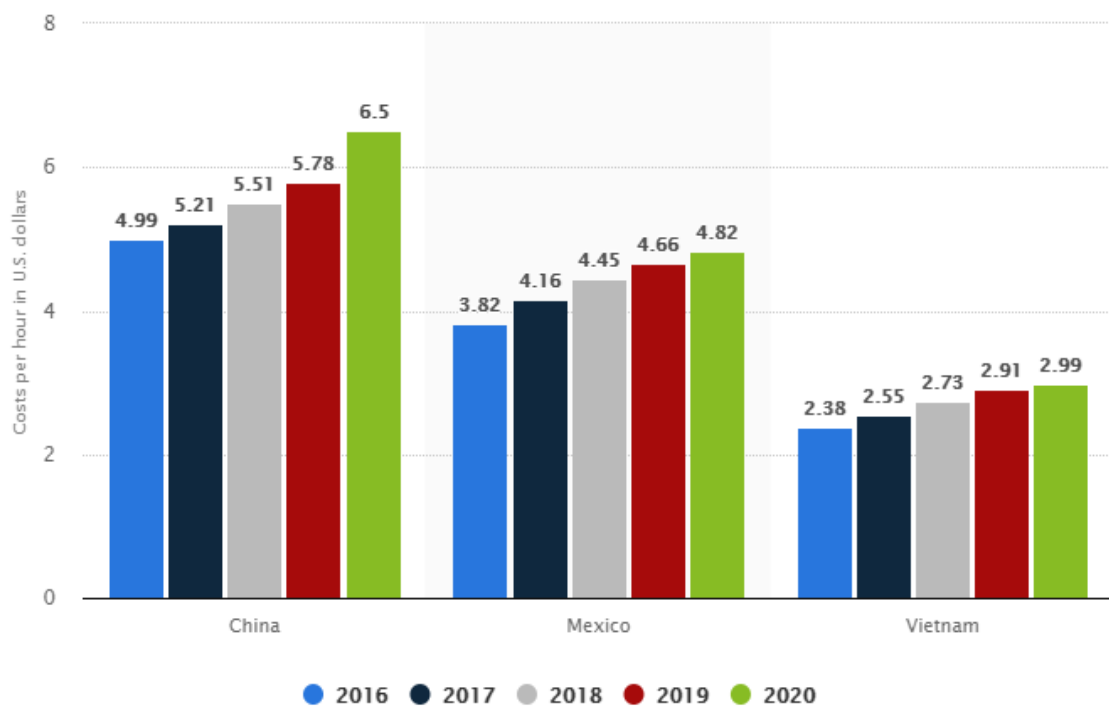
Chart 4.5 *Minimum wages in Vietnam and China in 2012 to 2017*



(Source: Trading Economics, 2018)

From these charts, we can easily see and understand the low labor costs make Vietnam an attractive alternative. Vietnam not only has a large workforce but also has much cheaper labor prices. Chinese minimum wages are much higher, compared to Vietnam, China does not have a great advantage in cheap labor.

Chart 4.6 *Manufacturing labor costs per hour for China, Vietnam, Mexico from 2016 to 2020 (in U.S. dollars)*



(Source: Statista, 2018)

Once China was known as the "world factory," many well-known foreign companies have set up camps in China. "Made in China" is even more global. The abundant labor resources and low prices have always been one of China's advantages in international economic competition.

However, in recent years, Chinese manufacturing has gradually lost its competitiveness. The rising labor prices in China have made China no longer in the world's most labor-saving countries, the advantages of cheap labor in China are

gradually disappearing. It is reported that the wage level in China has increased significantly in the past 10 years. The average wage in the manufacturing industry exceeds that of most Southeast Asian countries and South Asian countries. The labor cost advantage has become a thing of the past.

According to the chart 4.6, we can calculate the exposure if Huawei put their production and find labor force in Vietnam.

Table 4.14 *Costs per hour of China and Vietnam (in USD)*

Costs per hour (in USD)		
	2018	2019
China	5.51	5.78
Vietnam	2.73	2.91

(Source: based on chart 4.6)

The cost per hour is 2.73 USD in Vietnam in 2018, accounts for 49.55% of China's per hour cost in 2018. Thus, it saves 50.45% of the costs in USD. We assume that Huawei's production line has 2000 employees, every employee works for eight hours one day, and work 250 days one year. Thus, for example, we multiply these numbers to get the total costs of wages of Vietnam and China in 2018 are 10.9 million USD and 22.04 million USD. Savings from labor costs are almost 11 million USD. Similarly, the labor cost in 2019 are 11.64 million USD and 23.12 million USD. It is easy to see that labor costs in China are much higher than in Vietnam.

Table 4.15 *New foreign exchange exposure in millions of USD*

	2018*	2019*
Revenues	6055	7494
Expenditures	1211	1499
Labor costs for one year	10.92	11.64
Exposure	4833	5984

(Source: own calculation)

From the table 4.15 we can see, comparing with the previous foreign exchange exposure in USD, the new exposure becomes smaller. Hence, for Huawei's production of mobiles and other products, we think it is better not to spend much expenditures, costs of wages in China's market, but to look for some other countries and regions that have much cheaper labor, such as Vietnam. Hence, Huawei could reduce production costs and labor costs. And if Huawei pay for expenditures in USD, they will make a smaller exposure. Because expenditures for labor in Vietnam paid in USD will increase the expenditures of Huawei, thus, the exposure will become smaller.

4.4.3.2 Asking for loans in foreign currency

To buy more inputs abroad can reduce the transaction exposure, so in addition to reducing the labor costs, it is also possible for Huawei to apply for loans or credits in foreign currency, such as EUR. As we have mentioned in the previous part of thesis, compared to China, Europe has a lower interest rate, which can also reduce the exposure. Therefore, we will calculate the savings between Chinese and European interests.

Here is a part of Huawei's loan in 2017 from the annual report:

(CNY million)		Interest rate	Total	1 year or less	1 to 5 years	over 5 years
Intra-group guaranteed bank loans:						
Euro (EUR)	variable	0.73% p.a.	775	-	775	-
South African Rand (ZAR)	variable	8.89% p.a.	341	-	341	-
Nepalese Rupee	fixed	9.00% p.a.	95	95	-	-
CNY	variable	4.41% ~ 4.90% p.a.	910	91	614	205
			2,121	186	1,730	205

(Source: annual report of Huawei in 2017)

March 3, 2018, the European Central Bank announced the interest rate resolution and maintained the three major benchmark interest rates unchanged, but in the statement adjusted the wording of asset purchases. The European Central Bank kept the main refinancing rate unchanged at 0.0%; keeping the overnight lending rate unchanged

at 0.25%; keeping the overnight deposit rate unchanged at -0.40%, both in line with expectations.

The European Central Bank stated in a public statement that the 30 billion euros monthly asset purchase plan will continue until the end of September 2018 and will continue for longer if necessary until the inflation path is continuously adjusted. The ECB stated that the policy rate will remain low until the QE program ends "long time later."

According to the provisions of loan interest rates in China and Euro Area, we assume that Huawei will make a five-year loan of 10 billion CNY in China, (we use the current exchange rate, 7.7525 CNY/EUR), comparing to a five-year loan of 1,289,906,481 EUR in Euro Area. The lending rate for one to five years in China is 4.75% p.a., and in Euro Area is 0.25% p.a. After the calculation, we get the following table:

Table 4.16 *Comparison of loans between China and Euro Area*

<i>(Exchange rate: 7.7525 CNY/EUR)</i>	China (CNY)	Euro Area (EUR)
Loan amount	10,000,000,000	1,289,906,481
Months	60	60
Lending rate	4.75% p.a.	0.25% p.a.
Monthly payments	187,569,120	21,635,326
Total interest	1,254,147,187	8,213,070
Total to be repaid	11,254,147,187	1,298,119,551
Total to be repaid in CNY	11,254,147,187	10,063,671,819

(Source: own calculation)

From the table 4.16, we can see that the same amount of money with same period that borrow from China and Euro Area will have different interests and different amount to be repaid. They are 11,254,147,187 CNY and 10,063,671,819 CNY. It is much lower to be repaid in Euro Area than in China. Thus, it is better for Huawei to ask for loan or credit in EUR.

With lower interest rates, there will be smaller exposure for Huawei, so based on the previously calculated income and expenditures in EUR, add the amount of loan repayments for one year, we can calculate a new exposure in table 4.17.

Table 4.17 *New foreign exchange exposure in millions of EUR*

	2,018*	2,019*
Revenues	24,081	29,291
Expenditures	4,816	5,858
Payments for loan of one year	260	260
Open exposure	19,005	23,173

(Source: own calculation)

With hedging, the exposure becomes smaller, from 19265 million of EUR to 19005 million of EUR in 2018, and from 23432 million of EUR to 23173 million of EUR in 2019. It reduces the fluctuation of gain and loss. The loan payment of one year in EUR is an added part of expenditures of Huawei, thus, the expenditures increase, and the difference between revenues and expenditures gets smaller. Hence, the open exposure of Huawei becomes lower comparing to the previous data.

5 Conclusion

The aim of this thesis is to analyze and manage the foreign exchange exposure of the chosen company in China, to do this, it is necessary to research the foreign exchange rate, foreign exchange system and foreign exchange risk, and analyze the impact of foreign exchange risk on Chinese enterprises combining with China's exchange rate system. And through case study, it is shown that how to manage the exposure of foreign exchange, so that Chinese enterprises that have overseas development and business can make better financial managements with foreign exchange risk.

The first chapter was introduction, the aim of this thesis and contents of each chapter were explained. The second chapter was the theoretical part, including definition and development of exchange rate, types of exchange rate system, foreign exchange risk and the management of it. China's exchange rate system was introduced in the third chapter, including how it changed and reformed in different periods and what characteristics it had.

The fourth chapter was the application part of foreign exchange rate risk and its management of Huawei company. In this chapter, we briefly introduced the Huawei company, such as its history, corporate affairs, and achievements. Then we used Huawei as our case object to analyze its foreign exchange exposure and its management.

Huawei has foreign currency exposure related to buying, selling, and financing in foreign currencies. It has a very good development overseas, due to the accelerated pace of digital transformation of Huawei and a growing share of the smartphone market, it earned 163,854 million of CNY in revenue from Europe in 2017, and 156,509 million of CNY in America. Total revenues in foreign market are 298,529 million of CNY in 2017, and EUR is the main currency. We calculated forward rates according to difference between interest rates. By using the spot exchange rate of 2016 and 2017 and forward exchange rate of 2018 and 2019, the revenues and expenditures of Huawei in USD and EUR were calculated.

And we showed the exchange rate changes' trends of CNY/EUR and CNY/USD from 2014 to 2018 in the fourth chapter. Huawei actually faced with a lot of foreign exchange risks, during a long period of development in the past, Huawei's awareness of foreign currency risk was relatively weak, it focused on market development as the core concept and ignored the actual exchange risks and operating benefits. But in recent years, with the positive development of the company's business development, the company gradually realized the necessity of foreign exchange risk management, and thus strengthened the risk management in this area.

In the last part of the fourth chapter, some methods and suggestions about how to manage the foreign transaction exposure for Huawei were done through three kinds of scenarios: no hedging, external hedging with forward contract and internal hedging. We measured transaction exposure in monthly and yearly terms.

Through the calculation and analysis, we found that through no hedging, Huawei got profits of 377.04 million of CNY in 2016 and 569.26 million of CNY in 2017, because the EUR appreciated. And it was the highest amount of profits among these three scenarios. As for the external hedging, we proposed to hedge 25% or 75%, it is not wise to hedge 100%, because not all revenues are paid on time. With forward contract of 75% of exposure, there were losses in 2017, about 50.09 million of CNY, because the forward exchange rate was lower than the spot exchange rate. But the exchange rate is changing, so having the forward contract is protection against bigger losses. As for 25% of exposure, there were both profits, 304.46 million of CNY and 362.81 million of CNY in 2016 and 2017, but they were lower than the profits with no hedging.

The internal hedging was done through reducing labor costs and paying in foreign currencies, asking for loans or credits in EUR. We compared labor force and costs in China and Vietnam, the lower labor costs made Vietnam an attractive alternative. Hence, we think Huawei had better transfer productions to Vietnam to save the labor costs. Through calculation, we got new foreign exchange exposure, 4833 million of USD in

2018 and 5984 million of USD in 2019, comparing with the previous data, Huawei made a smaller exposure in foreign exchange risk management. Then we calculated the expenditures for loans in EUR and in CNY, with same amount of loans, the total to be repaid in China and Euro Area were about 11.3 billion of CNY and 10 billion of CNY. The lending rate in Euro Area was much lower than in China, so the expenditures for loans were lower in Euro Area. Hence, added the yearly payment of loans in EUR, the exposure becomes smaller, from 19265 million of EUR to 19005 million of EUR in 2018, and from 23432 million of EUR to 23173 million of EUR in 2019. It reduced the fluctuation of gain and loss.

For Huawei, the company is already doing some managements to deal with the foreign exchange risks. Apart from these ways, they need to use more methods to reduce its transaction exposures. And every country has its own exchange rate system, different from other countries. Hence, Huawei should pay attention to the significant influence of government and domestic rules, make the management with the considering of the actual situation of China. According to China's research and the actual situation. the main hedge methods used by Chinese enterprises include forward exchange sales and foreign exchange swaps, trade finance, changing the trade settlement method and so on. The foreign exchange forward contract has become the main tool for the management of exchange rate risk of enterprises and has enhanced the ability of enterprises to adapt to the floating exchange rate system. Enterprises that use foreign exchange forwards and swaps to hedge are more than 40%.

Also, Huawei has to make more reduction of exposure through buying more inputs in foreign currencies or reducing the labor costs, the internal hedging must be much bigger. Through buying more inputs abroad, such as asking for more loans in foreign currencies, Huawei will make the transaction exposure become much lower.

With the changes of times, China's exchange rate system is changing and gradually improving. The Central Bank indirectly intervenes in the foreign exchange market through major trader systems and it will allow the market's power to determine the trend

of the CNY exchange rate, this change proves that the CNY exchange rate system is gradually being transformed into a floating exchange rate system. These multiple factors increase the exchange rate risks faced by Chinese enterprises.

More and more Chinese enterprises are entering the global markets nowadays, they are actually facing with a lot of foreign exchange risks. Hence, Chinese enterprises must pay more attention and start with the management of the foreign exchange risk and improve the enterprises' mechanism for dealing with foreign exchange risk.

Bibliography

Books

[1] COPELAND, Laurence S. *Exchange Rates and International Finance*. 5th ed. Harlow: Financial Times Prentice Hall, 2008. ISBN 978-0-273-71027-1.

[2] JOHN Locke, Nicholas Capaldi, Gordon Lloyd. *Some Considerations of the Consequences of Lowering the Interest and Raising the Value of Money*. 2010. ISBN 9780470948293.

[3] KRUGMAN, P.R., M. OBSTFELD, and M.J. MELITZ. *International Economics: Theory and Policy*. 9th ed. Harlow: Pearson Addison-Wesley, 2012. ISBN 978-0-273-75409-1.

[4] MADURA, Jeff. *International Financial Management*. 10th ed. USA: South-Western Cengage Learning, 2010. 709p. ISBN 978-1-4390-3833-8.

[5] MOOSA, Imad A. and Razzaque H. BHATTI. *The Theory and Empirics of Exchange Rates*. Singapore: World Scientific, 2010. ISBN 978-981-283-953-4.

[6] THOMAS A, Pugel. *International Finance*. 15th ed. 2012. 800p. ISBN 978-0073523170.

[7] VDM, Verlag, Dr. Müller. *Principles of Political Economy*. 2006. 608p. ISBN 978-3865507549.

Electronic Bibliography

[8] Definition of exchange rate. [07.03.2018]. Available on: https://en.wikipedia.org/wiki/Exchange_rate

[9] Types and contents of exchange rate system. [12.03.2018]. Available on: https://en.wikipedia.org/wiki/Exchange-rate_regime

[10] The reform of China's exchange rate system. [16.03.2018]. Available on: <http://wiki.mbalib.com/wiki/%E4%BA%BA%E6%B0%91%E5%B8%81%E6%B1%87%E7%8E%87%E6%94%B9%E9%9D%A9>

[11] Theory of exchange rate risk management. [25.03.2018]. Available on: <http://www.baike.com/wiki/%E5%A4%96%E6%B1%87%E9%A3%8E%E9%99%A9%E7%AE%A1%E7%90%86>

[12] Huawei's basic information. [06.04.2018]. Available on: <http://www.huawei.com/cn/about-huawei/corporate-information>

[13] Huawei's annual report in 2016 and 2017. [10.04.2018]. Available on: <http://www.huawei.com/cn/press-events/annual-report/2017>

[14] Interest rates of China, America, and Europe. [16.04.2018]. Available on: <https://tradingeconomics.com/country-list/interest-rate>

[15] Historical data of exchange rate of CNY/EUR. [16.04.2018]. Available on: <https://www.investing.com/currencies/eur-cny-historical-data>

[16] Exchange rate changes' trend of CNY/USD and CNY/EUR between 2014 to 2018. [18.04.2018]. Available on: <https://www.bloomberg.com/quote/EURCNY:CUR> and <https://www.bloomberg.com/quote/USDCNY:CUR>

[17] Manufacturing labor costs per hour for China, Vietnam, Mexico from 2016 to 2020. [21.04.2018]. Available on: <https://www.statista.com/statistics/744071/manufacturing-labor-costs-per-hour-china-vietnam-mexico/>

List of abbreviations

FX	Foreign exchange
CNY	Chinese yuan
USD	Us dollar
EUR	Euro
SDR	Special Drawing Right
REDUX	Exchange rate dynamics redux
SAFE	Synthetic for Forward Exchange
IMF	International Monetary Fund
NDF	Non-deliverable forward
OTC	Over-the-Counter
ICT	Information communications technology
PBXs	Private branch exchanges
R&D	Research and Development
CIS	Commonwealth of Independent States
IBM	Integrated Supply Chain Management
PCT	Patent Cooperation Treaty
IFAA	Internet Finance Authentication Alliance
EMEA	Europe, the Middle East, and Africa
CF	Cash flow
ECB	European Central Bank

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Ostrava dated 27.04.2018

Xuexin Chen

Student's name and surname

List of annexes

Annex 1: Revenues of Huawei from 2016 to 2017

Annex 2: Historical exchange rate of CNY/EUR in 2016 and 2017

Annex 1: Revenues of Huawei from 2016 to 2017

Sales (Revenues) (in millions of CNY)		
	2016	2017
CHINA	236,512	305,092
Europe	156,509	163,854
Asia Pacific	67,500	74,427
America	44,082	39,285
Other	16,971	20,963
Total sales	521,574	603,621

Annex 2: Historical exchange rate of CNY/EUR (Monthly)

	2016	2017
January	7.1487	7.4308
February	7.1316	7.2640
March	7.3390	7.3369
April	7.4167	7.5118
May	7.3281	7.6569
June	7.3830	7.7478
July	7.4166	7.9656
August	7.4534	7.8486
September	7.4996	7.8604
October	7.4405	7.7270
November	7.2918	7.8718
December	7.3034	7.8067