UNIVERSITY OF LJUBLJANA
FACULTY OF ECONOMICS

MASTER'S THESIS

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UPRAVLJANJE Z VALUTNIM TVEGANJEM V STOPANSKI BANKI SKOPJE

(MANAGING THE FOREIGN EXCHANGE RISK IN STOPANSKA BANKA)

Ljubljana, March 2009   MIRJANA TRAJANOVSKA

C O N T E N T S

1 Introduction

This dissertation is prepared within the context of MBA studies at the University of Ljubljana, Faculty of Economics, and it explores several subject fields that are very important for analyzing the issue of foreign exchange risk and foreign exchange risk management.

1.1 Study's definition and objectives

Risk management is a structured approach for managing uncertainty related to a danger that some action will happen which will affect the normal operations and / or their results. Hence, there are many activities that are related to risk management such as risk assessment, risk strategies and risk mitigation techniques.

The objective of risk management is to reduce different risks related to a pre-selected domain to the level acceptable for the business entity. As such, it involves all means available including personal resources, hardware and software solutions for implementation of different risk models.

In general, there are tree main groups of risk: <u>credit, market and operational risk</u>. Furthermore, market risk treats several aspects i.e. equity, interest rates, currency and commodity risk.

International commerce has rapidly increased for individuals and entities to conduct international business and trading activities. Significant changes in the international economic and political landscape have led to uncertainty regarding the direction of foreign exchange rates. This uncertainty leads to volatility and the need for an effective vehicle to hedge foreign exchange rate risk and/or interest rate changes while at the same time effectively ensuring a future financial position.

Foreign exchange rate risk (FER) exposure is common to virtually all who conduct international business or trading. Buying & selling of goods or services denominated in foreign currencies can immediately expose one to foreign exchange rate risk. Foreign exchange risk management consists of the following steps:

- Identification and quantification of foreign exchange exposure
- Development of the most appropriate risk management strategy

- Implementation of FER strategy
- Monitoring the results.

1.2   Purpose of the research and structure of the thesis

Purpose of the research presented in this document is:

- To examine whether the foreign exchange risk management in Stopanska Banka is in compliance with the best banking practices.

The hypothesis of this research <u>is to assert that Stopanska Banka has established appropriate foreign exchange risk management that it manages very successfully</u>.

In order to confirm the above hypothesis, the following questions should be answered:

- How is the foreign exchange risk management treated from the theoretical point of view?
- What are the determinants of FER?
- How to identify FER?
- What is the best banking practice, which tools and instruments for FERM are used?
- What are the regulatory aspects for FERM in Macedonia?
- How does Stopanska Banka cope with the issue of FERM?

The thesis is structured in five chapters.

<u>The first chapter</u> of this thesis is an Introduction that treats the objectives and purpose of the research.

<u>The second chapter</u> explores the foreign exchange rates as key reason for the appearance of the foreign exchange risk. This chapter also focuses on the different foreign exchange rate systems and implications of each of them. Different FE theories will be briefly presented.

<u>The third chapter</u> analyzes the definition of FER, identification of FER, and different models for its measuring.

<u>The fourth chapter</u> refers to the foreign exchange risk in Stopanska Banka, with brief introduction of the banking environment and regulatory framework. This chapter

presents in more detail the activities that create risks in SB, operating procedures and tools, as well as instruments used for hedging. Many reports that are used for identification and hedging of risks are described as well.

The last, fifth chapter is conclusion of the hypothesis.

2   Foreign exchange rate

Foreign exchange has been around as long as transactions have involved crossing country borders. The trade took place even before national boundaries and modern currencies existed. In the simplest of terms, exchange rates are determined by the international supplies and demands for each currency.

But once a country or region established money of their own, then currency transactions became necessary. This need was not always the case if the two currencies were convertible. In other words, if two countries both used gold coins and the values of those coins were based entirely on the weights of the metal they contained, then there should have been a single exchange rate between those currencies. An economic agent may demand foreign exchange for one of several reasons:

1. Importing: to facilitate purchase of foreign goods and services (for simplicity, it is assumed that exporters require customers to bear the burden of currency conversion–it makes little difference in practice);

2. Direct foreign investment: to purchase foreign assets for ownership purposes (assumed to be held for relatively long periods);

3. Portfolio investment: to purchase foreign assets for capital gain (assumed to be held for relatively short periods);

4. Official reserve management: to purchase foreign currency for purposes of exchange-rate intervention.

The overall demand for foreign currency is a sum of the demands associated. (Harvey, John T., p. 201).

Numerous empirical studies of the international asset pricing model have rejected the joint hypothesis of integrated world capital markets and the equilibrium pricing model of some kind. Stock returns are affected by not only a world factor but also a national

factor. The empirical relationship between stock returns and exchange rate movements has been examined by: Solnik (1984), Adler and Simon (1986) and Eun and Resnick (1988). Eun and Resnick documented a significant correlation for seven industrial countries. Solnik, Adler and Simon found a weak correlation between stock market indices and currency movements. However, this weak correlation between stock indices and currency movements does not rule out a significant cross-sectional relationship between currency movements and stock returns due to the differences in the international links, the international competition, and the import-export patterns among firms. (Fang, Hsing et al., 1996, p.474).

Even though there are different forms of money, the biggest contributor of this topic is Thomas Gresham, who in 1558, stated that bad money always drives out good money. This means that currency made of lower precious metal content tends to drive "better money" out of circulation. Prior to 1900, most national currencies were backed by gold and / or silver (and were, therefore, in a sense, immediately and directly comparable).

Britain adopted a gold standard around 1820. Germany and France also moved to a gold standard for their currencies in 1871 and 1876, respectively. In China, they resisted a gold-backed currency because of the dominance of silver in that part of the world. On paper, the official gold 63 standard in the United States set the value of one ounce of gold at USD 20.67—from 1834 through 1933. The United States, during the recovery after the Civil War, guaranteed that the Dollar could actually be converted into gold (but not silver) via the Coinage Act of 1873 despite many political objections in the ensuing years.

Prior to 1900, international trade was not an important part of many countries. Mainly what was grown in one country was used within the frames of that economy in the all stages of production. However, with the development of the transportation technology, the interaction between geographies becomes more important.

Until global depression in the late 1920s and 1930s, most major currencies, except German Mark, were freely traded and were convertible into precious metal. However, the Great depression changed all of that. In April 1933, with 25% US workforce unemployed and the world attacked by global depression, the President Franklin Delano Roosevelt abandoned the gold standard by suspending the US Dollar convertibility and ordering US citizens to surrender their gold holdings.

According to many theoreticians, the reason for the great depression was the reduction of money supply in the economy, which fell by one third between 1929 and 1933.

At the Breton Woods Conference in July, 1944, the fixed exchange rate system was settled in which most of the European currencies were pegged to US Dollar, and in order to provide more stability to the world economic order, the Dollar was pegged to gold. The fixed exchange rates were supposed to be maintained within a band of +/-1% trough the active intervention of the governments and central banks of the ratifying countries. It was also understood that a periodic adjustment of those par rates may be needed in case of serious international trade imbalances.

The Breton Woods System worked well for 25 years. The first unsuccessful bank intervention working under the model of the Breton Woods system was noticed in 1967, when GBP (the British pound sterling) was attacked. The Vietnam war, which the US government financed by printing money, attributed to weakening the value of US Dollar, so the President Nixon suspended gold convertibility and price and wages controls were imposed. Later, the US Dollar was devalued.

Although the fixed exchange rate system seemed to be falling apart, the European Economic Community (EEC) recognized the difficulties that could result from a floating exchange rate system among the larger European currencies and established tight "bands" between member countries. The European countries, though, continued to feel the need for some stability between their currencies. The European Monetary System was established in 1978-1979, for more effective maintenance of the exchange rates of the major European currencies relative to each other, trough support of the European Central Banks. The name of this new arrangement was the Exchange Rate Mechanism (ERM). Although there was occasional pressure, this system was effective for a number of years.

In 1992, the Maastricht Treaty replaced the old European Economic Community (EEC) with the new European Union (EU), but, in 1993, the bands were widened from 2.25% to 15% and so, there was effectively a floating exchange rate system in place among the important European currencies. According to many theoreticians, this was the key factor for introduction of Euro as single European currency for the largest and most important European economies.

2.1   Fixed and floating rates

Fixed foreign exchange rate is the rate set by the Central Bank or the Government in one country and maintained as official exchange rate. In order to maintain it at a stable level, the Central Bank buys and sells foreign exchange at the market in return to the currency for which the domestic currency is pegged. For long-term maintenance of the

foreign exchange stability, the Central Bank has to maintain sufficient level of foreign exchange reserves.

Another, less used method for maintaining a fixed exchange rate is by simply making it illegal to trade currency at any other rate. This is difficult to enforce and often leads to a black market in foreign currency. Nonetheless, some countries are highly successful at using this method due to government monopolies over all money conversion. This is the method employed by the Chinese government to maintain a currency peg or tightly banded float against the US dollar. Throughout the 1990s China was highly successful at maintaining a currency peg by using a government monopoly over all currency conversion between the Yuan and other currencies. (Fixed Exchange rate, Wikipedia).

There have been divided opinions about the optimal foreign exchange model for a long time that reflected the evolution of the world economy and conduct of the monetary policy. The long existence of the gold standard enables a monetary anchor as a standard for financial transactions.

The Breton Woods system was established, with the U.S. dollar as the center-piece, as a system of fixed, but variable exchange rates, and when this system came under stress in the 1960s, older debates of the relative merits of fixed versus flexible exchange rates developed new life and the original Breton Woods system was replaced by a system of floating exchange rates among the major currencies. The question of the appropriate exchange rate regime for other currencies remained open to debate. In the early 1990s, influential economic arguments supported fixed exchange rate regimes as an anchor to break hyper- and high inflation in many emerging markets. The emerging market financial crises later in that decade, however, prompted a reassessment of these arguments and an emphasis on the virtues of flexible exchange rate regimes for large emerging markets, increasingly integrated into the global financial system. It became clear that economies operating in the framework of a flexible exchange rate system were better able to absorb shocks from open capital markets than economies with a pegged rate.

There are few points regarding the selection of the foreign exchange currency regime:

- Under fixed exchange regime, the economic activity in one country adjusts to the foreign exchange rate. In the floating regime, the exchange rate is a reflection of the economic activity. In both cases, the fundamentals are key determinants of the economic stability and prosperity.

- There is no optimal regime; both models have strengths and weaknesses. Fixed regime has been seen as transparent and simple anchor of the monetary policy. In countries with less developed financial sectors, economic agents may not have the financial tools to hedge long-term currency risks. But adjustments under fixed exchange rates can be very gradual and require significant flexibility in prices in the domestic economy, especially in the face of changing capital flows. The inflexibility of fixed exchange rates can place an enormous constraint on monetary policy and create pressures in a downturn for pro-cyclical fiscal policies. Fixed exchange rate regimes in economies where interest rates are higher than rates denominated in the anchor currency can also give debtors an incentive to borrow unheeded in the anchor currency, leaving national balance sheets vulnerable to exchange rate changes. To withstand currency pressures under fixed exchange rate regimes, authorities have an incentive to put in place harmful capital controls (to be sure, such pressures can exist under flexible regimes as well). A country cannot maintain a fixed exchange rate, open capital market, and monetary policy independence at the same time. In recent years more large emerging market countries, increasingly integrated into the global financial system, have begun to adopt policies that target low inflation and establish central bank independence.

- Flexible exchange rates have the advantage that they allow a country to pursue an independent monetary policy, rather than have its own monetary policy set by an anchor currency country. Experience shows that flexible exchange rates are more resilient in the face of shocks, and are better able to distribute the burden of adjustment between the external sector and the domestic economy. Also, fixed exchange rates have the effect of sharply reducing or eliminating exchange rate volatility. Protection from volatility dampens the incentives for financial markets to develop hedging products and financial instruments, so risk is more likely to be transferred to the public sector effectively.

The conditions under which fixed or floating exchange rates yield higher welfare depend on the exact nature of price stickiness and on the degree of risk-sharing opportunities.

The traditional approach to fix versus floating exchange rate questions examines the short-run stabilizing properties of each regime. Friedman's (1953) famous argument for floating exchange rates stipulates that in the long run the exchange rate system does not have significant real consequences. His reasoning is that the exchange rate system is ultimately a choice of monetary' regimes. At the end, monetary' policy does not matter for real quantities, he argues, but in the short run it does. (Engel, Charles, p. 518-519).

The reason for introduction of the currency peg[1] is connected with the stability of the currency. More particularly, in today's world of developing nations, the countries might choose fixed exchange regime in order to create more stable environment for attracting foreign investors. With the currency peg, the investor will always know his/her investment value and will not have worries about daily fluctuations. However, fixed regimes can often lead to severe financial crisis since it is not easy to maintain the peg at long run. The experience of Mexican, Asian and Russian countries is evidence that in an attempt to maintain a high value of the local currency they became overvalued meaning that the government could not meet the demands to convert the local into foreign currency at the pegged rate. Under such circumstances, the investors in a panic to protect their investments attempt to convert their local currencies into foreign currency thus spending huge amount of foreign currency reserves, which were not sufficient to protect the currency peg anymore.

As the world practice shows, countries with pegs are not sophisticated and developed markets, so the peg is aimed to help them create price stability.

Some countries might choose to have "relatively floating" exchange rate regime, where it reassess the value of the peg periodically and than make appropriate change if needed. Usually, the change is local currency devaluation. This model is mainly used in the transition countries.

The main criticism of fixed exchange rate is that flexible exchange rates serve automatically to adjust the balance of trade. When a trade deficit occurs, there will be increased demand for the foreign (rather than domestic) currency which will push up the price of the foreign currency in terms of the domestic currency. That in turn makes the price of foreign goods less attractive to the domestic market and thus pushes down the trade deficit. Under fixed exchange rates, this automatic re-balancing does not occur.

Unlike the previous, the floating exchange rate model is determined by the private market trough supply and demand. Floating rate is often known as "self-correcting" because the differences in supply and demand automatically correct the currency value. If the demand of one currency is low, its value will decrease thus making the import of goods more expensive and stimulating the demand for local goods. Such situation in turn will stimulate new job positions that will increase the demand of the currency and that will affect the increase of its value, which is the opposite reaction from the previous one.

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[1] In the Republic of Macedonia the rate of the local currency-MKD is pegged with EUR in a relatively floating band

In reality, no currency is wholly fixed or floating. In the period 1870-1914 there was a global fixed exchange rate regime. Currencies were linked to gold and such regime allowed unrestricted capital mobility and stability in world trade. A free floating exchange rate increases foreign exchange volatility. This may cause serious problems, especially in emerging economies. These economies have a financial sector with one or more of the following conditions:

- High liability dollarization
- Financial fragility
- Strong balance sheet effects

When liabilities are denominated in foreign currencies while assets are in the local currency, unexpected depreciations of the exchange rate deteriorate bank and corporate balance sheets and threaten the stability of the domestic financial system. For this reason, emerging countries appear to face greater fear of floating, as they have much smaller variations of the nominal exchange rate, yet face bigger shocks and interest rate and reserve movements. This is the consequence of frequent free floating countries' reaction to exchange rate movements with monetary policy and/or intervention in the foreign exchange market.

2.2 Fluctuations in exchange rates

A market based exchange rate changes whenever the values of either of the two component currencies change. A currency tends to become more valuable whenever the demand for it is greater than the available supply. It becomes less valuable whenever the demand is less than available supply.

Increased demand for a currency is due to either an increased transaction demand for money, or an increased speculative demand for money. The transaction demand for money is highly correlated to the country's level of business activity, gross domestic product (GDP), and employment levels. The more people there are unemployed, the less the public as a whole will spend on goods and services. Central banks typically have little difficulty adjusting the available money supply to accommodate changes in the demand for money due to business transactions.

The speculative demand for money is much harder for a central bank to accommodate, but they try to do this by adjusting interest rates. An investor may choose to buy a currency if the return (that is the interest rate) is high enough. The higher countries interest rates the greater demand for that currency. It has been argued that currency

speculation can undermine real economic growth, in particular since large currency speculators may deliberately create downward pressure on a currency in order to force that central bank to sell their currency to keep it stable (once this happens, the speculator can buy the currency back from the bank at a lower price, close out their position, and thereby take a profit).

The variance of the rationally expected rate of depreciation exceeds the variance of the foreign exchange risk premium if that coefficient exceeds the value 0.5 (and vice versa). Empirical results indicate that the variance of the risk premium typically exceeds the variance of the rationally expected rate of depreciation. (Granziol M.J, 1985, p.59).

In a pure floating exchange rate system the exchange rate is determined as the rate that equalizes private market demand for a currency with private market supply. The central bank has no necessary role to play in the determination of a pure floating exchange rate. Nonetheless, sometimes central banks desire, or are pressured by external groups, to take actions (i.e. intervene) to either raise or lower the exchange rate in a floating exchange system. When central banks do intervene on a semi-regular basis, the system is sometimes referred to as a "dirty float." There are several reasons such interventions occur.

The first reason central banks intervene is to stabilize fluctuations in the exchange rate. International trade and investment decisions are much more difficult to make if the exchange rate value is changing rapidly. Whether a trade deal, or international investment, is good or bad often depends on the value of the exchange rate that will prevail at some point in the future. If the exchange rate changes rapidly, up or down, traders and investors will become more uncertain about the profitability of trades and investments and will likely reduce their international activities. As a consequence, international traders and investors tend to prefer more stable exchange rates and they often pressure governments and central banks to intervene in the foreign exchange market whenever the exchange rate changes too rapidly.

The second reason central banks intervene is to reverse the growth in the country's trade deficit. Trade deficits (or current account deficits) can rise rapidly if a country's exchange rate appreciates significantly. A higher currency value will make foreign goods and services relatively cheaper, stimulating imports, while domestic goods will seem relatively more expensive to foreigners, thus reducing exports. This means a rising currency value can lead to a rising trade deficit. If that trade deficit is viewed as a problem for the economy, the central bank may be pressured to intervene in order to reduce the currency value in the foreign exchange market and thereby reverse the rising trade deficit.

There are two methods central banks can use to affect the exchange rate. The direct method is to intervene directly in the foreign exchange market by buying or selling currency. The indirect method is to change the domestic money supply.

2.3 Foreign exchange rate theories

There are many foreign exchange rate theories[2], which differ among each other and are used by different theoreticians.

Conventional theory relies on the exchange rate as the adjusting mechanism to achieve and maintain some degree of competitiveness. In a general equilibrium neoclassical framework, competitiveness between countries is determined by the comparative cost principle; and the real exchange rate is determined by the Purchasing Power Parity (PPP) doctrine. Thus, any country would always find at least one industry in which it is competitive. If the exchange rate is adequately managed to achieve and maintain such competitiveness, foreign trade will tend to be balanced. Moreover, the adjusting mechanism is assumed to be automatic if the exchange rate is absolutely flexible and free trade prevails.

According to the PPP doctrine, a currency becomes overvalued when the domestic inflation rate exceeds the rate of inflation in its trading partners and this, presumably, is what produces a loss of competitiveness and consequently a trade deficit in the balance of payments. Thus, to correct the deficit, the nominal exchange rate should be adjusted to the real exchange rate, either directly by the authorities in a fixed exchange rate regime, or through the market mechanism in a flexible exchange rate regime. If the theory is correct, then, in the long run, the nominal exchange rate should freely move around the real exchange rate as defined by PPP.

Most empirical models test to what extent this theory is true; that is, they test the market efficiency in adjusting from one exchange rate level to the other, under assumed free market and competition. However, the PPP theory has some important flaws. On the one hand, it involves the use of price indexes; which, while expressing the effects of supply and demand conditions in general, do not necessarily show the degree of competitiveness of the economy, but only the general price level. The cost structure would in this case be more revealing. On the other hand, the evidence shows that in the 1970s and 1980s, depreciation policies have not significantly corrected current account

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[2] Arsovski Dragoljub (1998), Rizici vo bankarskototo rabotenje, Economy Press

deficits in most economies. Instead, they have had a very strong impact on domestic inflation rates.

One modern alternative to comparative cost theory is the consideration of absolute advantages, based on technology differences, as major determinants of trade flows and competitiveness.

According to this approach, known as the 'technology gap' argument, the international competitiveness of a country, or industry, is primarily based on its absolute advantages in terms of product technology and labor productivity. With regard to exchange rate determination, since the 1970s there are theories that emphasize unit labor costs as determinants of the real exchange rate. These are essentially of two types: one within the neoclassical tradition, and the other based on Ricardo's theory of relative prices. In other models, the real exchange rate, defined as the 'nominal exchange rate and competitiveness, exchange rate adjusted unit labor costs for traded goods', is estimated by econometric techniques, using data of various countries. The estimation shows that this real exchange rate is determined by three structural variables: the ratio between the two countries of income growth, income distribution, and national specialization. (Ruiz-Nápoles, Pablo, p.79). Some of the most important theories are briefly presented in the forthcoming text.

2.3.1   Purchasing Power Parity

Purchasing Power Parity is one of the oldest exchange-rate determination theories. There is voluminous and ever-growing literature on testing the PPP. It is generally recognized that although the real exchange rate does not seem to tend toward PPP in very long run, PPP is unable to account for short-run fluctuations in exchange rates and deviations from PPP are frequently large and volatile. (Chang Shu, p. 242).

The Purchasing Power Parity is also known as the inflation theory of exchange rates. Under this model, the price of one good should be equal at home and abroad. Absolute PPP theory was firstly presented to deal with the price relationship of goods with the value of different currencies.

The theory requires very strong preconditions. Generally, Absolute PPP holds in an integrated, competitive product market with the implicit assumption of a risk-neutral world, in which the goods can be traded freely without transportation costs, tariffs, export quotas, and so on. However, it is unrealistic in a real society to assume that no costs are needed to transport goods from one place to another. In the real world, each economy

produces and consumes tens of thousands of commodities and services, many of which have different prices from country to country because of transport costs, tariffs, and other trade barriers.

According to PPP, when exchange rate changes the offset price level changes; hence, some argue, there is no exposure to exchange risk. For example, if the annual rate of inflation in France is 10 percent higher than the one in the United States, the French franc will depreciate vis-à-vis the U.S. dollar by a corresponding percentage. As a result, there is no relative price risk. If one unit of American wheat exchanged for two units of French wine in the beginning of the year, that same exchange ratio would hold until the end of that year. The mere fact that the franc has depreciated need not cause concern. The effect on the American exporter of wheat or on the French exporter of wine is non-existent because the change in nominal prices in the respective national currencies has been compensated for by the exchange rate change. (Dufey, Ginter et al, 1983, p.55).

Absolute PPP is generally viewed as a condition of goods market equilibrium. Under absolute PPP, both the home and foreign market are integrated into a single market. Since it does not deal with money markets and the balance of international payments, it is considered to be only a partial equilibrium theory, not the general one. Perhaps, because absolute PPP requires many strong impractical preconditions, it fails in explaining practical phenomenon, and signs of large persistent deviations from absolute PPP have been documented.

Although absolute PPP may contradict practical data, this does not imply market failure. It may simply reflect the inability, without expenses, to instantaneously move goods from one place to another. Thus, a more general version of PPP, called the relative purchasing power parity, was introduced to describe the relationship of prices with the exchange rate in different economies. Generally, relative PPP can be derived by assuming that transaction costs are proportionately related to price level.

It is clear that absolute PPP is built on the assumption of a perfect market setting with high information efficiency in both foreign exchange and goods markets. Allowing for transport costs, tariffs and trade barriers, absolute PPP may not hold. Many empirical studies show that neither absolute nor relative PPP holds in the short run, since the adjustment is a time-consuming process. Though controversies over PPP remain, it seems that only relative PPP can hold in the long run, and this may explain why PPP was thought by some to be a long-run equilibrium condition instead of a casual relationship.

Relative PPP implies that the real exchange rate is constant. However, this theory itself does not explain why the real exchange rate should remain constant over a particular period of time.

Empirically, evidence against PPP may be caused by inaccuracy of the price index measuring the inflation rate for the countries studied, the statistical procedure, or the problem of simultaneous determination of both price and exchange rate.

Theoretically, deviations of the PPP from its practical value may also be caused by differences in production technology and consumer's preferences toward risk and uncertainty.

In an idealized world, without information and transactions costs, explicit or implicit contract periods, and other obstacles to instantaneous price adjustments, deviations from various equilibrium conditions such as purchasing power parity, the law of one price, and both the domestic and intimation Fisher effect would not occur; neither would firms be exposed to exchange risk.(Dufey, Gunter et al.1983).

2.3.2   Theory of Interest Rate Parity

Until the Great Depression in 1929, most economies relied on the free market system with limited economic role for government. However, the great depression was a period of decline in production, high unemployment and declining incomes. The "invisible hand" did not seem to be working. However, an economist by the name of John Maynard Keynes offered an alternative theory. He suggested that one might rely on the invisible hand for the most parts. But occasionally, the invisible hand may need a helping hand from the visible hand - the government. He advocated government intervention in the free market economy to correct for its deficiencies. His theory eventually gained support and became predominant. The period after the Great Depression saw more government interventions in the economy. In today's modern economies government plays a significant role. The appropriate level of government intervention has remained the subject of many debates among economists and other social scientists. The market economies in which government plays a significant role are referred to as mixed economies. US economy is an example of a mixed economy. (Definition and methodology   of   economics,   http://faculty.collegeofthedesert.edu/hshahidi/notes /notes01.htm.)

In the period of the gold standard, the monetary authorities discovered that the exchange rates were influenced by the changes in the monetary policy. For instance,

the increase in the domestic interest rates is usually followed by the appreciation of the home currency and the fall of the domestic interest rates is followed by the depreciation of the home currency. This means that the price of the assets is the main determinant of the exchange rate variation.

As it was stated, the Theory of Interest Parity was developed by Keynes in 1923 and it links the exchange rates, interest rates and inflation. There are two variants of this theory: covered interest rate parity and uncovered interest rate parity.

Covered interest rate parity

Covered Interest Rate Parity is also known as Interest Parity Condition. It assumes that the 'interest rate return from different currencies will be the same if one covers against currency changes.' That is, the returns will be the same when you invest USD in US deposits and the same dollar amount in a foreign currency, and protect that investment by using a forward on the foreign currency. (What is interest rate parity? www.nobletrading.com/blogs/2008/10/what-is-interest-rate-parity.html).

Uncovered interest rate parity

A parity condition stating that the difference in interest rates between two countries is equal to the expected change in exchange rates between the countries' currencies. If this parity does not exist, there is an opportunity to make a profit.

Figure 1: Uncovered interest rate parity

$$(i_1 - i_2) = E(e)$$

- "i_1" represents the interest rate of country 1
- "i_2" represents the interest rate of country 2
- "$E(e)$" represents the expected rate of change in the exchange rate

Source: Investopedia, www.investopedia.com/terms/u/uncoveredinterestrateparity.asp

2.3.3   The Mundell-Fleming Model

Modern international macroeconomics progresses in two main ways. First, techniques or paradigms developed in mainstream micro or macro theory have been applied in an international setting. Second, researchers probe more deeply, using both theoretical and empirical methods, into the classic issues that define international economics as a distinct field–the implications of sovereign governments and national monies, of partial or complete cross-border factor immobility, of transport costs and cross-border information asymmetries that impede or even prevent trade. Frequently, prominent International policy problems, even crises, provide the inspiration for new explorations. (Obstfeld, Maurice, 2000)

Enduring contributions typically reflect both modes of progress. For example, the Mundell–Fleming model illustrates how specific combinations of monetary and fiscal policy changes can cause temporary changes in the balance of payments relative to an equilibrium level. The exchange rate therefore becomes the transmission mechanism by which equilibrium is restored to the balance of payments. It must be noted within this that the degree of capital mobility is crucially important.

In an economy with high capital mobility, suppose that a central bank decides to loosen monetary policy by cutting interest rates. One must assume that it does this because of weak growth conditions and benign inflation. As aforementioned, lowering interest rates reduces the incentive to hold interest-bearing securities, thus on a relative basis increasing the incentive to hold money or cash. This increase in money demand can be put to work buying goods and should reflect a future rise in national income and growth. The standard monetary model thinks of this in terms of rising demand causing price increases, which in turn causes the exchange rate to depreciate via the concept of PPP.

Looking at it another way, rising domestic demand will cause rising import demand, which should mean deterioration in the trade balance. This in turn should eventually lead to depreciation in the exchange rate to allow the trade balance to revert back towards an equilibrium level. Another way of expressing the same thing is that lower interest rates cause capital outflows, which in turn cause depreciation in the exchange rate. Conversely, the basic assumption is that tighter monetary policy through higher interest rates should lead either to weaker domestic demand and a positive swing in the trade balance, or capital inflows, both of which should cause exchange rate appreciation. (Henderson, Callum, 2006, p.27).

The invention of money as medium of exchange among different economies has many contributions especially in reducing the transaction costs. But, this effect is not paid

attention in the previous theories, thus the effect on the nominal exchange rates of monetary policy is not clear from the previous models. This model considers three markets: goods, money and assets, and it is mainly used to analyze the impacts of monetary policy and fiscal policy. When the goods market is not in full employment, it shows how to use the fiscal policy and monetary policy in order to adjust economy not new employment equilibrium. Since only two of three markets are independent, this model establishes a link between the money market and goods market.

One of the most important issues addressed by the model is the so-called trilemma, which states that perfect capital mobility, monetary policy independence and a fixed exchange rate regime cannot be achieved simultaneously. Specifically, it argues that a country cannot sustain monetary policy independence in a fixed exchange rate regime with perfect capital mobility.

The model also forecasts that the exchange rate level is perfectly correlated with the level of monetary supply in the long run, and thus that monetary policy may only play a trivial role. Another important implication is that devaluation may lead to further devaluation if fiscal discipline, inflation and balance of payments are not well managed or if the assets market produces a self-fulfilling bubble.

Finally, the impact of devaluation on the improvement of the current account may be weakened if an economy is heavily reliant on the re-export processing industry.

3   Foreign exchange risk and management

3.1   Definition of the foreign exchange risk

The evidence of financial globalization is everywhere. Capital flows are unprecedented large. The stocks of cross-border financial assets and liabilities are growing year by year. Yet, at the same time, there is ample anecdotal evidence that flows of financial capital have not driven the returns expressed in common currency terms to equality. Some of this can be attributed to the fact that de facto impediments to arbitrage might still exist. Or it could also be that arbitrageurs are not able to access sufficient amounts of capital in order to drive expected profits to zero. This last interpretation appears to be consistent with the large practitioner literature focused on the 'carry trade'. (Ito, Hiro et.al, 2007, p.419).

The foreign exchange risk (hereinafter: FER) represents a probability any trade actor to be exposed to negative material effects due to the change in the value of the local currency compared with other international currency. Every country has its own national currency that serves as legal tender for executing and/or expressing all concluded deals. However, the transactions are not performed only within the framework of one national economy, but there are plenty of deals which are concluded in the currencies different than the national one.

Traditional explanations of foreign exchange exposure have generally suffered from two deficiencies: the failure to place the foreign exchange problem within the context of the firm trying to maximize shareholder wealth, and the attempt to deal with exposure management on a transaction by transaction basis. (Eaker , Mark R., 1981, p.419)

The value aspect of the relations among currencies is called inter-parity relations, expressed as foreign exchange rates, which are essential for understanding the foreign exchange risk.
Treasurers and CFOs need to step back and perform a comprehensive evaluation of the risks represented by these challenges. Most corporate treasurers and CFOs are primarily concerned, and rightfully so, with eliminating volatility risk and its effect on earnings. Nevertheless, you must also consider compliance, operational and other economic factors.
From an economic perspective, beyond mitigating risk to earnings, it has to understand the cost-effectiveness of your currency program. (Koester, Wolfgang, issue may/2007).

To measure the difference in pricing of exchange risk between foreign and local investors, one needs to distinguish between foreign and local investors in the same market. It is, however, impossible to differentiate between the two investor groups unless the market is separated by regulation, each group investing as a result in a segmented market. In general, foreign investors require different risk premiums for foreign exchange risk present in international investments than do local investors. The source (exchange risk of underlying share returns or currency translation risk) and magnitude (low or high premium) of differences in exchange risk pricing, however, vary significantly across countries. (Kwon, Taek Ho, 2005, p.558 and p.571).

The foreign exchange rate, said with simple words, represents a price for buying/selling one currency for another, or gives the answer on how many units of one currency can be exchanged for one unit of another currency. Each foreign exchange asset has its own price, regardless whether it is cash or foreign exchange.

Basically, there are three types of FX risk exposure:

- Translation exposure[3], originating from the accounting aspects of evidencing the deals. This exposure refers to already past actions.
- Transaction exposure, which arises from actions contained in sales. For example, if the values of any future sales deals devalue, it will affect the profit/loss account of an economic agent.
- Economic exposure, which is a combination of translation and transaction exposure.

The transaction exposure is very important, but it can not be easily predicted.

Economic exposure measures how the value of a firm, the present value of all future cash flows, will be affected by changes in foreign exchange rates. While future foreign currency receivables / cash inflows or payables / cash outflows give rise to the transaction exposure of a firm to foreign exchange market uncertainties individually and respectively, these future foreign currency cash inflows and cash outflows give rise to the economic exposure of a firm to foreign exchange market uncertainties collectively and as a whole, accompanied by a changing economic environment that affects, among others, the discount rate applied to the firm. Yet, firms with economic exposure do necessarily have transaction exposure. Domestic cash flows can also be affected by foreign exchange risk, due to the effect of foreign exchange rate changes on foreign competition in the domestic market.

The empirical research in foreign exchange risk management investigates firms' transaction exposure hedging activities to assess their effectiveness in economic exposure management. However, economic exposure has implications beyond the reach of transaction exposure – the scope of economic exposure management is wide and the horizon of economic exposure management is distant. If transaction exposure management is tactical and technical, then economic exposure management is strategic and fundamental. (Wang, Peijie, 2005, p.289).

The economic exposure is correct measure for exposure, but there is a problem not only in quantifying it but also in using it as a basis for hedging risk action. For example, the accounting uses the currency value applicable at a particular time, and in case of devaluation, its new value from the moment when the currency devalues, without taking the possible offset coming in the future. In hedging the liabilities on the basis of the anticipated receipts, the company could have to book a loss to reported earnings at the end of the year and wait until following year for the receipts and offset the profit. One

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[3] The impact of the translation exposure is booked on a daily basis trough re-valuation of the Bank's positions.

solution to this problem might be the company to allocate enough reserves until anticipated profit materializes.

In the innards of most company's financial systems are cracks in the foundation. Using rigorous analytical tools and techniques, in nine cases out of ten, it is apparent that fundamental transaction data quality issues stem from two sources: underlying multicurrency accounting and system configuration issues. Basic multicurrency accounting processes are one of the most common culprits. Improperly recorded and relieved foreign currency transactions account for the kinds of errors that often go undetected by the finance team or treasury organization, unless or until the problem has a material impact on FX gains / losses. Examples include recording business transactions denominated in a foreign currency, in local currency or reconciling accounts in local currency and not transaction currency.

The other big issue stems from foreign currency-related re-measurement. Companies, both large and small, use a combination of manual and systematic re-measurement as a part of the monthly close processes, many times in an uncoordinated fashion. Add a global multi-accounting / ERP system environment, and the issues increase geometrically. The process is further complicated by the re-measurement functionality in accounting / ERP systems, which require continuous maintenance and administration to keep up with changes within the enterprise. As a result, accounts that should be re-measured often are not, while accounts that are being re-measured shouldn't be. In most cases, companies are unaware of the problem and have no processes/controls or analytics to monitor the results. (Edens, Corey, 2008, p.63).

Several authors have viewed the foreign exchange exposure as the sensitivity of economic value or stock prices to change in relations to exchange rate changes. This approach emphasizes the valuation of cash flows rather than accounting balances and focuses on the total effect of exchange rate fluctuations taking into account coincident changes in prices, costs, and demand and production technology. (Heckman, Christine R., 1983, p. 59).

But, there is some bias in the accounting profession related to FER. In the absence of adequate reserves, there are following possibilities: 1) to hedge the liability or the major part of it, or 2) to establish a meaningful compromise for certain items.

Foreign exchange rate fluctuations affect banks both directly and indirectly. The direct effect comes from banks' holdings of assets or liabilities with net payment streams denominated in a foreign currency. Foreign exchange rate fluctuations alter the domestic currency values of such assets. This explicit source of foreign exchange risk is

the easiest to identify, and it is the most easily hedged. The indirect sources of risk are more subtle, but just as important. A bank without foreign assets or liabilities can be exposed to currency risk because the exchange rate can affect the profitability of its domestic banking operations. For example, consider the value of a bank's loan to a U.S. exporter. An appreciation of the dollar might make it more difficult for the U.S. exporter to compete against foreign firms. If the appreciation thereby diminishes the exporter's profitability, it also diminishes the probability of timely loan repayment and, correspondingly, the profitability of the bank. In this case, the bank is exposed to foreign exchange risk: a stronger dollar decreases its profitability. In essence, the bank is "short" dollars against foreign currency. Any time the value of the exchange rate is linked to foreign competition, to the demand for loans, or to other aspects of banking conditions; it will affect even "domestic" banks.

Foreign exchange risk also may be linked to other types of market risk, such as interest rate risk.

The estimates of the market risk, interest rate risk and foreign exchange risk continue to be unstable. The estimates of risk differ by bank type and period. As interest rate risk declines, foreign exchange risk increases. Foreign exchange risk is positively related to foreign or less developed country loan exposure and negatively related to off-balance sheet exposure, implying foreign exchange risk explained by un-hedged foreign loan activity. Market continues to reflect changes in the economic and regulatory situation of commercial banks in the pricing of bank stocks. (Wetmore, Jill.L., 1994, p.594).

Interest rates and exchange rates often move simultaneously. So, a bank's interest rate position indirectly affects its overall foreign exchange exposure. The foreign exchange rate sensitivity of a bank with an open interest rate position typically differs from that of a bank with no interest rate exposure, even if the two banks have the same actual holdings of assets denominated in foreign currencies. Again, the vulnerability of the bank as a whole to foreign exchange fluctuations depends on more than just its holdings of foreign exchange.

The Foreign exchange risk findings need to be announced for appropriate treatment. When managers choose not to disclose all the relevant information in their possession in their financial statements, there is an information gap between the managers and users, and consequently a lack of transparency. (Marshal, Andrew I., 2007, p. 705).

3.2 Identifying foreign exchange exposure

The first step in managing the foreign exchange risk is to acknowledge that such risk does exist and that managing it is in the interest of the firm and its shareholders. The next step, however, is much more difficult: the identification of the nature and magnitude of foreign exchange exposure. In other words, identifying what is at risk, and in what way. The task of gauging the impact of exchange rate changes on an enterprise begins with measuring its exposure, that is, the amount, or value, at risk. This issue has been clouded by the fact that financial results for an enterprise tend to be compiled by methods based on the principles of accrual accounting.

Unfortunately, this approach yields data that frequently differ from those relevant for business decision-making, namely future cash flows and their associated risk profiles. As a result, considerable efforts are expended to reconcile the differences between the point-in-time effects of exchange rate changes on an enterprise in terms of accounting data, referred to as accounting or translation exposure, and the ongoing cash flow effects which are referred to as economic exposure. Both concepts have their grounding in the fundamental concept of transactions exposure. Transaction exposure is an exposure in a simple transaction.

The typical illustration of transaction exposure involves an export or import contract giving rise to a foreign currency receivable or payable. On the surface, when the exchange rate changes, the value of this export or import transaction will be affected in terms of the domestic currency. However, when analyzed carefully, it becomes apparent that the exchange risk results from a financial investment (the foreign currency receivable) or a foreign currency liability (the loan from a supplier) that is purely incidental to the underlying export or import transaction; it could have arisen in and of itself through independent foreign borrowing and lending. Thus, here are simply involved foreign currency assets and liabilities the value of which is contractually fixed in nominal terms.

While this traditional analysis of transaction exposure is correct in a narrow, it is really relevant for financial institutions, only. With returns from financial assets and liabilities being fixed in nominal terms, they can be shielded from losses with relative ease through cash payments in advance (with appropriate discounts), through the factoring of receivables, or via the use of forward exchange contracts, unless unexpected exchange rate changes have a systematic effect on credit risk. However, the essential assets of enterprises have non-contractual returns, i.e. revenue and cost streams from the production and sale of their goods and services which can respond to exchange rate

changes in very different ways. Consequently, they are characterized by foreign exchange exposure very different from that of firms with contractual returns.

The concept of accounting exposure arises from the need to translate accounts that are denominated in foreign currencies into the home currency of the reporting entity. Most commonly the problem arises when an enterprise has foreign affiliates keeping books in the respective local currency. For consolidation purposes, these accounts must somehow be translated into the reporting currency of the parent company. In doing this, a decision has to be made on the exchange rate that is to be used for the translation of different accounts. While income statements of foreign affiliates are typically translated at a periodic average rate, balance sheets pose a more serious challenge.

To a certain extent this difficulty is revealed by the struggle of the accounting profession to agree on appropriate translation rules and the treatment of the resulting gains and losses. A comparative historical analysis of translation rules may best illustrate the issues at hand. Over time, U.S. companies have followed essentially four types of translation methods. These four methods differ with respect to the presumed impact of exchange rate changes on the value of individual categories of assets and liabilities. Accordingly, each method can be identified by the way in which it separates assets and liabilities into those that are "exposed" and are, therefore, translated at the current rate, i.e. the rate prevailing on the date of the balance sheet, and those whose value is deemed to remain unchanged, and which are, therefore, translated at the historical rate.

The current / concurrent method of translation divides assets and liabilities into current and concurrent categories, using maturity as the distinguishing criterion; only the former are presumed to change in value when the local currency appreciates or depreciates vis-à-vis the home currency. Supporting this method is the economic rationale that foreign exchange rates are essentially fixed but subject to occasional adjustments that tend to correct themselves in time. This assumption reflected reality to some extent, particularly with respect to industrialized countries during the period of the Breton Woods system. However, with subsequent changes in the international financial environment, this translation method has become outmoded; only in a few countries is it still being used.

Under the monetary / no - monetary method all items explicitly defined in terms of monetary units are translated at the current exchange rate, regardless of their maturity. No monetary items in the balance sheet, such as tangible assets, are translated at the historical exchange rate. The underlying assumption here is that the local currency value of such assets increases (decreases) immediately after a devaluation (revaluation) to a

degree that compensates fully for the exchange rate change. This is equivalent of what is known in economics as the Law of One Price, with instantaneous adjustment.

A similar but more sophisticated translation approach supports the so-called temporal method. Here, the exchange rate used to translate balance sheet items depends on the valuation method used for a particular item in the balance sheet. Thus, if an item is carried on the balance sheet of the affiliate at its current value, it is to be translated using the current exchange rate. Alternatively, items carried at historical cost are to be translated at the historical exchange rate. As a result, this method synchronizes the time dimension of valuation with the method of translation. As long as foreign affiliates compile balance sheets under traditional historical cost principles, the temporal method gives essentially the same results as the monetary / no - monetary method. However, when "current value accounting" is used, that is when accounts are adjusted for inflation, the temporal method calls for the use of the current exchange rate throughout the balance sheet.

The temporal method points to a more general issue: the relationship between translation and valuation methods for accounting purposes. When methods of valuation provide results that do not reflect economic reality, translation will fail to remedy that deficiency, but will tend to make the distortion very apparent.

The accounting model of exposure has many critiques. Even with the increased flexibility of accounting standards, users of accounting information must be aware that there are three system sources of error that can mislead those responsible for exchange risk management:

1. Accounting data do not capture all commitments of the firm that give rise to exchange risk.
2. Because of the historical cost principle, accounting values of assets and liabilities do not reflect the respective contribution to total expected net cash flow of the firm.
3. Translation rules do not distinguish between expected and unexpected exchange rate changes.

Regarding the first point, it must be recognized that normally, commitments entered into by the firm in terms of foreign exchange, a purchase or a sales contract, for example, will not be booked until the merchandise has been shipped. At best, such obligations are shown as contingent liabilities. More importantly, accounting data reveals very little about the ability of the firm to change costs, prices and markets quickly. Alternatively, the firm may be committed by strategic decisions such as investment in plant and facilities.

The second point surfaced in our discussion of the temporal method: whenever asset values differ from market values, translation - however sophisticated - will not redress these shortcomings. Translation rules do not take account of the fact that exchange rate changes have two components: (1) expected changes that are already reflected in the prices of assets and the costs of liabilities (relative interest rates), and (2) the real goods and services, the basic rationale for corporate foreign exchange exposure management is to shield net cash flows, and thus the value of the enterprise, from unanticipated exchange rate changes.

This thumbnail sketch of the economic foreign exchange exposure concept has a number of significant implications, some of which seem to be at variance with frequently used ideas in the popular literature and apparent practices in business firms. Specifically, there are implications regarding (1) the question of whether exchange risk originates from monetary or no-monetary transactions, (2) a reevaluation of traditional perspectives such as "transactions risk," and (3) the role of forecasting exchange rates in the context of corporate foreign exchange risk management.

An assessment of the nature of the firm's assets and liabilities and their respective cash flows shows that some of them are contractual, that is to say fixed in nominal, monetary terms. Such returns, earnings from fixed interest securities and receivables for example, and the negative returns on various liabilities are relatively easy to analyze with respect to exchange rate changes: when they are denominated in terms of foreign currency, their terminal value changes directly in proportion to the exchange rate change. Thus, with respect to financial items, the firm is concerned only about net assets or liabilities denominated in foreign currency to the extent that maturities, actually "durations" of assets, are matched.

What is much more difficult, however, is to gauge the impact of an exchange rate change on assets with no contractual returns. While conventional discussions of exchange risk focus almost exclusively on financial assets, for trading and manufacturing firms at least, such assets are relatively less important than others. Indeed, equipment, real estate, buildings and inventories make the decisive contribution to the total cash flow of those firms. And returns on such assets are affected in quite complex ways by changes in exchange rates. The most essential consideration is how the prices and costs of the firm will react in response to an unexpected exchange rate change. For example, if prices and costs react immediately and fully to offset exchange rate changes, the firm's cash flows are not exposed to exchange risk since they will not be affected in terms of the base currency.

3.3 Measures of foreign exchange risk

The direct sources of foreign exchange risk can be measured by tallying up the net positions on a bank's assets and liabilities that are denominated in foreign currencies. By itself, this measure of direct exposure can provide only a narrow assessment of the bank's exchange rate sensitivity since - as described above - the value of the bank's domestic assets will also vary with the exchange rate. Narrow as it is, this gauge provides the "standardized method" for assessing a bank's overall foreign exchange exposure; specifically, under the aegis of the Basel Committee on Banking Supervision, central bankers from Europe, Japan, and North America proposed in 1993 the use of such methods in assessing the exposure to a variety of market risks, including foreign exchange risk.

Responding in part to such limitations, the Basle Committee ultimately allowed for a more flexible approach to evaluating foreign exchange and other market risks (Basle Committee 1996). By 1997, bank regulators in all of the represented countries may choose to assess exposure (against which they must hold a cushion of capital) either by using the standardized method or by using banks' own proprietary in-house models. Use of the latter option, known as the "internal models" approach, is subject to several requirements for prudence, transparency and consistency. When used appropriately, it can provide a significant improvement over the standardized method.

The internal models approach enables banks to take a broader view of their foreign exchange risk than does the standardized method. The internal models approach focuses on evaluating the risks arising from banks' trading activities. The approach is well-suited to incorporate the correlation between, say, the value of interest rate instruments and the value of foreign exchange. In principle, the internal models approach allows each bank to measure its exposure carefully enough to incorporate the relationships among even its non-trading operations. However, even at its best, the internal models approach is limited in its range of coverage.

An even broader approach to assessing banks' foreign exchange risks can be obtained from an analysis of banks' equity returns. Equity returns reflect changes in the value of the firm as a whole. So, if the value of a bank as a whole is sensitive to changes in the exchange rate, the bank's equity returns will mirror that sensitivity. Whether from direct or indirect sources, foreign exchange exposure will be reflected in the behaviour of returns. Thus, the exchange rate sensitivity of a bank's equity returns provides a comprehensive measure of its foreign exchange exposure.

3.4 FERM tools and models

Economic actors that are placing their money have exposure to fluctuations in all kinds of financial prices, as a natural by-product of their operations. Financial prices include foreign exchange rates, interest rates, commodity prices and equity prices. The effect of changes in these prices on reported earnings can be overwhelming. Often, it can be seen that companies say in their financial statements that their income was reduced by falling commodity prices or that they enjoyed a windfall gain in profit attributable to the decline of their reporting currency.

One reason why companies attempt to hedge these price changes is because there are risks that are peripheral to the central business in which they operate. For example, an investor buys the stock in a company in order to gain from its management of the company's business. The investor does not buy the stock in order to take advantage of a falling currency, knowing that the company exports over 75% of its product to overseas markets. This is the insurance argument in favour of hedging. Similarly, companies are expected to take out insurance against their exposure to the effects of theft or fire.

By hedging, in the general sense, we can imagine the company entering into a transaction which sensitivity to movements in financial prices offsets the sensitivity of their core business to such changes. Hedging is not a simple exercise nor is it a concept that is easy to pin down. Hedging objectives vary widely from firm to firm, even though it appears to be a fairly standard problem, on the face of it. And the spectrum of hedging instruments available to the corporate treasurer is becoming more complex every day.

There is another reason for hedging the exposure of a firm to its financial price risk and that is to improve or maintain the competitiveness of the firm. Companies do not exist in isolation. They compete with other domestic companies in their sector and with companies located in other countries that produce similar goods for sale in the global marketplace.

Companies that are the most sophisticated in this field recognize that the financial risks produced by their businesses present a powerful opportunity to add to their bottom line while prudently positioning the firm so that it is not pejoratively affected by movements in these prices. This level of sophistication depends on the firm's experience, personnel and management approach. It will also depend on their competitors. If there are five companies in a particular sector and three of them engage in a comprehensive financial

risk management program, then that places substantial pressure on the more passive companies to become more advanced in risk management or face the possibility of being priced out of some important markets. Firms that have good risk management programs can use this stability to reduce their cost of funding or to lower their prices in markets that are deemed to be strategic and essential to the future progress of their companies.

Most importantly, hedging is contingent on the preferences of the firm's shareholders. There are companies whose shareholders refuse to take anything that appears to be financial price risk while there are other companies whose shareholders have a more worldly view of such things. It is easy to imagine two companies operating in the same sector with the same exposure to fluctuations in financial prices that conduct completely different policy, purely by virtue of the differences in their shareholders' attitude towards risk.

3.4.1   Hedging

The risk aversion is an attitude where the economic actor is concerned with the negative impact of the shocks. From the perspective of the risk-averse producer, shocks can only have an adverse (or at best neutral) effect (a reduction in output, etc.). Consequently, risk aversion can be defined in terms of the concerns and outlook of the agent and not the derivatives of a utility function. Contrary to the traditional concept of risk-aversion, a major advantage of this framework is that the attitude toward risk is not Synonymous with the attitude toward wealth. (Alghalith, Moawia , 2008, p.80).

Hedging foreign exchange helps companies to remove the uncertainty from their financial forecasts. The exchange rate may not be as favourable as last year, but at least it means that a more accurate budget can be drawn up with no nasty surprises at the end of the fiscal year.

FX hedging is best when it is simple. For many companies buying simple forward contracts that will deliver the foreign currency in three to six months can be the most effective   way   to   hedge   FX   exposure.   (Feeling   the   FX   volatility, www.financialdirector.co/uk/ 2154091).

A natural hedge is an investment that reduces the undesired risk by matching cash flows, i.e. revenues and expenses. For example, a company that opens a subsidiary in another country and borrows in the local currency to finance its operations, even though the local interest rate may be more expensive than in its home country: by matching the

debt payments to expected revenues in the local currency, the parent company has reduced its foreign currency exposure.

Optimum hedging theories postulate that hedging firms should be less exposed to foreign exchange rate movements than non-hedging firms. Since data on hedging activities are mostly incomplete and difficult to obtain – the exact nature of derivative positions is usually not disclosed – the variables are used of proxy firms' incentives to hedge in order to examine the relationship between hedging activities and estimated exchange rate exposures. Because managing foreign exposure entails high costs that offer operational, financial and informational economies of scale, firms have a motive to hedge if hedging benefits are greater than costs. Larger firms with economies of scale in hedging cost, therefore, are more likely to hedge than smaller firms. On the contrary, smaller firms face higher bankruptcy costs as their probability of financial distress is higher. Correspondingly, these firms have more incentives to hedge than larger firms and should be less exposed to foreign currency risks. Thus, the impact of firm size on exposure is ambiguous and has to be empirically verified.

According to some authors, there are three strategies for hedging exposure to foreign exchange risk: (1) to hedge always, (2) to hedge or not to hedge depending on the expected spot exchange rate, and (3) not to hedge always. The three strategies are applied to historical data involving three currencies to obtain results showing that there is no significant difference in the performance of the three strategies if the measure of performance is the domestic currency value of payables. In the long run, the three different strategies produce more or less similar results, indicating that there is no need to worry about hedging exposure to foreign exchange risk. Even the availability of perfect forecasts does not make any difference for the outcome.

The discussion leads to the following conclusion. If an agent faces a regularly arising foreign currency exposure over a long period of time, and provided that on no occasion is the exposure significantly large, hedging will be irrelevant, since various hedging strategies will produce similar results. However, if the exposure is large and arises only infrequently, then hedging is imperative to avoid the consequences of adverse movements in exchange rates. If the sole objective is to eliminate risk, then forward hedging should be used in preference to money market hedging. However, the advantages of hedging via currency options must be considered against the costs of using the appropriate instrument. (Moosa, Imad A., 2004, p.283).

Another way to measure a firm's probability of financial distress is its long-term debt ratio. Indeed, firms with higher debt ratios (DE) tend to be confronted with higher bankruptcy costs and have therefore more incentives to hedge, thereby reducing the

expected costs of financial distress. As these firms have more incentives to engage in hedging activities, they are expected to be less exposed to foreign exchange rate risk. In addition, a firm can reduce its probability of financial distress and agency costs by maintaining a larger short-term liquidity position. By keeping a higher quick ratio or by deciding on a more restrictive dividend payout policy, a firm is therefore less compelled to hedge and hence more exposed to exchange rate risk. (Muller, Aline, 2006, p.215).

There are many types of risk that are subject of hedging. Credit risk is the risk that money owing will not be paid by an obligor. Since credit risk is the natural business of banks, but an unwanted risk for commercial traders, naturally an early market developed between banks and traders: that involves selling obligations at a discounted rate. Currency hedging (also known as Foreign Exchange Risk hedging) is used both by financial investors to parse out the risks they encounter when investing abroad, as well as by non-financial actors in the global economy for whom multi-currency activities are a necessary evil rather than a desired state of exposure.

Currency hedging, like many other forms of financial hedging, can be done in two primary ways: with standardized contracts or with customized contracts (also known as over-the-counter or OTC).

The financial investor may be a hedge fund that decides to invest in a company in, for example Albania, but does not want to necessarily invest in the Albanian currency. The hedge fund can separate out the credit risk (i.e. the risk of the company defaulting), from the currency risk of the Albanian lek by "hedging" out the currency risk. Actually, this means that the investment is effectively a USD investment in Albania. Hedging allows the investor to transfer the currency risk to someone else that wants to take up a position in the currency. The hedge fund has to pay this other investor to take on the currency exposure, similar to insuring against other types of events.

Compared to other types of financial products, hedging may allow economic activity to take place that would otherwise not have been possible. The increased investment is assumed in this way to raise economic efficiency.

The foreign exchange exposure is increasing in inherent exposure. Also, exposure is decreasing in firm size. The larger firms may have lower inherent exposure due to their ability to use operational hedges. The financial hedges are effective in reducing firms' foreign exchange exposure. Financial hedging is associated with risk reduction for firms that use currency derivatives and/or foreign denominated debt. Particular interest is directed towards the impact from transaction exposure hedges and translation exposure hedges respectively. This is of interest because translation exposure and transaction

exposure tend to affect firms differently. The results suggest that there are risks reducing effects from transaction exposure hedges as well as from translation exposure hedges. A possible explanation for the latter is that translation exposure approximates the exposed value of future cash flows from operations in foreign subsidiaries (i.e. economic exposure). If so, by hedging translation exposure, economic exposure is reduced. (Hagelin, Niclas, et al., 2004, p.15).

There are many hedging instruments that serve investors for hedging their positions like forwards, forward rate agreements, currency options, on-deliverable forwards, futures and others, which are briefly described hereinafter.

<u>Forward</u> is a simple derivative and it is assumed that one party has long position and agrees to buy the underlying asset at a certain specified date in the future at today's agreed price. The other party has the opposite position i.e. short position and agrees to sell the asset at the agreed price. Here, we must distinguish between the forward price and the delivery price. Forward price is the market price that would be agreed today for the delivery of the assets. It is usually based on the spot market price corrected with the interest rate differentials of the contracted currencies. (Hull, John, C., 2000, p.437).

There is a large literature that documents the existence of significant differences between the forward exchange rate and its ex post realisation. The bias of the forward exchange rate as a predictor of the future spot exchange rate can be viewed as evidence of market inefficiency; or the existence of time-varying risk premia in a rational expectations world; or of irrational expectations, or possibly a combination of the above. Much of the literature is trying to explore the statistical properties of the ex post foreign exchange risk premium on the assumption of market efficiency. Any test of market efficiency needs to assume a specific equilibrium model, and therefore, will be a joint test of market efficiency and validity of the equilibrium model. (Panigirtzoglou, Nikolaos, 2004, p.321).

 <u>A Forward Rate Agreement</u> is a contract agreement specifying an interest rate amount to be settled at a pre-determined interest rate on the date of the contract. This is also known as FRAs.

<u>Currency option</u> is a contract that gives the owner the right, but not the obligation, to take (call option) or deliver (put option) a specified amount of currency at an exchange rate decided at the date of purchase. The advantages of the options are the following: they control more assets with less money, trade with the leverage because the costs are low, the position is much more sensitive to the underlying stock's price movements and

hence percentage returns might be much higher, trade for income if the designed strategy is channeled for constant income generating, reduce or eliminate risk.

Having in mind all above advantages, one might ask the questions why traders are not using options to eliminate the risk. The answer to this question is the fact that entry barriers are quite high and the options are very complex instruments and it is quite hard to understand them. (Cohen, Guy, 2005, p.33).

In considering whether an option should be perceived as a hedge or as a speculative instrument, a hedger's main concern is the value of the option at maturity. For this reason, any fluctuation of the option's intrinsic value during its life is important, but any change in its time value is largely irrelevant. Also, as the option is itself a hedge, no further hedging is required and therefore there are no extra costs. (Shani Samah, 2004, p.44).

<u>Non-Deliverable Forwards (NDF)</u> is strictly risk-transfer financial product similar to a Forward Rate Agreement, but only used where monetary policy restrictions on the currency in question limit the free flow and conversion of capital. NDFs are, as the name suggests, not delivered, but rather, these are settled in a reference currency, usually USD or EUR, where the parties exchange the gain or loss that the NDF instrument yields, and if the buyer of the controlled currency truly needs that hard currency, he can take the reference payout and go to the government in question and convert the USD or EUR payout. The insurance effect is the same, it's just that the supply of insured currency is restricted and controlled by government.

<u>Interest rate parity and Covered interest arbitrage</u> is a simple concept that two similar investments in two different currencies ought to yield the same return. If the two similar investments are not at face value offering the same interest rate return, the difference should conceptually be made up by changes in the exchange rate over the life of the investment. IRP basically gives the math to calculate a projected or implied forward rate of exchange. This calculated rate is not and cannot be considered a prediction or forecast, but rather is the arbitrage-free calculation for what the exchange rate is implied to be in order for it to be impossible to make a free profit by converting money to one currency, investing it for a period, then converting back and making more money than if you had invested in the same opportunity in the original currency.

<u>Hedging equity & equity futures</u> - Equity in a portfolio can be hedged by taking an opposite position in futures. To protect the stock picking against systematic market risk, one might short futures when buying equity.

The perfect hedge can be created using the money market. That hedge eliminates the random element in money market hedge and is the appropriate hedge to compare with a forward exchange hedge. The choice of hedging techniques depends on the validity of the interest parity relationship for a particular hedger. (Esker, Mark R., 1980, p.65).

3.4.1.1 Hedging translation exposure

Balance sheet risk is largely made up of foreign investments or debt structure of the bank. On a daily basis, there are a large number of deals that affect the balance sheet positions, or it is affected by the simple change of the fixing rate at which the booking should be done. Therefore, the ideal situation for a bank is to have squared balance sheet position at any time. However, this is neither possible nor real situation, so many banks have introduced their own policies how to manage the balance sheet position, which instruments to use and how frequent.

In case of a currency structure mismatch, the best possible hedging scenario is to make the opposite deals at rates that provide profit for the bank. For example, if a bank has approved loan, it has to sell amount equal to the approved loan for neutralizing the position, and opposite, to buy foreign currency when the loan is collected.

When a bank has a "long position" in a foreign currency, it has surplus of assets in that currency versus its base or home currency. A sale in a foreign currency generates a receivable and consequently contributes to a long position or exposure in that currency until it is paid and converted. A bank can offset that asset and the related currency risk exposure without entering into a forward FX contract or option by creating a counter liability. Such a counter liability, for foreign currency purposes, would be borrowing an amount of money in that foreign currency equal to that receivable. When the foreign buyer pays the receivable, the company can use the proceeds to pay off the foreign currency loan. However, there are costs associated with this type of hedging, such as those related to the loan itself as well as legal or other possible costs. This type of hedging is best suited for banks that engage in numerous foreign transactions and investments. (Diana, Tom, April 2007)

Usually, the banks dispose with the software applications that provide correct data on the position, so they close them at the end of day.

In some cases, where the rates are not favorable, the banks might intentionally leave open position, which becomes speculative position.

3.4.1.2 Hedging economic exposure

Economic risk reflects the degree to which the present value of future cash flows might be affected by exchange rate movements. Exchange rate moves are themselves related trough purchasing price policies to differences in inflation rate. For example, if the costs are in line with the exchange rate move, the original value is restored in line with purchasing price parity and economic exposure does not matter. However, cost inflation differs from general inflation rate, which in turn affects the competitiveness relative to competitors of the banks, so in this case economic exposure does matter and the best way to hedge it is to finance operations in the currency to which the bank's value is sensitive.

The reliance on the Treasury Centres to manage exchange rate hedges on a centralised basis is the "classic" approach adopted by most multinational companies. Such "netting" allows the reduction of the foreign exchange risk basis by taking advantage of natural hedges to enhance the efficiency of internal control by specializing and concentrating the expertise at treasury centre level obtaining in that way one single entity in the market that results in a better and fairer distribution of operations among banks.
The problem of netting opposite positions becomes apparent in a strategy model of the Cash Flow Hedge type. (Masquelier, François, 2005, p.19).

Figure 2. Netting
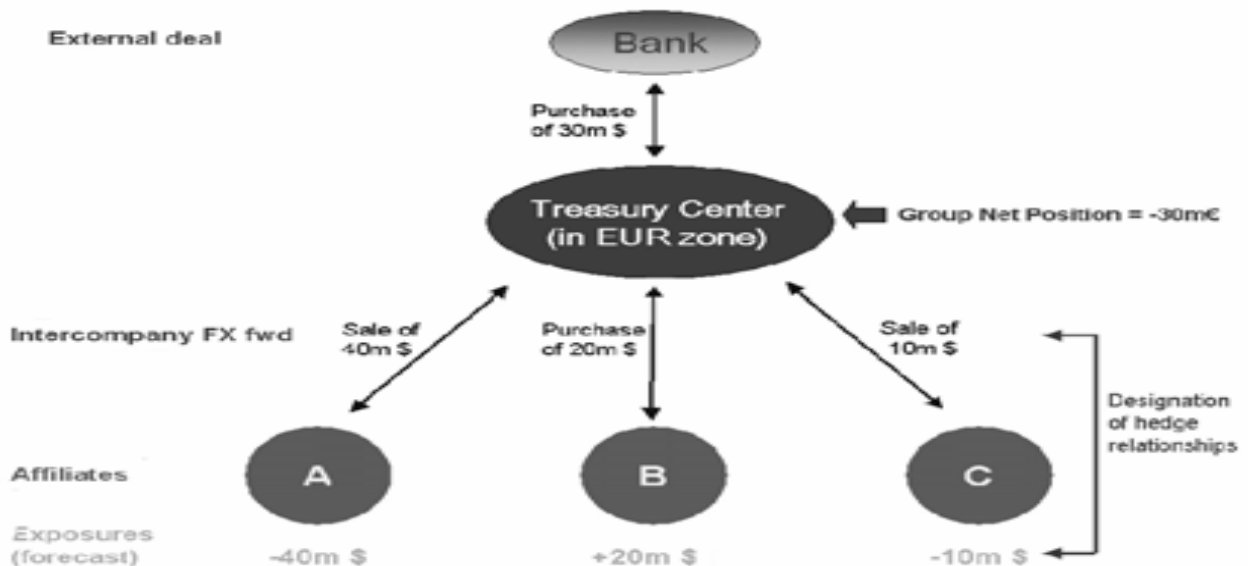
Source: Masquelier, François, July-September 2005, p.19

3.4.2 Value at risk (VaR)

Value at risk or VaR has been accepted by many banks and funds as a surrogate measure of various forms of risks, primarily market risk. Market risk originates from the open positions that are mark-to-market daily based on the uncertain movements in rates, prices, volatilities and other relevant parameters. It is used to determine at the outset risk elements that are in operation, and then to estimate the overall risk in the bank trading book or portfolio. After made calculation, the maximum loss percentage can be assumed   with certain probability (usually very high, around 99%), which is the maximum exposure or loss that can be taken with a given level of confidence.

VaR simplistically reduces risk to one figure in a financial report. Because of this simple presentation, there is a loss of data granularity and details. There is also hidden danger that a real distribution of events can hide a skewed distribution with a "fat tail". The normal distribution figures for variance and probability can cope with a skewed distribution, but alternative flavors of VaR have to be used in order to handle the fat tails. This would raise the probable chances of loss above the standard VaR figures computed.

The confidence in the forecasts should diminish when the wings of probability are going to be reached. A common in debt analysis of VaR often estimates that the portfolio is safe at the 99.9% likelihood cut-of line and this is a once in life-time or once in 1000 years event. If this unexpected loss event happens, then the company will go bust when it has not got the resources to cover the losses on the market.

The limit of 99.9% confidence is called "science fiction" by some risk professionals because the extreme events and crashes that emerged in the market in 1987 and 2001 confirm the fact that "once in life time" does not happen only once in 1000 years. There is a danger that investment behavior can be adversely biased by such a low theoretical probability.

The traders and market makers are not primarily aimed to offset their or their customers' position but they are required to work successfully meaning that they should quote the rates at any point of time and hedge thus open position with available instruments, which still bears basis risks.
In order to limit the positions, the market makers should stick to:

- The size of the open position

- The degree of the maturity in the mismatch position
- Change in the volatility position exposure
- Limits in the intraday position
- Stop / loss limit.

Such limits represent significant constraints in the day-to-day business of the traders. For example, intra-day limits are set to limit a dealer's ability to take excessive open exchange position during the dealing day. (Parker, Phil, 2003, p.305).

The most important shortcoming of such risk management system is the lack of integration of the risk management.

After many arguments about the appropriate way of managing the risk, the fundamental consensus appears that the most important point in the risk is the probability distribution of potential losses from the traders' positions regardless of the exact structure of those positions. This point was essential for developing the model Value-at Risk (VaR). This model gives more integrated concept of management of the risk trough embedded levels of risks into the formal limits within which the traders are required to operate.

VaR is an estimate of the loss from fixed sets of the trading positions over a fixed time horizon that would be equaled or exceeded with a specified probability. It should be pointed out that VaR is an estimate and not a uniquely defined value. The value of any VaR estimate depends on a stochastic process that is assumed to drive the random realizations of market data. The structure of the random process should be identified and specific parameters of that process must be calibrated. This process requires collecting historical data in order to define the representative sample, and still the question whether to weigh heavily the recent events compared with the past events is pending and depends on each particular situation. The final goal of this process is to arrive to the best estimate of the stochastic process driving the data over the sample period in which VaR is applied.

Another important point to VaR is the fact that the trading positions are fixed for the analyzed period. This point raises the question whether the estimated period is long enough. VaR does not address distribution of potential loses on those rare occasions when the VaR estimate is exceeded. VaR never reports the losses as "worst-case-scenario". Analysis of the rare but extreme loses must involve the alternative tools.

VaR involves two very important parameters:

- The holding period and
- The confidence level.

The usual holding period is one day or one month, but other periods could be observed as well depending on investments and time horizons. The holding period might be dependant on the liquidity of the markets. Other things being equal, the ideal holding period appropriate in any given market is the length of the time needed for regular liquidation of positions in the market. Holding period might also be specified by the regulators. For instance, the Basel Capital Accord stipulates that minimum holding period should be at least two weeks. The holding period might depend as well on:

- The assumption that portfolio does not change over the holding period
- The short holding period is necessary for model validation.

The confidence level depends on the purpose to which the risk measures are being put. For instance, high confidence level means low level of probability of the risk. The confidence level might be set, and it is recommended to be set, at a higher level than the prescribed regulatory levels. For the purpose of setting limits, many institutions prefer confidence levels lower than the amount of actual losses exceeding the related VaR estimate, which is somewhere between two and twelve times per year. These forces commit to take the limits seriously since losses over the limits can occur with reasonable likelihood.

From the mentioned above, it appears that parameters are dependent on each context.

We can illustrate this with one example:

Figure 3: Calculation of VaR

- Confidence level: 95%
- Holding period: one day
- Mean:0.005,
- NORMINV function in Excel for 5% gives =-1.64485
- NORMINV function in Excel for 1% gives =-2.32643
- Standard deviation: 0.02
- Portfolio: 1 M US $

VaR=-(0.005-1.64485 X 0.02) X 1 M=$27.897

Source: Navarrete, Enrique, 2006.p.4

If the confidence level is required to be higher, for instance 99%, VaR would be higher than or equal to the amount of $ 41.527.

The analytical approach gives the simplest model of estimating VaR. It is based on the parameters market data histories and could be easily provided. However, there are ready-made software solutions that are used by the banks.

This model has the criticism based on the probability that the distribution is equally dispersed and this assumption is rare case in the practice. In addition to this, other shortcomings of this model are the following:

- Market value sensitivities are not stable as market conditions change.
- It is inappropriate when there are discontinuous pay-offs in the portfolio.
- Financial institutions / banks require a method for reporting their risk that is readily understandable by non-financial executives, regulators and the investment public, and they also require this mechanism to be scientifically rigorous.

Value-at-Risk (VaR) analysis is exactly the model that satisfies this requirement. VaR is a number that expresses the maximum expected loss for a given time horizon, and for a given confidence interval, and for a given position or portfolio of instruments, under normal market conditions, attributable to changes in the market price of financial instruments.

Another example of VaR is presented bellow:

We need an assessment of what we can expect to be the worst case for the position overnight with a 95% degree of confidence. The VaR number gives us this measurement. For example, the portfolio manager might have 100 million dollars under management and an overnight-95% confidence interval VaR of 4 million dollars. This means that 19 times out of 20 his biggest loss should be less than 4 million dollars. Hopefully, he is making money instead of losing money. VaR might be expressed as a percentage of assets, in this case 4%.

VaR is also useful when we want to compare the risk of different portfolios. Let us now consider two portfolios: one investment manager makes a return of 30%, handily beating his target of 20%. The other investment manager makes a return of 20%, coming in on target. Who is the better fund manager? The answer is, as economists always say, it depends. To make an accurate judgment, many people believe that we need to compare the risk involved.

Let's say that first's investment manager average overnight-95% VaR was 7 million dollars and second's average overnight-95% VaR was 2 million dollars. One way of calculating first's return on risk capital is as follows: 30 million dollars / 7 million dollars = 428.6%. Using the same method, second's return on risk capital is: 20 million dollars / 2 million dollars = 1000.0%. It could be reasonably argued that the second manager is a better fund manager in that he used his risk capital more efficiently. How many people, when they invest in mutual funds, know anything about the risk that their portfolio managers take in generating a return? Most mutual funds do not report this kind of risk-adjusted number, although some of them could use it to justify or explain their actions.

This is especially important when evaluating how closely a portfolio manager conformed to the stated risk tolerance of his fund. If the fund is advertising itself as a very low-risk investment vehicle, the average daily VaR as a percentage of assets is an interesting number, especially when compared to the same number for more open risky investments. Corporate Treasuries and Banks use VaR for the same purpose. They need to have an idea of how their market exposures behave under normal market conditions. It is a risk management cliché, but you know that you have a bad risk management regime in place if you are surprised by the extent of any gains or losses that you sustain.

Despite the critics, many admit that this model is good starting point for deriving VaR. However, the weaknesses of VaR depend upon opinions, but most agree that:

- The loss amount that exceeds VaR is important and VaR does not tell by how much
- There is no utility function associated with this excess measure given by VaR
- VaR assumes that assets can be sold at their market price with consideration of liquidity.

- VaR provides effective assurance when:
- Market assumptions hold where theory meet practice
- Other models or data can be used to back-test VaR to check for realistic or alternative situations
- Following both predicates in case of risk-managed portfolio, using VaR alone gives the impression that everything is done for handling the risk.

3.4.3 FX gap analysis

The concept of gap analysis is relatively simple. Each of the bank's asset and liability categories are classified according to when they will be re-priced and when they will be placed in groupings called time buckets. (Uemura, Dennis et al.1993, p. 129).

Exchange risk may exist, by virtue of maturity gaps, even though the bank has no net open position (assets equalling liabilities). Gaps are the result of unmatched forward maturities creating days or longer periods of uneven cash inflows and outflows. For example, a maturity spread of bank's assets, liabilities, and future contracts may reflect a prolonged period over which substantial amounts of a particular currency will be received well in advance of any scheduled offsetting payments (positive gap). The bank must decide whether:

- To hold the currency in its own accounts;
- To invest or place it short-term;
- To sell it (spot or forward) for delivery at the time the gap begins and to repurchase it (spot or forward) for delivery at the time the gap ends;
- To use any combination of these alternatives.

The converse situation, wherein the maturity spread reflects maturing shorter term liabilities or substantial cash outflows prior to maturities of offsetting assets (negative gap), obviously involves liquidity implications which do not exist in the positive gap. The bank must meet its obligations at maturity.

It must be secured that cash-management systems give an accurate picture of the cash requirements, currently and in the future. Especially, on the securities side the systems must show which of them are available for reporting out and in which asset the position is short.

For matched book trading, the bank must be able to identify un-matched positions and to measure accompanied risk in order to set trading limits for various time baskets. (Steiner, Bob, 1997, p.182).

Therefore, it must have the ability to borrow the currency short-term or be in a position to purchase (spot or forward) for delivery at the time the gap begins and, perhaps, sell (spot or forward) for delivery at the time the gap ends. The decision to close either gap when it is created, or leave it open until a later date, is determined by analyzing the money market interest rates, as well as the difference (the swap rate) between any applicable spot and forward, or two forward, exchange rates. The loss exposure, or

profit potential, for the bank is measured by the anticipated, or actual, movement in the swap rate between the time the gap is created and the time it is closed.

Although controlled and monitored by senior management, day-to-day supervision of net positions and maturity gaps is usually the responsibility of the foreign exchange and money market traders and, perhaps, a line supervisor.

However, regardless of the care with which those functions are managed, factors beyond the direct control of bank officers affect liquidity and exposure to interest and exchange rate movement. Proper evaluation of such factors requires close coordination and effective communication among the trading, lending, correspondent relations, and economic research functions within the bank. Some of these exposure factors may be identified as follows:

Customer Creditworthiness and Delivery Capabilities

When entering into any money market or foreign exchange transaction, the bank must be confident that the counterparty possesses the required financial soundness and liquidity to meet the obligations at maturity. Money market assets expose the bank to credit risk for the entire amount of their face value. The liquidity considerations arising from the unanticipated non-repayment of these assets, particularly when proceeds are intended to meet maturing liabilities presumably in the same currency, should be obvious. The bank must satisfy its liability and again fund the asset, perhaps for an undetermined period and at a relatively unfavourable rate.

Foreign exchange transactions may involve the same liquidity and rate risks as money market transactions. However, the inherent credit risks are measured differently. Foreign exchange transactions are normally considered to be void of, or contain less than face value, credit risk except on the day(s) on which they are settled. For example, every foreign exchange transaction involves the exchange of one currency for another. If counterparty is unable to deliver at maturity the currency that it has contracted to sell, the bank should either dispose with the currency it acquired for delivery under the contract or purchase the currency that the bank expected to receive and had contracted to deliver to a third party. If the bank knows in advance that the counterparty will default, its exchange risk exposure will be determined by the difference between the contracted rates and the rates (spot or forward) at which funds could be obtained in due time prior the warning and the maturity of contract. Some bankers would attribute the rate difference to credit risk, although others would maintain that no credit risk existed prior to settlement date because there would be no need for funds to be paid. However, of

importance is the fact that the bank in that instance would not lose the full amount of the contract. If the bank does not receive prior warning, the liquidity considerations could obviously be more severe.

Economic and Political Considerations.

Political changes and / or adverse economic trends within a country are likely to be accompanied by shifts in policies which often affect such factors as interest rates, investment levels, capital flows, overall payments balances, and foreign exchange reserves. Such policies, whether based on economic necessity or changing attitudes, might affect the availability of exchange to counterparties or the bank branches within the country or even the convertibility of that country's currency in other markets. In either case, the exchange rates for that currency will be subject to additional demand and supply considerations while sources of cover or liquidity in that currency may vanish.

Example of gap analysis

Gap analysis for the foreign exchange presents the "gaps" a bank might have in each individual currency. For example, one bank may have interest rate sensitivity gap arising from the mismatch in assets and liabilities in terms of currency.

Table 1: Example of gap analysis

			in US $
	Maturity under one year	Maturity over one year	Total
Assets	50,000	15,000	65,000
Liabilities	45,000	20,000	65,000
Interest rate gap	5,000	-5,000	0

Source: Own work

It can be seen from the presented table that the bank has long position for short term period and short position for long term period. In order to hedge the balance thus protecting from interest rate deviations, the bank should sell short-term US $ and buy long term US $ forward. This will eliminate any residual currency risk.

4   Foreign exchange risk management in Stopanska Banka

4.1   Banking system in the Republic of Macedonia

The banking system in the Republic of Macedonia (hereinafter: RM), as of 31.12.2007, consists of 18 banks and 12 savings institutions. However, the role of the saving institutions is very insignificant accounting for 1.9% of the total loan & deposit portfolio. (Izvestaj za bankarskiot sistem i bankarskata supervizija na Republika Makedonija vo prvata polovina od 2008 godina, p.66).

According to the asset structure, the banks are grouped into three categories:

- Large, with assets over MKD 15 B, 3 banks
- Medium, with total assets in the range MKD 4.5-15 B, 8 banks, and
- Small, with total assets bellow MKD 4.5 B, in which there are 7 banks.

The Herfindal Index is calculated as per the following formula:

$$HI = \sum_{J=1}^{n} (S)j^2$$

Where:

S is participation of each bank in the total category that is subject of calculation (i.e. total assets, total deposits) in the total amount of the category,

n is total number of banks in the system (when the index is in the range 1000-1800 units, the level of concentration is considered as acceptable).

The relatively high level of concentration of the banking system is confirmed by the comparative analysis of the European Union. According to the shareholders structure,

financial institutions [4] participate with 60.4%, retail sector participates with 10%, non-financial institutions with 22% and public sector and other entities cover 7.1%.

The main factors that influenced the high level of participation of the financial institutions were the general conditions on the stock market that attracted the institutional investors to invest in the banks' share under the perception of improved performance of this financial segment and expected high level of profitability. The foreign banks account for over 80% in the total capital of large banks.

However, the developments in the last quarter of 2007, followed by the price correction in general, affected the market capitalization of the banking segment.The parallel process over the last years was the trend of increased participation of foreign banks in the banking system of RM.

The banks utilize three strategic variables per region: deposit interest rate, loan interest rate, and number of branches. The multiregional dimension of banking competition matters as long as there are some restrictions that link deposits and loans prices across regions. (Kim, Moshe et al.2007, p.353)

The level of financial intermediation of the banking sector versus GDP in 2007 reached 66.2%, which was higher by 9.8 pp compared with the same indicator in 2006, thus showing the increased need of economic entities for financing. Total loans versus GDP in 2007 were 37%, while loan/deposit ratio realized up-ward trend to 77.9% in 2007 from the previous 72.9%, reflecting the better utilization of own sources (instead of using foreign credit lines) for extending loans.

4.2   FER determinants in Macedonian Banks

Countries in transition, like the Republic of Macedonia, have large amount of foreign currency in circulation, mainly driven from existence of high level of inflation that influenced most of the savings to be kept in foreign currency, primarily for preservation of the money value. Very often, under such circumstances, one currency is selected as a "peg" that serves for calculation purposes as well.

The process of monetary independence of the Republic of Macedonia started in the period of hyperinflation, as problem inherited from former SFRY. At the same time, the

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[4] Financial institutions are considered: banks, brokerage houses, investment funds, fund management companies, local or foreign and international financial institutions

country was faced with the problem of "frozen savings" that influenced negatively the total financial movements, creating mistrust toward the total banking sector.

During this period, the Macedonian economy passed trough several stages of reforms that affected foreign exchange operations. In the period of the first years of independence, the foreign exchange policy was very conservative, with limitedly liberalized foreign exchange activities.

The retail foreign exchange savings, which were previously kept with the banking sector, started to be placed with foreign banks outside the country, while financing corporate loans for export / import oriented companies was realized trough utilization of foreign credit lines. Such situation was unfavorable for the Macedonian economy since the foreign exchange savings were not used for development of the country.

The foreign exchange market existed with banks' intermediation while the companies were selling foreign exchange among each other, meaning that the market level was determined by supply and demand of companies. The Central Bank intervened when it was necessary in order to protect the foreign exchange rate from unpleasant movements.

Under such situation, the banks had relatively balanced open currency position, without need for imposing risk management controls. However, the new Law on Foreign Exchange Operations (hereinafter: Law), enacted in 2001 / 2002, was directed towards liberalization of foreign exchange activities in few stages.

The most important novelties arising from the new Law, which are directly connected with foreign exchange operations in the banks and hence with the need for introducing FERM, are the following:

- Full liberalization of foreign exchange loans, with obligations for banks only to report them to the Central Bank. As previously explained, in the period when the old Law was in force, the foreign currency loans were pre-approved by the Central Bank only for special (limited) purposes. The new Law enables all banks to approve loans without limitations - to residents and non-residents, in local currency or in foreign currency. If the utilization of the loan is to be realized in the country, the loan will be approved in local currency under foreign currency clause. The banks are given possibility to utilize their own sources for financing the loans, which is a radical change if compared with the previous period.

- The companies were given possibilities to keep the foreign exchange received from abroad in the accounts for unlimited period, instead of selling it within 180 days as it was in the past.
- Full liberalization of foreign direct investments, that determined the inflow of foreign currency and expanded the volumes of trading in the foreign exchange market
- Portfolio investments were enabled, which in line with the growing trend of the stock exchange led to increased inflow of foreign currency.

Above mentioned changes contributed the foreign exchange operations in Macedonian banks to become closer to the international markets. Therefore, for hedging the risk and preserving the value of the funds for shareholders and clients, the banks were required to establish policies, procedures and units for measuring, monitoring and controlling FE risk.

Credit risk arising from the foreign exchange

With the new Law on Foreign Exchange Operations that went into effect in 2002, the domestic banks were allowed to approve foreign currency loans for financing the export/import companies, or to approve loans under the foreign currency clause for financing needs within the country.

This novelty caused change in the management of the foreign exchange assets that were previously kept abroad to be used for financing the loans in foreign currency or under the foreign currency clause. However, the risk related to the change in the value in such positions shows that the non-performing loans and write-offs as at end of 2007, reached the following levels:

Table 2: Non-performing loans

Loans under foreign currency clause	13.4%
Pure foreign exchange loans	4.3%

Source: Izvestaj za bankarskiot sistem i bankarskata supervizija na Republika Makedonija vo prvata polovina od 2008 godina, www. nbrm.gov.mk, p.66

The level of concentration of the credit risk measured trough the Herfindal Index shows high level of risk exposure arising from the concentration of foreign currency with several big banks.

The foreign exchange assets of the total banking sector account 52%, while the foreign exchange liabilities are 47.4%. The euro is the prevailing foreign exchange currency with 85%, which is a logical consequence from the fact that the foreign exchange rate is "pegged" with it, while the second important currency is the US dollar accounting for 11% of the total banking activities.

Table 3: Currency structure of the foreign exchange assets and liabilities

Currency	2006		2007	
	Assets	Liabilities	Assets	Liabilities
Euro	84.7	85	86.8	87
US $	10.3	11.4	8.2	9
CHF	1.8	1.6	2.7	2.2
Other	3.2	2.0	2.3	1.8

Source: Izvestaj za bankarskiot sistem i bankarskata supervizija na Republika Makedonija vo prvata polovina od 2008 godina, www. nbrm.gov.mk, p.66

The total banking sector has long foreign currency position of 36.7% in relation to own funds, out of which euro accounts for 82.8%.

Table 4: The currency structure of open currency position according to bank size

Currency	Large banks	Medium banks	Small banks	Total banking system
Euro	87.6%	77.5%	72.8%	85.8%
US $	0.8%	-0.2%	6.6%	0.9%
CHF	7.3%	7.7%	0.3%	7.0%
Other	4.4%	14.9%	20.3%	6.3%
Total	100%	100%	100%	100%

Source: Izvestaj za bankarskiot sistem i bankarskata supervizija na Republika Makedonija vo prvata polovina od 2008 godina, www. nbrm.gov.mk, p.66

It is evident from the above-presented that euro participation in the foreign currency position prevails.

4.3   Foreign currency risk management

The Decision on foreign currency risk management passed by the Central Bank of Republic of Macedonia, prescribes more closely the rules and methodology for foreign currency risk management that banks should fulfill.

This regulation prescribes the manner of defining the open currency position, indicators for foreign currency risk exposure, and establishment of appropriate reporting system.

Manner of defining the indicators for foreign exchange position

Indicators for defining the foreign exchange exposure are as follows:
- Relations of the individual currencies with the own funds[5], and
- Relation of the aggregate position with own funds.

The open currency position in one currency is sum of:
- Net spot position, which is equal to the asset and liability gap in that currency
- Net forward position, equal to the difference from all amounts paid and received on the basis of individual forward, futures and swap contracts
- Off-balance sheet position (irrevocable letters of credit, letters of guarantees, and similar instruments classified in D and E risk categories) or position for which there is certainty that the bank will have to pay without possibility to collect the claim
- Off-balance sheet positions in favor of the bank for which it is sure that will be collected.

All positions in the methodology should be expressed in local currency calculated by applying the middle exchange rate from the indicative list of the Central Bank. The open currency position is calculated for each individual currency in the balance sheet of the bank. The open currency position can be long, which is the case when the asset side is higher than the liability and short in the opposite case. The sum of all individual long positions represents aggregate level of long position and the sum of all individual short positions represents aggregate short position. The net position, which is calculated from the aggregate long and short positions, represents net open currency position.

According to the regulation, it is prescribed that the aggregate long currency position must not exceed 30% of the own funds of the bank (guarantee capital). Furthermore, the

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[5] Own funds are considered the funds of a bank consisting of: start-up capital and reserves

Central Bank imposes obligation open currency position to be maintained on a daily basis and in case of deviation within two consecutive days, the bank is obliged to submit a corrective action plan for adjustment, or the Central Bank will undertake corrective measures.

4.4   Stopanska Banka AD Skopje

Stopanska Banka is the oldest bank in the Republic of Macedonia, established in 1944, in conditions of a devastated, war-ruined and underdeveloped agricultural country with primary aim to support the most important financial facilities in the economy of the country. The Bank participated in financing of several big projects like: Steelworks "Skopje", Chemical Factory "Ohis", Factory for aluminium profiles "Alumina", Lead and zinc mines "SASA", hydro plants "Globocica" etc.

In 1967, Stopanska Banka extended its activities in the area of international operations thus satisfying requirements of its clients. In the period up to 2000, SB was passing trough many processes of transformation followed by splitting up related to Komercijalna Banka AD Skopje and Komercijalna Banka AD Kumanovo, which separated from SB in 1990 and 1995, respectively.

In April 2000, SB was acquired by the National Bank of Greece (73%), IFC (10.8%), and EBRD (10.8%), privatizing the Bank with 95%.

The acquisition brought strengthening of SB's competitiveness through intensive restructuring. Consequently, the Bank introduced sophisticated IT system, implemented a new organizational scheme, cleaned the loan portfolio, introduced standardized procedures for decision-making, risk management and procurement, reduced the redundant labor force, and became a country leader in corporate governance. As a member of a large international group, SB plays a crucial role in strengthening the country's financial system. It provides Macedonian companies and households with a wide range of the most up-to-date services within easy reach.

The expert knowledge, supported by the largest branch network in the country and the advanced IT solutions, along with the capital size and synergies from membership in one of the largest financial groups in Southeast Europe - NBG Group, appeared to be the main driving forces of SB competitive advantage in dealing with the increasing pressure of competition.

Looking at the future, sustained growth, profitability and improved customer satisfaction have been identified as Bank's main concerns. The key factor of the successful implementation of Bank's growth strategy, as envisaged in the medium term Business Plan, lies in achieving high customer satisfaction by placing the client in the focus of company's thinking and developing market position that distinguishes SB from the others by strengthening of its brand name.

By focusing on the strategy and business plan that took into account both market trends and expectations of our clients, Stopanska Banka maintains its leading position in capital strength, assets size, loan volumes, and deposits base. By enhancing permanently its products and processes in order to keep its competitive advantages, Stopanska Banka (SB) has been serving more than half of the country's population by making itself a financial partner of every household in the country.

Main achievements of Stopanska Banka in the period 2001-2008:

- SB completed the internal organizational and functional restructuring according to the best banking practices and transformed itself into a modern and customer oriented bank.

- The Bank rearranged the asset mix in favor of higher yield assets such as retail and corporate loans, as well as risk free government securities, which resulted in steadily rising loans to deposits ratio, increasing profitability and more efficient use of Bank's funds on long-term perspective.

- While keeping high the participation of private sector deposits in total liabilities, there was quality change in the structure of liabilities towards expanding the funding base consisted of long-term and stable sources of funds, and at the same time enlarging the guarantee capital of the Bank.

- SB successfully maintained its competitive advantage and leadership in retail lending by means of wide product range with superior characteristics and competitive pricing, investments in technology intensive infrastructure and unique alternative sales channels.

- In order to achieve maximum benefit for investments of its customers, SB pioneered among the group the implementation of Temenos T24 as the most technically advanced banking system available today.

Financial indicators

According to capital strength, total assets and capital, SB is the largest bank in the Republic of Macedonia. Its main competitors are Komercijalna Banka AD Skopje and Tutunska Banka AD Skopje, all together constituting the group of "big three". If we compare the main asset & liability activities, i.e. loans and deposits, the situation is as follows:

Figure 4: Peer comparison: Total Deposits
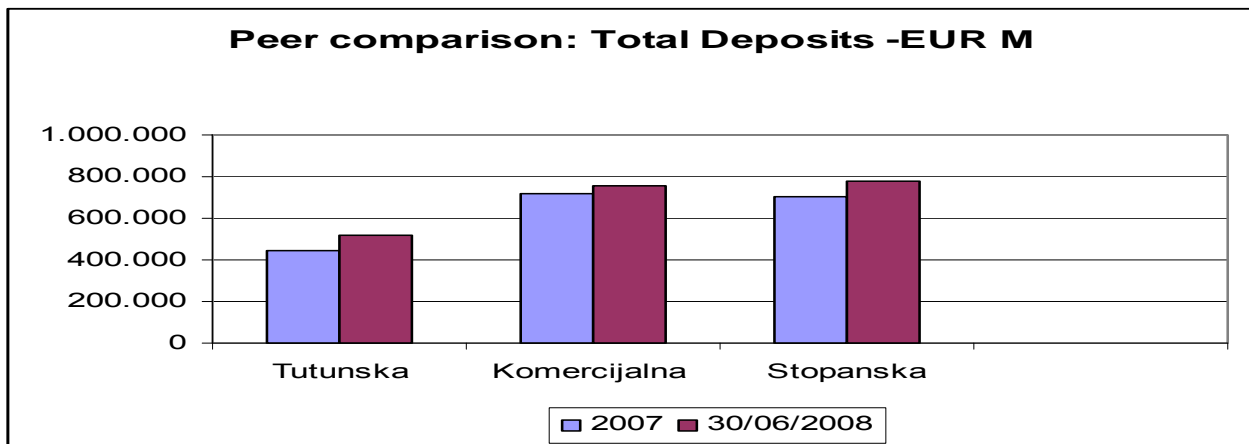
Source: Securities and Exchange Commission

Figure 5: Peer comparison: Total Loans
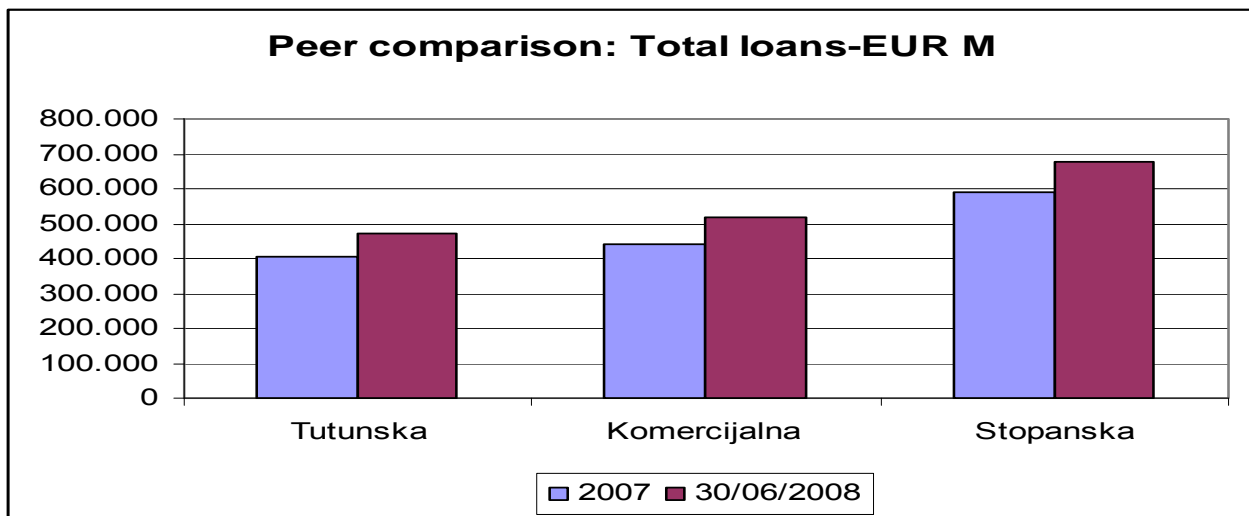
Source: Source: Securities and Exchange Commission

Figure 6: ROE & ROA
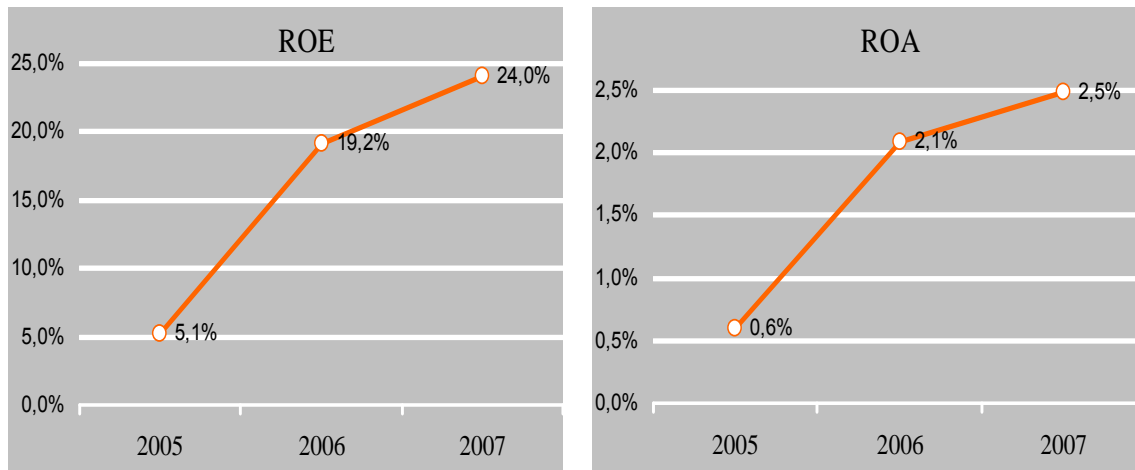
Source: SB Annual Report dated 2007

4.5   Foreign exchange activities in SB

The foreign exchange market in the Republic of Macedonia is at the beginning stages of development due to the above described conditions. However, many foreign exchange instruments are traded in Stopanska Banka, which are presented bellow:

- Spot / forward transactions
- Arbitrage / swap transactions
- Money market
- Foreign currency cash trading.

4.5.1   Spot / forward transactions in Stopanska Banka

Spot / forward transactions[6] are initiated by a customer or the Bank might have the need to transact spot / forward transactions. The counterparty might be another bank or exchange office. The volumes of trades are usually defined at the Asset & Liability Committee meetings on the basis of forecasted liquidity plan prepared by the Liquidity Department.

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[6] Spot transactions present the bulk of the foreign exchange transactions in Stopanska Banka

Based on the instructions of the relevant authorities, the frameworks for movements of the foreign exchange rate are defined as well as the quantity that may be bought. By monitoring the currency movements in the world market, the dealers make deals with authorized exchange offices. The concluded exchange rate is afterwards corrected (decreased) for the transactional costs. Quotation of the price with the exchange office is done via phone and the agreed transaction is hedged by the dealers on phone through Reuters Dealing terminal.

The concluded transaction is recorded in the Bank information system, while the settlement instructions are automatically available to back-office since the information system is on line.

Large companies that need to transact spot or forward transactions ask quotations from the Trading Department, instead of dealing trough Domestic Market. The companies might have a need for spot if they need to make payments within 48 working hours (in accordance with the regulations) or for forward transactions if they need to buy/sell foreign currency with future value date. (Procedures of the activities performed in the Trading Department, Stopanska Banka AD Skopje, 2006).

4.5.2   Arbitrage / swap transactions with domestic banks

Depending on the assigned counterparty limits for domestic banks by the Risk Management Department, arbitrages are also made (SPOT transactions for foreign currency / foreign currency) through Reuters Dealing terminal, through the dealing platform or by telephone. (Procedures of the activities performed in the Trading Department, Stopanska Banka AD Skopje, 2006).

SWAP transactions

SWAP –transaction is simultaneous purchase and sale of one currency for another with different date of realization and previously set exchange rate.

In a cross currency swap, the two cash-flow schedules and notional amounts are in different currencies. Other than that, a cross currency swap is just like an interest rate swap. The default motivation to enter into a cross currency swap is the desire to pay interest in a currency with lower rates and receive interest in a currency with higher rate free of cost. However, it works only if the notional amounts are agreed to be exchanged at the maturity date of the swap, so both counterparties have an open foreign exchange

position, namely a long-term FX forward. Lower interest rates are hence bought by taking this risk.

Advantages

• Beneficial interest rate payments, i.e. receiving higher coupons or paying lower coupons than market
• Liquid and transparent product, whence sales margins are comparatively small
• Zero cost product
• (Partial) protection of the notional amount

Disadvantages

• Long term FX forward risk
• Long term view on the FX rate impossible. (Wystup, Uwe, (2006), p.191)

For the purpose of maintaining the foreign currency position of the Bank within the prescribed frameworks, upon order of the Treasury Division Manager or Trading Department Manager or other authorized employee, the dealers make SWAP transactions. They are made through Reuters Dealing terminal or by phone and are settled by the Back Office.
(Procedures of the activities performed in the Trading Department, Stopanska Banka AD Skopje, 2006).

4.5.3   Money Market Deposits

The surplus of the foreign exchange liquidity over the daily needs is placed with foreign banks, which are included in the counterparty limits defined by the Risk Management Department.

The schedule of placements is set-up in accordance with the maturity structure of the deposits on order to secure maintenance of as small maturity gap as possible.

The practical placement of the money market deposits is done on the basis of the liquidity Instructions received from the Liquidity Management Department, which are delivered to the dealers in e-form or in person until 12:00h every working day, the placement of free FC funds that are at SB disposal is planned, or if SB has a need for additional funds, borrowing funds from overseas banks is planned, depending on the

free limits. The processes, tickets and control are identical even when SB borrows and places FC funds. The free funds are placed as deposits through SB international accounts in various terms: O/N, T/N, 1W, 2W, 1M etc.

The maturity of placed FC funds depends on the maturity structure of SB liabilities, as well as on the requirements for SB liquidity, expectations for the movements in interest rates in ensuing periods, and other needs for rational and profitable management of SB assets and liabilities. The placement of time funds is done through Reuters Dealing station, whereas, in exceptional cases, thru telephone if technical blackout of Reuters lines occurs. In such case, the dealers from both banks additionally send confirmations for the transactions by fax or e-mail. The Dealing station, following each confirmed transaction, automatically produces printed text at Back Office that contains the conversation of both parties, as well as a confirmation ticket for the transaction executed. On the basis of the said ticket, the dealer enters the transaction in internal information system, while one of the other dealers immediately authorizes it. Such entered and authorized transaction can be viewed and printed in a ticket from the system by Back Office and the person that manages the FC liquidity at Liquidity Management Department.

Survey of time / borrowed funds is drawn up on a daily basis. It presents all placed / borrowed funds on the part of the Bank and is delivered to the Back Office and Liquidity Management Department by electronic means. The survey of placed time funds is delivered the next day by e-mail to the following persons:

- First General Manager
- Second General Manager
- Treasury Division Manager
- Trading & Foreign Exchange Market Department Manager.

4.5.4   Buying / selling foreign currency cash

In cases when Cash Management and Keeping of Securities Department estimates that there is a need for buying/selling foreign exchange cash, it announces 2 to 3 days earlier in order to complete the required transaction. In buying foreign currency cash preferred are domestic banks, as many of them offer effective foreign currency cash without costs, i.e. "al pari". When SB does not need foreign currency cash, and the transaction is initiated at a request of the other Bank, in that case SB may charge fee for buying foreign currency cash in accordance with the Tariff of fees for services rendered by the Bank.

The agreement for buying foreign currency cash with domestic bank is made through Reuters Dealing terminal[7] (if the Bank has a dealing terminal), trading platform or via telephone. The dealer enters the transaction in information system, whereat the ticket is created which both Back Office and Liquidity Management Officer has possibility to monitor and print it. The Cash Management and Keeping of Securities Department and the Correspondent Banking Department are notified about the concluded transaction on telephone or by mail. The Cash Management and Keeping of Securities Department should undertake further activities for transporting the cash. In the meantime, the domestic bank sends a disposition by fax or SWIFT message with all settlement instructions. The disposition/confirmation is delivered to the Correspondent Banking Department, which transfers the funds to the foreign bank. The transfer is made when the Cash Management and Keeping of Securities Department notifies the dealer that the amount of the taken cash is exact and the quality of the bank notes is good.

In buying the foreign currency cash from foreign banks, the transaction is concluded through Reuters Dealing terminal. Buying foreign currency cash from foreign banks is possible only if SB has concluded an Agreement for trading in foreign currency cash with the foreign bank signed by the General Managers. The terms and conditions for trading with the foreign bank are described in that Agreement. When the Agreement is signed, the dealer enters the transaction in the internal information system, whereat it creates a ticket which both Back Office and Liquidity Management Officer has possibility to monitor and print it. The elements from the ticket must be identical with those from the conversation slip. The Cash Management & Keeping of Securities Department is notified by telephone or mail on the concluded transaction in order to undertake further activities for taking the cash from the airport.

Selling foreign currency cash to foreign banks is possible only if SB has concluded Agreement for trading in foreign currency cash with the foreign bank, signed by the General Managers. Agreements stipulate the terms and conditions for trading with the foreign bank in detail. When SB sells foreign currency cash to foreign banks, the dealer through Reuters Dealing terminal agrees the terms and conditions of the transaction. Foreign correspondent banks are obliged to pay the insurance and transport costs after the shipment is placed in the plane (FOB clause). After making the deal, the dealer enters the transaction in internal information system, and one of the other dealers authorizes it in internal information system, whereat a ticket is created which is reviewed and printed by the Back Office employee and employee who manages the foreign currency liquidity in the Liquidity Management Department. The dealer notifies the Cash

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[7] Reuters Dealing Platform is the trading& information platform used in international frames. In Republic of Macedonia, only 4 out of 21 banks dispose with such system

Management and Keeping of Securities Department by telephone or by mail, which should undertake activities regarding transfer of cash abroad and transport to airport. (Procedures of the activities performed in the Trading Department, Stopanska Banka AD Skopje, 2006).

4.6 Open currency position in SB and hedging tools

The open currency position is calculated as a difference between asset and liability position of the foreign exchange balance sheet of the bank in each foreign currency.

There are 10 (ten) foreign currencies that can be traded in the Republic of Macedonia, as follows: EUR., USD, CHF, GBP, AUD, CAD, DKK, JPY, NOK, and SEK. Any other currency that might appear in the market is subject of individual acceptance of the bank based on acceptance of the deal of the foreign counterparty.

The asset side of the open currency position includes:

- Cash, checks and debt securities
- Funds at domestic or foreign banks
- Foreign currency loans and loans under foreign exchange clause
- Securities available-for-sale and securities held-to-maturity

The liability side of the open currency position includes:

- Deposits of banks
- Retail deposits
- Corporate deposits and public sector deposits
- Debt issued securities
- Used credit lines

The difference between the aggregate asset side and aggregate liability side is net open currency position.

Management of open currency position is a complex process. Any transaction that involves one currency in one leg and other currency in another leg represents open currency position. The daily bank's operations incorporate a huge number of such transactions, which at the end results in creation of the open currency position. Therefore, the role of the Treasury Division in SB is to monitor, hedge and maintain the open currency position on a daily basis, thus protecting the Bank from unexpected

losses. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7 Activities that open foreign currency positions

4.7.1 Foreign exchange deposits conversion

In accordance with the existing regulations, retail clients may dispose with foreign exchange savings that are deposited in the accounts, or originate from the international transfers.

If at some point of time the client requests the bank his deposit, which is originally deposited in foreign currency, to be paid in local currency that means the open currency position is created. Said in other words, the process of conversion consists of a transaction of buying foreign currency from the client and selling equivalent value of local currency, at the buying exchange rate of the Bank.

Having in mind the fact that local foreign exchange market exists in euros, all such conversions that are done in foreign currency other that euro, must be converted into euro. And how is this done? If we assume that one client having USD deposit wishes to withdraw the funds in local currency, the bank will buy USD at the bank's buying rate and will sell the MKD funds. By this transaction the bank has created long USD position, and in order to hedge the position, the bank must do the following steps:

1. Sell USD on international market, which is done by the dealers from the trading desk, and buy euros. The foreign bank will buy USD at its buying rate, therefore the counter-value of euros (calculated trough MKD) paid to the domestic customer should be lower than received euros from the foreign bank in order the bank to make some profit. Therefore, setting the buying and selling rates is very essential.

2. Sell EUR at domestic market and receive MKD, thereby the position is squared. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7.2 Approving loans under the foreign currency clause

The new Law on foreign exchange operations has liberalized the loan activities. The banks are allowed to approve loans denominated in foreign currency to residents - retail and corporate.

The loan contract is expressed in foreign currency and utilization of the loan is done in local currency. In order to provide local currency for approving the loans, banks are obliged to undertake the following activities:

- sell foreign currency (kept abroad) to a local bank / client in order to provide local currency
- Approve the loans in local currency at the buying exchange rate of the bank.

With this activity, the bank has changed the asset structure - from money market placement abroad it converts the asset position into loan.

In case the loan is approved in other currency than EUR, the Bank is obliged to undertake the following:

- sell other currency abroad for EUR (for example CHF)
- sell euro on local market for MKD
- Approve loan in local currency under the other foreign exchange clause (under CHF clause).

Similarly, the bank has transformed the money market position kept as money market deposit in CHF into loan under CHF foreign exchange clause. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7.3 Collection of foreign currency loans

When the clients settle their obligations, they affect the balance sheet position of the bank, due to which the bank is obliged to undertake necessary activities:

- From collected loan in local currency, the bank should buy euro
- The bank should place the bought euro as money market placement.

If the loan is in other currency than euro (for example: CHF), the banks should do the following:

- To buy euro on domestic market
- To sell the euro and buy CHF on international market
- To place CHF as money market placement.

In the explained manner, the bank has balanced the asset position of the balances sheet and converted the loan position into money market placement. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7.4   Buying foreign currency

By purchasing of foreign currency, the bank creates long position and in order to hedge it, it should do the opposite – sell the foreign currency.

Due to the specifics of local market, which is pegged with euro, if the bank is buying currency other than euro, it should sell it on international market for euro, and then sell the euro for local currency on local foreign exchange market. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7.5   Selling foreign currency

This is the opposite situation to the previous one, when the bank sells foreign currency in order to hedge, it must buy foreign currency. In case of selling currency other than euro (for example: CHF), the bank with local currency (received from the customer) should buy euro and then sell euro on international market and buy CHF. Thus, the sold CHF on domestic market are hedged with bought CHF on international market. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7.6   Deposits under foreign currency clause

When accepting the deposits under foreign currency clause, the bank creates short foreign currency position due to higher liabilities than assets. The deposits under FX clause are deposited at selling foreign exchange rate which should enable the bank to buy pure foreign currency in order to hedge the position.

When the deposits mature and the bank is obliged to return them, in order to provide local currency, the foreign currency must be sold and the bank returns the deposit in

local currency at the buying FX rate. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7.7   Buying securities in EUR or under FX clause

In order to buy EUR or EUR denominated securities, the bank is obliged to sell EUR placed abroad and buy pure EUR securities or, in case of EUR denominated securities, sell EUR for local currency and buy EUR denominated securities.

With these activities, the bank transforms again one asset position into another trough simultaneous buying of foreign currency as a hedge instrument. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.7.8   Selling securities in EUR or under FX clause

This is the opposite situation, when the bank wants to liquidate a security position in EUR or under EUR denominated clause. The bank sells securities and buys EUR, or sells EUR denominated securities for local currency and with local currency buys EUR. (Procedures of the activities performed in the Trading Department, 2006, Stopanska Banka AD Skopje).

4.8   Assessing FER in Stopanska Banka

From the different models for assessing and identifying FER, in Stopanska Banka are employed the models that are recognized from the international banking practice, such as: VAR, gap analysis, forecasting of FER, scenario analysis. In addition to this, the Bank conducts stress testing at least once a year in usual circumstances, while in case of extraordinary movements, such exercise is done more frequently. (Framework for managing liquidity risks, 2007, Stopanska Banka AD Skopje).

4.9   VAR

VAR provides a summary statistic of the order of magnitude of potential losses due to market risk. It represents the maximum loss over a target horizon such that there is a low, pre-specified probability that actual loss will be larger. VAR captures the combined effect of underlying volatility and net exposure to market risk which includes interest rate risk, exchange rate risk, equity risk and commodity risk. It is a popular measure of risk,

and has achieved the high status of being written into industry regulations. (Value at Risk analysis, Deutsche Bank Annual Report, (2003).

Following the 1995 Basel Committee agreement, VAR has become the standard risk measure adopted by financial institutions to define the net market risk exposure of a financial position. A considerable amount of research has been dedicated in recent years to the development of risk management tools based on the concept of VAR. VAR measures are predominantly used by financial institutions and are relatively new to the non-financial firms.(Lim, Chee Yeow et al, (2007), p.354)

To calculate the Value at Risk (VaR)[8] in terms of Market Risk on a daily basis, the Risk Management Department implements the internationally accepted variance/covariance methodology developed by Risk Metrics / J.P. Morgan. This approach is used to calculate the VaR of SB trading and AFS portfolio positions retained for one-day at a 99% confidence level.

Value at Risk is calculated for the following risks:
- The aggregate market risk of Trading and Available for Sale (AFS) portfolio.
- The interest rate risk resulting from investment in securities and derivative interest rate instruments.
- The foreign exchange risk resulting from SB aggregate open FX position.
- The risk arising from changes in equity prices (systemic and non-systemic risk) regarding the portfolio of equities and equity and stock market index derivatives.

Currently, risk factors comprise the market interest rates on specific currencies and for specific maturities, foreign exchange rates of major currencies, stock market indices in domestic and international markets.

In accordance with the methodology implemented, three risk factors are taken into account: the variance of risk factors, the covariance of risk factors, and the beta coefficient for equities.
The estimates of VaR as a risk management tool concern SB overall Trading and AFS portfolio, whereas for the purposes of capital adequacy they concern the Trading portfolio only.

VaR calculation is performed in four successive steps, which are repeated for each risk factor affecting the value of a portfolio:

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[8] VaR is at the testing stage in SB.

- The present value of all cash flows and positions is calculated, based on current market price of a risk factor
- Re-calculation of all present values under the assumption that the price of the risk factor moves against the portfolio. The size of these movements will depend on the confidence level selected by the user and may range from one to three times size of the daily volatility for a particular risk factor. Under the assumption that a risk factor is normally distributed, it is possible to translate a given confidence level into a price movement measured in terms of a standard deviation. For example, if the daily volatility of the 12-month interest rate for CHF is 9.28 basis points, then there is a 97.7% probability that the interest rate will not increase by more than 18.56 bp (i.e. two standard deviations) over the following day.
- The difference between the two valuations obtained in steps 1 and 2 represents VaR measure of the portfolio against this particular risk factor.
- Finally, the model compares the VaR obtained in step 3 against the VaR limit that may have been imposed on the portfolio against that particular risk factor.

For the valuation in steps 1 and 2, the VaR model uses either current market prices (mark-to-market) or produces theoretical values based on mathematical models (mark-to-model) depending whether there is a transparent market for the instrument being valued. The valuation of stocks is based on current market prices taken from the Reuters, while the valuation of OTC is performed in 2 steps:

- First, OTC instrument is decomposed into set of equivalent cash flows depending on type
- Then, the model calculates the present value of the above stream of cash flows using zero-coupon discount factor implied by the relevant interest rate curve for the currency of denomination of that particular instrument.

VaR limits can be imposed on individual portfolios or group of portfolios and may be set against certain risk factor or against the total VaR of a portfolio.
The results of VaR calculation are presented in different reports depending on selection of the user with respect to the type of VaR calculation.

4.10 FX Gap analysis

Foreign exchange gap analysis is performed for identification of gaps in different maturities and identification of interest rate gap.

FX Maturity gap analysis

For the purpose of calculating maturity gap, the assets and liabilities items are grouped in different maturity buckets, presented in the Table 5.The aim of this analysis is to identify the maturity gaps in order the bank to undertake on time appropriate measures to avoid possible liquidity squeezes.

Table 5: Maturity Gap Report

Description	Up to 7 days	7d- 1m	1m-3m	3m-6m	6m-12m	Over 12m	Total
Assets							
Cash and balances with NBRM							
Securities at Central Bank							
Debt securities							
Placements with other banks							
Placements with clients							
Other assets							
Placements in own securities and capital investments							
Total assets							
Liabilities							
Deposits from banks							
Customer sight deposits							
Short term customer deposits							
Short term borrowings							
Issued debt securities							
Long term borrowings							
Off-balance sheet items							
Total liabilities							
Difference (Asset-Liability)							
Cumulative difference							

Source: Framework for managing liquidity risk in SB, 2007

Usually, the short-term periods show gaps due to the fact that the banks approve loans with longer maturities, or buy longer term securities than the terms of the funding sources.

It is a school banking rule that short-term liabilities should be used for financing short-term assets and long–term liabilities should finance long-term asset, but the situation is different in practice. In general, banks' liabilities bulk consists of short-term liabilities up to one year, whereas the banks approve loans for longer maturities. This is possible because there are some deposits, which although placed on short-terms stay longer with the banks, even for several years. These deposits constitute the part that is called "core-deposits", which actually help the banks to extend loans at longer maturities.

Therefore, the first report should present the general picture of the bank, i.e. foreign exchange gap of the balance sheet according to the contractual maturity of the positions. However, over the time, the positions are amortized so the contractual maturity becomes residual maturity, which simply cannot be extracted from the accounting books. This is the case when, for example, we have a loan that is approved for one year, but after 5 months of the loan utilization, the residual (remaining) maturity of the loan is 7 months. Having in mind the fact that the reports on maturity gap are calculated frequently, the residual maturity of each position over the time will approach to 0.

In order to define the real maturity gap position, there is a corrective item which should adjust the real time exposure of the bank and that is the core deposit. So, the bank prepares accompanying report on the expected FX maturity gap, in order to define the real maturity position.

All items in the presented Report (Example 2) are corrected for the amounts of core deposits - those deposits that even have maturity, according to their historical movements, remain unchanged so the Bank may rely on them.

The Expected Maturity Gap Report shows the liquidity position of the bank according to different terms. The "short" position should alarm the bank to undertake measures not to fall into illiquidity problems.

Table 6: Expected Maturity Gap

Description	Up to 7 days	7d-1m	1m-3m	Total
Cash and balances with NBRM				
Securities at Central Bank				
Debt securities				
Placements in other banks				
Placements with clients				
Other assets				
Placements in own securities and capital investments				
Total assets				
Deposits from banks				
Customer sight deposits				
Short-term customer deposits				
Short-term borrowings				
Issued debt securities				
Long-term borrowings				
Off-balance sheet items				
Total liabilities				
Difference (Asset-Liability)				
Cumulative difference				

Source: Framework for managing liquidity risk in SB, 2007

4.11 Foreign exchange interest rate gap analysis

Interest rate policy of the Bank directly influences the profitability, which is the most important reason for operation. Working with different instruments, products and services at different interest rates creates FX interest rate gaps that should be constantly monitored.

The calculation of FX interest gap is done on every single asset and liability position, per single currency.

Table 7: Maturity FX interest rate Gap

Description	EUR	USD	CHF	GBP	AUD	CAD	DKK	JPY	NOK	SEK
Assets										
Cash and cash equivalent										
FX loans										
Loans under FX clause										
Securities										
Bonds										
Other assets										
Liabilities										
Deposits of banks										
Corporate deposits										
Non-resident deposits										
Borrowings from domestic banks										
Borrowing liabilities abroad										
Deposits under FX clause										
Total liabilities										

Source: Framework for managing liquidity risk in SB, 2007

Table 8: Positions per maturities:

Description	EUR	USD	CHF	GBP	AUD	CAD	DKK	JPY	NOK	SEK
Assets										
At sight										
Up to 3 months										
From 3-6 months										
From 6-12 months										
From 1-5 years										
Over 5 years										
Liabilities										
At sight										
Up to 3 months										
From 3-6 months										
From 6-12 months										
From 1-2 years										
From 2-5 years										
Over 5 years										
Net interest rate gap (margin)										
At sight										
Up to 3 months										
From 3-6 months										
From 6-12 months										
From 1-5 years										

Source: Framework for managing liquidity risk in SB, 2007

For hedging the fixed and floating interest rate gap, the Bank can utilize Interest rate swap, which is a derivative instrument that gives possibility to change the fixed with floating interest rate claims.

Interest Rate Swap is off-balance sheet agreement for making settlement on a future date to pay or receive on an agreed future date the difference between a fixed interest rate agreed at the outset and the interest rate actually prevailing on that future date, calculated on an agreed principal amount. The principal amount is "notional" which means it is used only for calculation purposes and it is not exchanged between the contracting parties.

If Stopanska Banka (SB) intends to approve mortgage loans with duration of 5 Y or 10 Y at fixed interest rate, and the loans are funded from the regular liabilities that originate from deposits and on which SB pays some percentage of EURIBOR, in order to hedge the risk from interest rate increase, SB may transact IRS with which SB will pay fixed rate and will receive floating rate.

Table 9: Interest rate swap

Assets	Liabilities
Before IRS	
Receive fixed	Pay percentage of EURIBOR
After IRS	
Receive EURIBOR	Pay fixed

Source: Own work

IRS is an exchange of one set of interest flows for another without exchange of principal.

Payment frequency of fixed and floating leg of the transaction may be different. SB can start approving mortgage loans, and when portfolio of certain amount is created, it might transact IRS. Fixed and floating rates can be settled monthly, quarterly, semiannually or annually.

Based on the current market prices announced on Reuters, the fixed rate for 5 Y is 4.078. If SB selects 5 Y IRS with quarterly settlement on 1M EUR notional amount and if

on Q1 EURIBOR is 4.20 and on Q2 EURIBOR is 4.011, the calculation will be as follows:

Table 10: Settlement of IRS

In EUR

Notional amount   1.000.000,00

Fixed rate   4,078

Q1 EURIBOR   4,200

Q2 EURIBOR   4,011

Q1 settlement:
SB receives   1000000 x 4,078 x 90/36000=10,195

SB pays   1000000 x 4,200 x90 /36000=10,500

Net:	305,00

Q2 settlement
SB receives   1000000 x 4,078 x 90/36000=10,195

SB pays   1000000 x 4,011 x90 /36000=10,027

Net	(168,00)

Source: Own work

The settlement can be done each quarter.

By using this instrument, SB can hedge the risk against rising of interest rates because it will constantly receive market rates that will adjust with liabilities rates, and pay fixed rate that it will receive on mortgages. The mortgage loan rate should be set at the price of minimum 4.078 (IRS rate) + SB margin.

4.12 Stress testing scenario analysis

From liquidity point of view, the foreign exchange analysis is based on current business conditions. It is essential though to analyze liquidity risk under abnormal stress situations that might cause serious problems. (Plan for managing the liquidity in Stopanska Banka in extraordinary circumstances, 2008, Stopanska Banka AD Skopje).

For preparing stress testing scenarios, the following issues play very important role:
- What risk factors to stress
- How to combine the stress factors
- What range of values to consider
- What time frame to analyze
- What is the maximum acceptable loss

A priori, risk managers choose set of risk factors to be stressed and the degree of the stress, regardless of the likelihood of the event and of their dependence on the other non-risk stressed factors. (Gonzales-Rivera, Gloria, 2003, p.8).

Historical scenarios, as a variety of stress testing, seek to quantify potential losses based on re-enacting a particular historical market event of significance. Scenario shocks that determine the impact on portfolio valuation are taken from observed historical events in the financial markets. This is in contrast to stress tests where shocks are based, for example, on specified changes in the covariance matrix of asset returns, or on shifting prices or rates by an arbitrary number of standard deviations. (Koenig, David, R., (2004), p.5)

The assumptions, which are used in stress testing scenarios, are frequently reviewed by the Risk Management Committee in order to secure that they continue to be appropriate. There are assumptions for stress testing and simulation analysis that are related to specific asset and liability sides.

Macroeconomic circumstances and the regulatory environment also greatly influence the type of instruments that central bank uses. For example, if inflation is high and volatile, the regulator might propose instruments of short maturity, reflecting the market preferences. Longer-term instruments will be considered too risky and will be too costly for the issuers of the liability. (Balino, Tomas et.al, 1997, p.22)

4.12.1 Assumptions for asset positions of SB

The main assumptions that are taken into consideration for the asset side of the balance sheet are:

1. Probability for collection of claims from the loan portfolio of SB within maturity deadlines
2. Probability for collection of claims from the loan portfolio of SB before the maturity deadlines
3. Probability for SB's readiness to prolong the mature asset positions (for instance, securities)
4. Probability and expected level of contingent liabilities and inflows (off-balance sheet claims, legal disputes)
5. Market value of asset positions, possibility it be transformed into cash, development of secondary market. (Assumptions for determinig the residual structure of Stopanska Banka AD Skopje, 2008, Stopanska Banka AD Skopje).

4.12.2 Assumptions for liability positions of SB

The following assumptions play crucial role when forecasting the liability position:

- Current Banking Law and by-laws enacted by NBRM
- Foreign exchange operations of clients in terms of anticipation of changes to determine clients' actions from the aspect of the possibility to buy / sell FC, limited/unlimited possibility for their conversion / keeping / transfer
- Tax regulations, i.e. whether changes in tax rates, methodology, and tax payment periods are expected, or introduction/abolition of a certain tax is anticipated.

1. Anticipations as per the projected budget assumptions of SB at level of balance sheet and income statement. The assumptions for anticipations of SB budget growth in assets and liabilities incorporate the assumptions related to the general condition of the national economy, level of growth of the banking system, level of growth of GDP, inflation rate etc. On the basis of the said assumptions, there is projection of the growth of deposits and loans (that have return impact on deposits), while, within the given assumptions, their residual maturity structure is projected as well.
2. Regulatory prescribed limits and ratios of SB determine its business actions, for instance, maintenance of a certain level of loan/deposit ratio that

determines the asset or liability deposit policy. Hence, the regulatory limits are mandatory incorporated into the assumptions.

3. Movements of deposits – their cyclical and seasonal floating nature. In addition, there is projection of probability for the level of deposits, which are not expected to be withdrawn within their maturity, i.e. deposits that are characterized by a continuous practice for their renewal and are included in the calculation of SB core deposits (with special attention to deposits of large clients accounting over 40% of the corporate deposit base).
4. Core deposit stability
5. Other relevant factors. (Assumptions for determinig the residual structure of Stopanska Banka AD Skopje, 2008, Stopanska Banka AD Skopje).

4.13 Forecasting model for FER in SB

Many international banks perform empirical studies for forecasting the foreign exchange risk. The evidence from those studies shows different level of success. The most of the professional forecasts are not accurate as the forward rate. The sample data for evaluation of the forecasts comprise several monthly observations corresponding to hedging recommendations, which are published on some public media. (Doukas, John, 1987, p.845)

Stopanska Banka uses forecasting information published by some well-known banks. However, the foreign exchange risk in Stopanska Banka is calculated by application of fundamental and technical analysis.

The technical analysis uses narrow lens to forecast price movements because it focuses exclusively on statistical and mathematical data. Price is the most common type of information analyzed with volume and interest.

The basics of a technical analysis system include:
• Price charts
• Volume charts, and
• Number of other mathematical representations of market patterns and behaviors.

There are different models of mathematical extrapolations of various market data types to evaluate the strength and sustainability of a particular trend. By using the technical analysis, it is possible to predict future price movements of currencies and these prices are applied on the currency positions for calculation the FX risk positions.

The technical analysis is built on the following assumptions:

- Market action anticipates and discounts everything. This means that the currency selling price is determined by known to the market factors such as: supply and demand, political issues, and the attitudes of market participants. The technical analyst is only concerned with the actual price movements, not with the reasons for changes. (Market Risk Management Policy, 2008, Stopanska Banka AD Skopje)

- Prices move in trends. There are certain recurring trend patterns that analysts have identified as being significant. Many of these patterns can be counted upon to produce expected results. Technical analysis identifies when these trend patterns will occur.

- History repeats itself. ForEx chart patterns have been followed for over 100 years. The manner in which many patterns have repeated themselves leads technical analysts to believe that these patterns will continue to recur in the same way. Because ForEx charts are based on market action involving price, a number of different factors affecting price need to be examined.

The used models for technical analysis are the following:

- Average true range: The range of a day's trading is simply high − low. The true range extends it to yesterday's closing price if it was outside of today's range:

$$\text{true range} = \max(\text{high}, \text{close}_{\text{prev}}) - \min(\text{low}, \text{close}_{\text{prev}})$$

The average true range is then an N-day exponential moving average of the true range values. Large or increasing ranges suggest traders prepared to continue to bid up or sell down a stock through the course of the day. Decreasing range suggests waning interest.

Momentum and rate of change (ROC) are simple technical analysis indicators showing the difference between today's closing price and the close N days ago. Momentum is the absolute difference:

$$\text{Momentum} = \text{Close (today)} - \text{Close (N – days ago)}$$

$$\text{Rate of change} \quad = \quad \frac{\text{Close (today)-Close(N-days ago)}}{\text{Close (N-days ago)}}$$

Rate of change scales by the old close, so as to represent the increase as a fraction. "Momentum" in general refers to prices continuing to trend. The momentum and ROC indicators show that by remaining positive while an uptrend is sustained or negative while a downtrend is sustained. A crossing up through zero may be used as a signal to buy, or a crossing down through zero as a signal to sell. How high (or how low when negative) the indicators get shows how strong the trend is.

4.14 Trend line analysis

A trend line is a bounding line for the price movement. A support trend line is formed when a price decreases and then rebounds at a pivot point that aligns with at least two previous support pivot points. Similarly a resistance trend line is formed when a price increases and then rebounds at a pivot point that aligns with at least two previous resistance pivot points.

Trend lines are a simple and widely used technical analysis approach to judging entry and exit investment timing.

It is important to note that the selection of chart should be based on price interval period that aligns with the trading strategy - short term needs tend to use charts based on interval period like minutes, hours etc., while long term needs are based on longer term of price movements - daily, weekly, monthly etc.

From the trend line we can see an indication if a stock price is moving between support and resistance rend lines, then a basic investment strategy commonly used by traders, is to buy a stock at support and sell at resistance, then short at resistance and cover the short at support. The logic behind this is that when the price returns to an existing principal trend line, it may be an opportunity to open new positions in the direction of the trend, in the belief that the trend line will hold and the trend will continue further. A second way is that when price action breaks through the principal trend line of an existing trend, it is evidence that the trend may be going to fail, and a trader may consider trading in the opposite direction to the existing trend, or exiting positions in the direction of the trend.

Money flow in technical analysis is typical price multiplied by volume, a kind of approximation to the dollar value of a day's trading. Money flow index (MFI) is an oscillator

calculated over an N-day period, ranging from 0 to 100, showing money flow on up days as a percentage of the total of up and down days.

The calculations are as follows. The typical price for each day is the average of high, low and closes.

$$\text{Typical price} = \frac{\text{High+Low+Close}}{3}$$

Money flow is the product of typical price and the volume on that day.

$$\text{Money Flow = Typical price x Volume}$$

Totals of the money flow amounts over the given N days are then formed. Positive money flow is the total for those days where the typical price is higher than the previous day's typical price, and negative money flow where below. (If typical price is unchanged then that day is discarded.) A money ratio is then formed

$$\text{Money ratio} = \frac{\text{Positive money flow}}{\text{Negative money flow}}$$

From which a money flow index ranging from 0 to 100 is formed, this can be expressed equivalently as follows. This form makes it clearer how the MFI is a percentage,

$$\text{MFI} = 100 - \frac{100}{1+ \text{Money Ratio}}$$

MFI is used as an oscillator. A value of 80 is generally considered overbought, or a value of 20 oversold. Divergences between MFI and price action are also considered significant, for instance if price makes a new rally high but the MFI high is less than its previous high then that may indicate a weak advance, likely to reverse.(Neely, Christopher et al.1996).

The technical analyst is not concerned with any of the underlying factors that affect the market the way the fundamental analyst is. In the technical analyst's world those events have already taken place; the issue then becomes looking at the factual data to predict future activity. Technical analysis is most successfully used to analyze shorter-term price movements and to set profit objectives.

The second type of methodology is fundamental analysis. It is reversing process of the technical analysis since at the first place puts the economic and political status of the country behind the currency. Fundamental analysis is the examination of economic indicators, asset markets and political considerations when evaluating a nation's currency in terms of another. The key to fundamental analysis is to gather and interpret this information and act before the information is incorporated into the currency price. The lag time between an event and its resulting market response presents a trading opportunity for the fundamentalist.

There are several approaches for modelling noise trader behaviour. For instance, some are based on maximising an explicit objective function, while the others involve non-linear responses on market signals. The presence of "noise traders" may give the raise to "short terms". Stocks and other instruments are then mis-priced and physical investment projects with returns over a short horizon are erroneously proffered to those with long horizon returns. (Cuthbertson, Keith ,(1996), p.14).

The most important and observed fundamental factors are the following ones:

- Decisions on interest rates made by central banks (FED, ECB, BoE),
- Quarterly GDP figures. Only preliminary national GDP figures generally have the effect of changing market sentiment,
- Market sentiment data. Market expectations are formed from one week to two days before the event. Participants become well positioned based on expectations. If the figures are not a surprise, profit taking is often the only result,
- Political Events. National elections, the September 11th attacks, and the war in Iraq are examples of events that have affected currency values,
- Major indices. Inflation indices, Institute of Supply Management (ISM) in the US and the Purchasing Management Index (PMI) in Europe are also carefully followed by traders,
- National industrial production figures,
- US non-farm payrolls (indicating new jobs created), Michigan sentiment figures in the US, the western German business climate or IFO index, and the Tankan quarterly survey in Japan.

The evaluation of the country's economic stability means looking at the rate of inflation, unemployment, interest rates and tax policy.

The subject of fundamental analysis is the current political situation, while taking note of impending changes like a new government or significant changes in the regulation.

Even though the approaches are different, both types of analysis complement each other. Such indicators are regularly observed on a weekly basis and the management of the Bank is notified, as well. Based on the above-mentioned forecasts, the foreign exchange rates are estimated, and such estimation is applied on the currency positions. (Framework for managing liquidity risk in Stopanska Banka AD Skopje, 2007, Stopanska Banka AD Skopje).

4.15 Other internal models for FERM in SB

SB is familiar with other model for risk management so-called Overview of Risk Value. It is used by both-Front Office and Back Office.

The model has the following sub-applications:

1. Deal Capturing, keeping the Data Base update with all open positions, in all instruments.
2. Detailed position and profitability report such as:
- Cash Flow Calculation
- Gap Analysis
- Spot FX positions
- Forward FX positions
- Position analysis per currency
3. Back-Office automatic update.

From the point of view of front-office, the dealers monitor their positions and make decisions with respect to the risk embedded in their portfolios. For the middle office, the model offers wide range of tools and analytics to measure risk under various market conditions as to ensure that risk is contained within acceptable levels trough the use of appropriate limits. From the angle of back-office, the model provides adequate source of support trough the available data base and reporting capabilities.

In brief, the Risk Value model offers the following menus:

- Deal: Wide range of different products could be entered (equity, spot, forward, swaps, futures, options, etc.).
- Securities, in which the different security characteristics are input.
- Clients: The profiles of different customer types are defined.

- <u>Accounting</u>: The menu comprises certain functions related to the accounting operations of a back-office.
- <u>Market</u>: Access to various market parameters such as currencies, interest rates, volatilities, correlations, etc.
- <u>Limits</u>: The menu enables specific limits to be set per groups of instruments, clients, portfolios.
- <u>OTC</u>: Positions taken over-the-counter are presented.
- <u>Tools:</u> This menu allows several options to configure the system according to the Bank needs.

Instrument details are set with their standard characteristics. Any risk calculation begins with marking-to-market a portfolio to current prices. This valuation serves as a reference point for subsequent risk calculation. Market prices could be up-dated in any of the following ways:

- Real-time link (Reuters)
- Input from existing database
- Manual Input.

Depending on the type of portfolios, there are certain prices that have to be up-dated on a regular basis:

- Exchange rates
- Interest rates
- Equity prices

In addition to market prices, it is important the volatility estimates to be used. There are different volatility parameters for various instruments:
- Volatility parameters for equities, indices and currency rates are expressed in terms of percentage points per day.
- Volatility parameters for interest rates are expressed in terms of basis points per day. The model makes the assumption that all three interest rate curves (Government, Money Market, and Swap) have the same volatility term structure.

Volatility parameters should be estimated either from market prices or reliable historical data.

4.16 Risk factor indicators

The Risk Value model is designed to detect the risk factors that are most crucial for the performance of total balance sheet. The mapping of different market exposures is based on the table bellow that summarizes the risk factors inherent to different instrument type. A price fluctuation in the market of a given risk factor will have direct impact on the valuation of the corresponding instruments:

Table 11: Risk factor implications

Instrument	Risk factor						
	Foreign currency	FX volatility	Interest rate in Ccy 1	Interest rate volatility	Interest rate in Ccy 2	Stock index	Commodity prices
Cash Flow	x		x				
Equities	x					x	
Commodities	x		x				x
Domestic Bonds			x				
Euro-bonds	x		x				
Spot FX	x						
Forward FX	x		x		x		
FRAs			x				
Interest rate swaps			x				
Currency swaps	x		x		x		
FX options	x	x	x		x		
Total	x	x	x		x	x	x

Source: Framework for managing liquidity risks in SB, 2007

As shown, there are many risk factors that are common to several instruments. For example, both the value of FX FWD transactions and FRAs depend on potential fluctuations in the interest rate market for the same currency involved. Thus, it is possible to estimate the total impact of an interest rate shift to the entire portfolio consisting of different types of instruments that are independently sensitive to interest rate movements.

Risk Value model offers a wide range of limits to help the user ensure that exposure is contained within acceptable levels. These limits can be imposed only on individual portfolios and on group portfolios specified by the user.

Depending on the credit quality of individual counterparty, the user might set different credit limits. These limits aim to constrain the pre-settlement risk associated with the probability of default of the counterparty. Such a default shall occur in the event that the counterparty fails to meet certain financial obligations stemming from loans, swaps or other bilateral agreements between the organization and counterparty.

The final aim of the model is to receive current reports on the risk exposure like:

- GAP Report for every day of all cash flows of a specific portfolio from specific date onwards.
- Asset & Liability Report
- Spot FX Position Report of a specific portfolio per currency with details on average price, volume, mark-to-market price.
- FX Forward Position Report, for a specific portfolio and per currency pair, the outstanding Fwd Deals and their average FX rate
- Position analysis per security
- VaR report.

5 Conclusions

Foreign exchange risk management is a complex matter. With market developments and expansion of international trade, the foreign exchange risk gains on significance mainly from the fact that it affects both individual and corporate activities. The banks, as financial intermediaries, are faced with FER which arises from their own activities and clients activities as well. Therefore, sound FERM is an important factor that influences the bank's operations, its market position, and trust in that bank.

In the presented material, we pass trough theoretical and practical aspect of FERM. The different theories make distinction among different types of FER exposure i.e. on transaction, transition and economic exposure that affect the economic actors. Furthermore, it is presented that the risk management process in general consists of several stages, which is essential for risk management approach, i.e. identification of the risk, developing adequate strategy, implementation of the strategy and monitoring the results.

Other treated conceptual issues cover the points of foreign exchange rates, different foreign exchange regimes that affect directly the money measures included in the

international transactions, which affect the FER exposure.

We can see that international banking practice pays attention to FERM and this issue becomes more and more important since many FERM tools and techniques have been developed. International market is developing very fast that imposes the need for introduction of new hedging tools and instruments.

Many models have been developed on the basis of theoretical and practical research and these models are being further developed. The new derivative products, which have risk accompanied, are the key drivers for invention of FERM tools, models and instruments, like VaR, Monte Carlo simulation, FX gap analysis, FX sensitivity analysis, many forecasting models etc. In addition to this, many banks have developed their own model for hedging the FER that is often accepted as benchmark from other banks for their FERM.

The foreign exchange instruments in Macedonia are at their introductory stage; such situation is influenced with the current FE regulation and still existent foreign currency regime that impose rules and manner of business behavior. However, different foreign exchange activities expose the banks to FER that affects the balance sheet and profit &loss statement of Bank accounts. Therefore, the Central Bank has recently drawn more attention to this issue.

Stopanska Banka, as one of the largest banks in Macedonia, is a universal bank that offers all available products and services to its customers. The aspect of FERM in the Bank is treated with the highest importance, having in mind the volume size and dynamics of the operations that, without attendance, might jeopardize the targeted results and normal course of business. Privatization of the Bank by foreign investors, which operate in more developed environments, attributed Stopanska Banka to be the first Bank that introduced adequate organizational structure, with correct segregation of duties and responsibilities, thus organizing properly the risk management functions. The Risk Management Division is a separate unit in charge of monitoring all present risk types, while the Treasury Division is responsible for maintaining the limits and operations within the pre-defined acceptable risk levels.

The Treasury Division activities are divided into front and back office units, so the segregation of duties for prevention of misuse or negligence is adequately separated.

In addition to this, the Bank has introduced a new modern information system, operation on on-line basis, fully decentralized, which is a solid platform for up-grading of different models and applications for risk management. Such tools enable the Bank risk

management process to be monitored and managed on real-time basis.

However, the market conditions in the country where the Bank operates are not so developed compared with other banking practices. Such situation limits the usage of models and instruments for risk management to the theoretical level only. On the other hand, the daily volumes of foreign exchange transactions like pure FX sell/buy, FX loans, and exchange office activities affect the open currency position and impose FX risk as a result of which the Bank is forced to utilize FERM tools.

It can be concluded from the presented research that: **Stopanska Banka has developed appropriate FERM organizational structure, information system, tools and instruments for successful management of FER.**

However, taking into account that the market is moving very fast nowadays along with all accompanying risks one of which is the currency risk, and that the regulation of the country is going towards higher liberalization, the attention to FERM should be constantly followed-up and implemented in the system of operations.

Abbreviations

AFS	Available for sale
ALCO	Asset & Liability Committee
AUD	Australian Dollar
b.p	Basis points
BoD	Board of Directors
CAD	Canadian Dollar
CHF	Swiss Frank
EBRD	European Bank for Reconstruction and Development
EUR	European Union Currency
EURIBOR	EUR inter-bank offered rate
f/x	Foreign Exchange
FE	Foreign Exchange
FER	Foreign Exchange Risk
FERM	Foreign Exchange Risk Management
Forex	Foreign Exchange Market
FRA's	Forward rate agreements
FX	Foreign Exchange
GBP	Great Britain Pound
GDP	Gross Domestic Product
HKD	Hong Kong Dollar
IFC	International Financial Corporation
IRS	Interest rate swap
JPY	Japanese yen
MKD	Macedonian Denar
NBG	National Bank of Greece
NBRM	Narodna Banka na RM (Central Bank of RM)
NDF	Non-deliverable forwards
O/N	Over night
OCP	Open Currency Position
p.a	Per annum
p.p	Percentage points
PMI	Purchasing Management Index
RM	Republic of Macedonia
SB	Stopanska Banka
SEF	Spot equivalent future
SOX	Sarbanes Oxley Act
T/N	Tom/next (from tomorrow to next working day)
USD	The United Stated Dollar
USFE	United States Future Exchange

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