MEASURING FOREIGN EXCHANGE EXPOSURE ON TURKISH FIRMS

Ahu Yasemin EMİRHAN

Danışman

Doç. Dr. A. Tülay YÜCEL

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FOREWORD

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ABSTRACT

Master with Thesis

Measuring Foreign Exchange Exposure on Turkish Firms
A. Yasemin EMİRHAN

Dokuz Eylul University
Institute Of Social Sciences
Department of Business Administration

Foreign exchange exposure, which refers to the degree to which a company is affected by exchange rate changes, is a central issue of international financial management. Due to the increasing volatility in exchange rates and international trade, firms are extremely exposed to foreign exchange risk even if they have no foreign operations. The aim of this study is to analyze theoretical and empirical studies about this concept and investigate the position of Turkish firms empirically.

To achieve this purpose, the concept of foreign exchange exposure and its relationship between monetary systems along with the foreign exchange rate regimes applied in Turkey are investigated in the first section of the study. In the second section of the study, three types of exposures existing in the literature- translation, transaction and economic exposure- are explained. In the third section, the methods for managing transaction and economic exposure are analyzed. In the fourth and last section of the study, empirical analysis on foreign exchange exposure of Turkish firms is made.

In the first part of the empirical analysis, stock return, market return and real effective exchange rate data are used in the study. It is found that 17 percent of the sample of 54 companies' stock returns experienced economically significant negative exposure for the period September 1997 to September 2005. None of the industries have significant foreign exchange rate exposure. In the second part of the empirical analysis, the extent to which a firm is exposed to exchange rate fluctuations is explained by its size, export ratio and foreign ownership ratio. From these variables, only export ratio is significant.

Key Words: **1)**Foreign Exchange Exposure, **2)**Foreign Exchange Regimes, **3)**Managing Exposure, **4)** Hedging, **5)** Stock Return

ÖZET

Yüksek Lisans Tezi

Döviz Kuru Riskinin Türk Firmaları Üzerinde Ölçülmesi

A. Yasemin EMİRHAN

Dokuz Eylül Üniversitesi
Sosyal Bilimleri Enstitüsü
İngilizce İşletme Anabilim Dalı
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Bir firmanın döviz kuru değişimlerinden ne kadar etkilendiği anlamına gelen döviz kuru riski uluslararası finansal yönetim alanında güncel bir konudur. Kurlardaki artan hareketlilik ve artan uluslararası ticaret nedeniyle, hiçbir uluslararası faaliyeti olmayan firmalar bile yoğun olarak kur riskine maruz kalmaktadır. Bu çalışmanın amacı bu kavramla ilgili teorik ve ampirik çalışmaları incelemek ve Türk firmalarını ampirik olarak incelemektir.

Bu amaçla, kur riski kavramı ve para sistemleri ile olan ilişkisi Türkiye'de uygulanan döviz kuru rejimleri ile birlikte çalışmanın ilk bölümünde incelenmiştir. Çalışmanın ikinci bölümünde, literatürde yer alan üç çeşit döviz kuru riski- Muhasebe, işlem ve ekonomik kur riski- açıklanmıştır. Üçüncü bölümde, işlem ve ekonomik risklerini yönetmek için kullanılan yöntemler analiz edilmiştir. Çalışmanın dördüncü ve son bölümünde, Türk firmalarının kur riski üzerine ampirik bir çalışma yapılmıştır.

Araştırma bölümünün ilk kısmında, hisse senedi getirisi, piyasa getirisi ve reel efektif döviz kuru değişim verileri kullanılmıştır. Örneklemdeki 54 firmanın yüzde 17'sinin hisse senedinin Eylül 1997-Eylül 2005 dönemleri arasında anlamlı negatif döviz kuru riskine maruz kaldığı bulunmuştur. Endüstri düzeyinde ise hiçbir endüstride hisse senedi getirisinin döviz kuru ile ilişkisi anlamlı bulunmamıştır. Araştırmanın ikinci bölümünde, bir firmanın döviz kuru riskinden ne derecede etkilendiği firmanın büyüklüğü, ihracat oranı ve yabancı hisse senedi oranı ile açıklanmıştır. Bu değişkenlerden sadece ihracat oranı anlamlı bulunmuştur.

Anahtar Kelimeler: **1)** Döviz Kuru Riski, **2)**Döviz Kuru Rejimleri, **3)**Kur Riskinin Yönetilmesi, **4)** Korunma, **5)** Hisse senedi

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SECTION IV

AN EMPIRICAL ANALYSIS ON TURKISH FIRMS

LIST OF ABBREVATIONS

B/S	Balance Sheet
COGS	Cost of Goods Sold
CTA	Cumulative Translation Account
ECB	European Central Bank
EMS	European Monetary System
EMU	European Monetary Union
EU	European Union
EXP	Export Ratio
FDI	Foreign Direct Investment
FO	Foreign Ownership
GDP	Gross Domestic Product
I/S	Income Statement
IFC	International Finance Corporation
IMF	International Monetary Fund
ISE	Istanbul Stock Exchange
MC	Marginal Cost
MNC	Multinational Corporation
MR	Marginal Revenue
OLS	Ordinary Least Squares
R&D	Research and Development
SDR	Special Drawing Right
T-bill	Treasury Bill
TL	Turkish Lira
TRY	New Turkish Lira

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INTRODUCTION

A. The Purpose of the Study

Foreign exchange rates had been generally stable for the period between 1945 and 1973. This stability is sustained by the Bretton Woods System. However, in 1973, with the collapse of Bretton Woods, foreign exchange rates were left to float. After the implementation of floating exchange rate regimes, foreign exchange rates showed great variability and created a major source of macroeconomic uncertainty for firms. Volatility in exchange rates affected all firms including the ones with no foreign operations and no foreign currency assets and liabilities. Because input prices, output prices and the competition in the industry may change due to the changes in exchange rates. Therefore, foreign exchange exposure concept is important for all firms.

There are three different types of risks identified under exchange rate systems as translation, transaction and economic exposure. Translation exposure is an accounting based exposure, which is characterized by the changes in book values of assets and liabilities in foreign currency. Transaction exposure arises due to the gains and losses arising from foreign currency transactions already settled into. Economic exposure is the broadest one, which is the sensitivity of firm value to changes in exchange rate.

Under a floating exchange rate regime, the competitive power of an export firm reduces by an appreciation of the local currency, whereas it increases by a depreciation of the local currency. Therefore, it is expected that depreciation of the local currency has a positive effect on the exporter firm's stock and negative effect for the importer firm's stock.

In the literature, the measurement of foreign exchange exposure is done by using Adler and Dumas (1984) model, which measures the exposure as the elasticity

between change in firm value and exchange rate. This elasticity is calculated from a regression of stock returns on exchange rate changes.

When the foreign exchange rate regimes in Turkey are analyzed, it is observed that exchange rate system has been liberalized after 1980. Floating exchange regime is commonly applied in Turkey and volatility in exchange rates is high for Turkey. Therefore, firms operating in Turkey are deeply exposed to foreign exchange rate risk.

The purpose of the study is to measure foreign exchange exposure of Turkish firms under the frame of previous studies and then to analyze the firm specific effects on foreign exchange exposure. By this way, the foreign exchange risk figure of Turkish firms will be presented.

B. The Method of the Study

In the study, firstly, the definition and theoretical structure of foreign exchange exposure is given. Then, with empirical models, the foreign exchange exposure of Turkish firms and the firm specific factors affecting this exposure are investigated. Jorion's (1990) model is used in this study. In Jorion's model, the stock return of company is regressed with the changes in foreign exchange rates and market return. While analyzing the effect of firm specific factors on the foreign exchange exposure of Turkish firms, the variables are selected from the previous studies. These variables are firm size; export ratio and foreign ownership ratio. Real effective exchange rate, a trade weighted index, is used in the study. ISE 100 index is employed to characterize market return.

The data from September 1997 to September 2005 is employed. The analysis is made for the full period and two sub periods as September 1997-September 2001 and October 2001-September 2005. Linear regression is used by applying Ordinary Least Squares Method. The analysis is carried out in the firm level. Furthermore, since there were some studies made in industry level, an industry level analysis is

performed by using the same model. Lastly, lagged effect of changes in exchange rates on stock return is investigated by following some studies in the literature.

C. The Plan of the Study

The study has four sections. The first three sections are aimed to propose the theoretical basis of foreign exchange exposure. The last section presents an empirical study to investigate foreign exchange exposure of Turkish firms and the firm specific factors having effect on this exposure.

In the first section of the study, primarily foreign exchange exposure concept is defined. Then the relationship between monetary systems and foreign exchange exposure is given. In this context, alternative exchange rates and a brief history of International Monetary Systems are presented. Lastly, the foreign exchange rate regimes in Turkey until today are explained.

In the second section of the study, foreign exchange exposure for companies is explained. Three types of foreign exchange exposure-translation, transaction and economic- are presented in this part of the study.

In the third section, the methods for managing transaction and economic exposure are discussed in detail.

The last section of the study consists of empirical analysis of the measurement of foreign exchange exposure of Turkish firms and the firm specific factors affecting their exposure. Firstly, a model consisting of changes in foreign exchange rate, market return and stock return that measures economic exposure is used. This relationship is analyzed both in firm and industry levels. Then the lagged effect of changes in foreign exchange rate changes on stock return is analyzed. In the second section of the empirical analysis, the relationship between firm specific factors- firm size, export ratio and foreign ownership and sensitivity of stock returns to changes in exchange rate is investigated. In the conclusion section, the results of the Section IV are interpreted.

I. SECTION I

FOREIGN EXCHANGE EXPOSURE AND INTERNATIONAL MONETARY SYSTEMS

In this section, foreign exchange exposure concept and the relationship between foreign exchange exposure and money systems will be discussed. In the last part of the section, foreign exchange exposures for the companies will be discussed.

A. The Concept of Foreign Exchange Exposure

The general concept of exposure refers to the degree to which a company is affected by exchange rate changes (Shapiro, 1994; 187). This means that a firm has assets, liabilities, and profits or expected future cash flow streams and the home currency values of these assets, liabilities, and profits or expected future cash flow streams changes as exchange rates change. Risk arises because currency movements may change home currency values.

Foreign exchange exposure and foreign exchange risk are separate concepts, which are used interchangeably (Buckley, 2000;136).According to Adler and Dumas, foreign exchange risk is related to the variability of domestic currency values of assets, liabilities or operating incomes due to unanticipated changes in exchange rates, whereas foreign exchange exposure is what is at risk (Adler and Dumas, 1984)

Several features of exposure are worth noting: First of all, exposure is a measure of sensitivity of domestic currency values to changes in foreign exchange rates. The second feature is that exposure may exist on assets, liabilities or operating incomes. Therefore, exposure occurs in both stocks and flows. The third important feature of exposure is that it creates foreign exchange risk as a result of unanticipated changes in exchange rates. This means that every change in foreign exchange rates do not create foreign exchange risk. If volatility in exchange rates can be estimated, the

market can make necessary adjustments by itself. Therefore, the effect of this volatility on the enterprise will not be a surprise.

Foreign exchange rate risk occurs when a cash inflow from a specific currency is different from a cash outflow of that currency. This is called as net foreign exchange position (Mengütürk, 1995; 79). If expected cash inflows exceed cash outflows, the company will be in a long position .On the other hand, if expected cash outflows exceed expected cash inflows, short position is realized. If the amount of cash inflows is equal to the amount of cash outflow, the net exchange position will be zero. This is called as a "square position". Hence, the position of a foreign exchange at a moment could be shown like this:

Cash inflows> Cash outflows: Long position

Cash inflows<Cash outflows: Short position

Cash inflows=Cash outflows: Square position

If an enterprise has a long position in a currency, it is vulnerable to a drop in the spot value of the long currency. In the case of "long position", the increase in the foreign exchange rate will result with exchange profits whereas a decrease in the rate will result with exchange loss. If an enterprise has a short position in a currency, it is vulnerable to a rise in the spot value of that currency. In the case of "short position", if the spot rate rises, there will be an exchange loss. A fall in the spot rate will cause an exchange profit. If the enterprise has a square position, changes in exchange rates will not cause profit or loss.

The effects of exchange rates changes for various cases of the net exchange position are given in Table 1.

Table 1: **The effects of exchange rates changes for various net positions**

Net Cash Flow Position	Description	Change in Exchange Rate	Exchange Profit or Loss
>0	Long	Rise	Profit
		Fall	Loss
=0	Square Exchange Position	Rise	None
		Fall	None
<0	Short	Rise	Loss
		Fall	Profit

Conclusively, foreign exchange risk management begins by identifying what items and amounts a firm has exposed to risk associated with changes in exchange rates. Management of this risk has vital importance for multinational companies since unexpected changes in foreign exchange rates affect cash flows, assets and liabilities of the firms and result with substantial amounts of profits and losses.

B. The Relationship between Foreign Exchange Exposure and Monetary Systems

The probability and the magnitude of change in exchange rates are closely related with the money system applied. In this part, exchange rate systems and the relationship of these systems with foreign exchange exposure will be discussed.

1. Alternative Exchange Rate Systems

The international monetary system refers primarily to the set of policies, institutions, practices, regulations and mechanisms that determine the rate at which one currency is exchanged for another.

The most important factor for determining the characteristics of the exchange rate systems is whether the exchange rate is determined freely or not. Free float and fixed exchange rates are two extreme regimes and there are many exchange rate systems between these two regimes. Four exchange rate systems will be given below. These are:

- Fixed Rate System
- Freely Float
- Managed Float
- Adjusted Peg System

a) Fixed Exchange Rate System

In a fixed exchange rate system, exchange rates are either held constant or are allowed to fluctuate within very narrow boundaries. The rate determined by the government is called "central rate or par value" (Ünsal, 2005; 492). If fluctuation in exchange rate is too much, governments can intervene to maintain it within the boundaries (Madura, 1992; 153).

In a fixed rate system, foreign exchange rates are kept fixed for long time and if there is a need for change in exchange rates, devaluations or revaluations are made with big rates. Since foreign exchange rates are forecasted, it seems that foreign exposure is limited in this system. As a result, foreign investment and international transactions may increase (İnan, 2002). Due to the decreased uncertainty, economic units enter into the international market easily. Interest rates decrease in domestic market and risk premium decreases in foreign markets.

On the other hand, this system has still some risks. The economy becomes very sensitive to external shocks. Since the value of domestic currency increases in real terms, it is expected that import will increase and export will decrease which leads to increase in current account deficit. In this system, it is very important to sustain confidence to keep rates at the expected level. If confidence is lost, big economic crises appear in the economy. These crises result with big devaluations or revaluations.

It is expected that devaluation increases export level by increasing competitive power of the country. Revaluation may increase import level of the country. So, revaluation may have a negative impact on current account by increasing deficit.

b) Free Floating

Exchange rates are determined by demand-supply mechanisms in a freely floating exchange rate system. Governments do not intervene to foreign exchange market. There is not a declared foreign exchange rate or parity in a freely floating system. As economic parameters change (price level, interest differentials and economic growth), market participants will adjust their demand and supply. However, even the central banks of developed nations, which claims that they are carrying out "free floating system" interferes the foreign exchange market (Çıdamlı, 1996; 79).

There are some arguments about freely floating exchange rate system. Defenders of this system argue that this system reflects the real value of currency protects economy from external shocks, protects against sudden and big foreign exchange rate changes. On the other hand, opponents of the system argue that volatility and speculations increase in this system (İnan, 2002).

Under such a system, companies dealing with international activities should devote more effort to estimate foreign exchange rates since volatility is high with respect to fixed exchange rate system.

c) Managed Float (Dirty Float)

In a managed float system, foreign exchange rates are left to float according to demand and supply conditions in the foreign exchange market. This floatation is controlled by the Central Bank. Central Bank intervenes the system to remove extreme increases or decreases (Ünsal, 2005; 492).

Managed float is similar to the fixed system that governments can and sometimes do intervene to prevent currency from fluctuating too much in a certain direction. This system lies somewhere between fixed and freely floating exchange system in which exchange rates are allowed to fluctuate on a daily basis and official boundaries do not exist.

This system came into force as a result of the experience with "Free Float Exchange System". The experience during 1980s was not very successful. Instead of reducing economic volatility as it was expected, floatation in exchange rates increased it. This exchange rate uncertainty affected economic efficiency negatively. Therefore, most countries with floating currencies have attempted to smooth out exchange rate fluctuations via central bank. By this way, managed float system was born (Shapiro, 1994; 53).

Managed float falls into three distinct categories according to central bank intervention. These categories are:

• Smoothing out daily fluctuations: Government occasionally enters the market on the buy or sell side to ease the transition from one rate to another rather than resist fundamental market forces

- Leaning against the wind: This approach is an intermediate policy designed to moderate or prevent abrupt short and medium term fluctuations brought about by random events whose effects are expected to be only temporary.

- Unofficial pegging: This strategy evokes memories of a fixed rate system. It involves resisting fundamental upward or downward exchange rate movements for reasons clearly unrelated to exchange market forces. With unofficial pegging, there is no publicly announced government commitment to a given Exchange rate level.

There are some criticisms about "Managed Float". Managed float system allows a government to manipulate exchange rates in a manner that could benefit its own country at the expense of others

d) Adjustable Peg System

Under adjustable peg system, countries adjust their national economic policies to maintain their exchange rates within a specific margin around agreed-upon, fixed central exchange rates. This fixed, central rate is called as "parity". In this system, market prices are left to float near parity exchange rates within narrow boundaries. In the case of reaching these determined boundaries, central banks intervene to the system. If the national currency continuously reaches to the bottom and top limits, it will be devalued or revalued (Seyidoğlu, 1994; 647).

The advantage of this system is that changes occurred between bottom and top limits can be calculated and therefore foreign exchange risk is limited. If floating is seen in narrow range, foreign exchange changes will be limited, too. Knowing the maximum amount of foreign exchange rate risk makes it easier to take necessary measures against this risk.

2. A Brief History of the International Monetary System

In this section, international monetary system will be evaluated historically from the beginning of 1876 to the present. International monetary system can be

evaluated in four sections. The first period is from 1876 to 1913; Gold Standard Period. The second period is from 1914 to 1944; Gold Exchange Standard Period. The third period is from 1944 to 1973, Bretton Woods Period and the last section that will be discussed is the period from 1973 to today.

a) The Gold Standard (1876–1914)

The international monetary system that operated from the 1870s to the 1914-1918 War was termed as the "Gold Standard". Most major countries applied this system.

The attributes of the system can be given as follows: A unit of a country's currency was defined as a certain weight (ounce) of gold. Gold could be obtained from the treasuries of the countries in exchange for money. In this system the central bank of the country was obliged to give gold in exchange for its currency. The exchange rates between currencies were determined according to the gold amount of the related currencies. For example; the pound could be converted into 113.0015 grains of fine gold and the US dollar could be converted into 23.22 grains of gold. The pound was defined as 113.0015\23.22 times as much gold as the dollar. The pound was worth $4.8665 (Buckley, 2000; 16).

The Gold Standard system had created inflexibility for exchange rates since exchange rates were dependent on the gold reserves (Mengütürk, 1994; 13). During the 19th century, Gold standard was commonly used but with the beginning of World War I, the adoption of Gold Standard was interrupted. World War I interrupted the trade flow and free movement of gold. During the war, major currencies were left to float freely (Seyidoğlu, 1994; 643).

b) The Gold Exchange Standard (1925–1931)

After the end of gold standard, most of the countries wanted to return back to the Gold Standard. Therefore, they began to apply a system that was close to the

Gold Standard. But this new system was modified Gold Standard. In this standard, the United States and England were allowed to hold only gold reserves but other nations could hold both gold and dollars or pounds as reserves. In 1931, England departed from the system with the reason of massive gold and cash outflows. This event had prepared the end of the system (Shapiro, 1994; 63).

Following the devaluation of sterling, 25 other nations devalued their currencies to maintain trade competitiveness. These beggar-thy-neighbor devaluations caused a trade war in which nations cheapened their currencies in order to increase their exports at the others' expense and reduce imports. These policies were resulted with "Great Depression" (Shapiro, 1994; 63).

Shortly, it could be said that at the edge of World War II, there was a chaos in the international monetary system and there was a need for a new monetary system.

c) Bretton Woods and IMF (1946-1973)

After the World War II, it was needed to establish an international trade and monetary system that would liberalize the world trade and restore the economies that were damaged during the war. In order to achieve this goal, nations closely cooperated. Most of the major countries met at Bretton Woods in 1944 in order to create a new monetary system. This system was called as the Bretton Woods System (Buckley, 2000; 21). Under this new system, each government pledged to maintain a fixed exchange rate for its currency against the dollar or gold. One ounce of gold was set equal to $35. The exchange rate was allowed to fluctuate only within 1 percent of its stated par value.

During the Bretton Woods Conference, two new institutions were established: International Monetary Fund (IMF) and World Bank. IMF was established to promote consultation and collaboration on international monetary problems and to lend to member countries in need due to deficits in balance of payments.

Members would change their par values only after having IMF approval. This approval would be given only if the country was suffering from a competitive disequilibrium in its balance of payments. Devaluation would not be used as a trade policy (Seyidoğlu, 1994, 646-647).

Under the Bretton Woods, all countries fixed the value of their currencies in terms of gold but were not required to exchange their currencies for gold. Only the dollar remained convertible into gold (Eitemann et al., 2004; 26). Therefore dollar had an important role in the system. This fact had arisen some problems. The level of international liquidity was dependent on the US balance of payment deficits. It was difficult to carry out this situation. Therefore, the introduction of a new international reserve asset was administered by IMF in 1969. This asset was called as "Special Drawing Right (SDR)" (Buckley, 2000; 22). SDRs were allocated to individual countries by the IMF. These credits were allocated to members in proportion of their quotas which are the holdings of a country's international monetary reserves. A country holding SDRs may use them to acquire foreign currency by transferring them to another country in exchange for foreign currency.

The Bretton Woods System worked well during post World War II. However, widely diverging national monetary and fiscal policies, differential rates in inflation and various unexpected external shocks eventually resulted in the collapse of the system. As it was mentioned, the US dollar was the main reserve currency held by central banks. A heavy capital outflow of dollars was required to finance the deficits. In 1970s, the system was collapsed. It could be said that there are two important reasons for the collapse of the system: One of them is the inflation in US economy and the other is that other countries did not want to expose to inflation imposed as a result of fixed rate system (Seyidoğlu, 1994, 647).

In 1971, at the Smithsonian Institute in the US, a conference was held. Smithsonian Agreement was signed. As a result of this agreement, fixed exchange rate band spread to 4.5 percent and dollar was devalued t $38 per ounce of gold. A second devaluation in dollar had come one year after and it became $41.22 per ounce

of gold. In March 1973, Bretton Woods era finished when 14 major industrial nations abandoned the fixed exchange and allowed their currencies to float against dollar (Eitemann et al., 2004; 26).

d) The Flexible Exchange Period (After 1973)

After the collapse of Bretton Woods, IMF members agreed to apply flexible exchange rates and central banks were allowed to intervene and manage floats of the currencies to prevent volatility. The period from 1973 to 1985 is named as "The Flexible Exchange Rate Period". After the transition to flexible exchange rate period, foreign exchange rates had begun to show monthly, weekly and as well daily changes, which was not observed before (Çıdamlı, 1996; 75).

Proponents of this system argued that the new system would reduce economic volatility and facilitate free trade. They said that uncertainty decreases with freely floating exchange rates. However the experience to date is disappointing. Real exchange volatility has increased, not decreased, as a result of floating exchange rates. This instability brought shocks to the world economy. During 1990s, many economic crises occurred in the developing countries. Mexico Crisis in 1994, Asian Crisis in 1997, Russia Crisis in 1998 and Turkey Crisis in 2001 are the examples of these crises. In addition to this, flexible exchange rates have a negative impact on current deficit.

History does not offer any convincing model of a system that will lead to long-term exchange rate stability. A good monetary system at least should be credible and stable. The economic characteristics of each country are different and most suitable exchange rate system should be determined according to specific conditions about that country.

e) Contemporary Currency Regimes

Fixed and flexible exchange rates are only two alternatives defining the extremes of exchange rate systems. In between these, there are a number of other

systems which have been practiced at various times. IMF has classified the currency regimes in 8 categories. These categories and the Birth of Euro, which is one of the most important economic events of the last years, will be discussed in this part.

The IMF's Exchange Rate Regime Classifications

IMF classifies exchange rate regimes into eight categories. These exchange rates are between fixed to freely floating (Eitemann et al., 2003; 31-32).

1. **Exchange Arrangements with no Separate Legal Tender:** The currency of another country circulates as the sole legal tender or the member belongs to a monetary or currency union in which the same legal tender is shared by the members of the union.

2. **Currency Board Arrangements:** It is committed that domestic currency is exchanged for a specified foreign currency at a fixed exchange rate. In this system, the issuing authority ensures the fulfillment of its legal obligations.

3. **Other Conventional Fixed Peg Arrangements:** The currency of the country is pegged to a major currency or a basket of currencies. The exchange rate fluctuates within a narrow margin such as 1 percent at most.

4. **Pegged Exchange Rates with Horizontal Bands:** The value of the currency is maintained within margins of fluctuation around a formal fixed peg wider than 1percent a central rate.

5. **Crawling Pegs:** In this system, the currency is adjusted in small amounts at a fixed rate periodically according to preadjusted indicators.

6. **Exchange Rates within Crawling Pegs:** The currency is maintained within certain fluctuation margins around a central rate that is adjusted periodically at a fixed preannounced rate.

7. **Managed Floating with no Pre-announced Path for the Exchange Rate:** The movements of the exchange rate are influenced by the monetary authority by active intervention in the market without preannounce this intervention.

8. **Independent Floating:** The exchange rate is determined in the market with any foreign exchange intervention aimed at moderating the rate of change and preventing undue fluctuations.

The Birth of EURO

On January 4, 1999, 11 member states of the EU initiated the EMU. They established a single currency, the euro, which replaced the individual currencies of the participating member states. These 11 countries were Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Portugal and Spain. The UK, Sweden, and Denmark, chose to maintain their individual currencies. Greece joined in 2001 since it could be able to meet the Maastricht Criteria in that year (Krugman and Obstfeld, 2003; 604).

The Maastricht Criteria were created in December 1991. The aim was to replace all individual currencies of the members with a single currency called "EURO". The members of the European Monetary Union (EMU) met at Maastricht, the Netherlands, and finalized a treaty that changed Europe's currency future. To prepare for the EMU, the Maastricht Treaty called for the integration and coordination of the member countries' monetary and fiscal policies. Before becoming a full member of the EMU, each member country was originally expected to meet the following criteria:

1. Nominal inflation should be no more than 1,5 percent above the average of the three members of the EU with the lowest inflation rates during the previous year.

2. Long-term interest rates should be no more than 2 percent above the average of the three members of the EU with the lowest inflation rates during the previous year.

3. The fiscal deficit should be no more than 3 percent of the Gross Domestic Product (GDP):

4. Government debt should be no more than 60 percent of Gross Domestic Product.

A strong central bank called the European Central Bank (ECB) was established in Frankfurt, Germany. The bank is modeled after the US Federal Reserve System. This independent central bank dominates the countries' central banks, which continue to regulate banks resident within their borders, all financial market intervention and the issuance of euro will remain the sole responsibility of the ECB (Eitemann et al., 2003; 36-37).

The launch of the euro was only the first of many steps to come. The euro affects markets in two ways:

1. Countries within the Euro Zone enjoy cheaper transaction costs.
2. Currency risks and costs related to Exchange rate uncertainty are reduced.

All consumers and businesses both inside and outside the Euro Zone enjoy price transparency and increased price-based competition.

C. FOREIGN EXCHANGE SYSTEMS AND REGIMES IN TURKEY

The economic policy of Turkey will be analyzed under sub periods: The first is the period between 1923 and 1980, and the second is the period between 1980 and

1994, the third one is between "1994-1999", the fourth one is after 2000 and the last one is from 2001 to 2005. These periods will be analyzed chronologically.

1. Foreign Exchange Regimes and Policies during the Period of 1923-1980

Turkey had a fixed exchange rate system and multiple currency practices with strict exchange controls until 1980. From the first years of the Republic to 1950, English sterling was used as reference currency. After 1950, as a result of the increased economic and political power of USA in the world, US dollar was started to be used as reference currency (Arat, 2003). In the period of 1924–1929, TL had been generally devalued. After 1930; more conservative and interfering policies were applied and current account had surplus for the first time.

In 1930, The Laws and Decrees about Protection of Turkish Currency (No: 1562) had come into force in order to make the supervision of the foreign exchange market directly. With this law; the convertibility of TL was ceased (Karluk, 1997, 505). Measures taken to achieve the supervision of foreign exchange market could not be successful since there was not a Central Bank that would carry out the monetary policy of the country. For this reason, in 11.06.1930, Central Bank of Turkey was established. In this period; TL was revalued and gold and foreign exchange reserves had increased. In 1933, convertibility of TL was ceased by abolishing free interest rate application. In this context, the first devaluation was made in 1946 and the price of one USA dollar was increased from 1.30 TL to 2.80 TL. This means that TL is devalued against dollar by 53.6 percent. This devaluation is devoted to adapt new market conditions and new economic policies in period after war. It was aimed to limit import and to increase export (Arat, 2003; 37).

In 1944, Bretton Woods Treaty was signed by Turkey. From 1944 to 1973, until the collapse of Bretton Woods system, fixed exchange rates were applied. After 1950, Turkey started to implement liberal economic policies. Due to this policy, imports had increased and foreign deficit had grown. In 1953, liberalization had been

ceased (Karluk, 1997; 505). Open foreign exchange market was established in order to meet increasing foreign exchange demand.

In 1960; Turkey was in a new period, which is called planned economy, in which 5 year development plans were applied. After 1964, a new inflationary period had begun and TL was overvalued. The third biggest devaluation of Turkey was in 1970 with 66.6 percent. During the period 1970-1980, Turkey had faced with huge trade deficits and devaluation had been the only tool used against this problem (Ertekin, 2003). Necessary measures were taken to obtain harmonization among international foreign exchange rates. These measures were shaped by IMF rules. According to IMF's rules, there should be a difference of maximum 20 percent between any two bid or ask price of the currency of one country and currencies of other members.

Until the economic measures package of January 24, 1980 one USA dollar was equal to 26.5 TL and at that date, a change in foreign exchange regime was realized. Crawling peg regime was in force after date and the value of one USA dollar was raised to 70 TL. It is seen that after 1980, the adjustments made in foreign exchange rates were seen more frequently. In 1980, foreign exchange rates were adjusted 16 times by following the developments in international money markets (Karluk, 1997; 505).

2. Foreign Exchange Regimes and Policies during the Period of 1980-1994

In early 1980, in response to a strong balance of payments crisis accompanied by a deep recession and accelerated inflation, Turkey abandoned its inward-oriented development strategy and started a step by step liberalization in its economy. (Kibritçioğlu, 2005). This liberalization had started with the devaluation of TL against other currencies. Until May 1st of 1981, TL was devalued frequently by 1.5-5.5 percent and thereby managed float regime was applied.

After May 1981, foreign exchange rates were begun to be announced by the Central Bank. After this date; the value of TL was announced each day to overcome the risk of overvaluation. The Central Bank had made devaluations of average 2-4 percents monthly (Karluk, 1997; 511).

The foreign exchange regime applied in Turkey was liberalized dramatically by Protection of Turkish Currency Laws and Decrees (Decision No: 28), which is in force since 29th December 1983 and the Decision No: 30 related with Protection of Turkish Currency Laws and Decrees, which is in force since 7th June 1984. In 1983, Capital Market Board had been established and in 1986, Istanbul Stock Exchange (ISE) had been opened. In 1987, The Central Bank had begun to make open market operations (Arat, 2003; 39).

In 1988, by a regulation in money market, foreign exchange rates were determined under market conditions. For this reason "Foreign Exchange and Effective Market" has been established in the Central Bank (Karluk, 1997; 512). The most dramatic change that affects foreign exchange regime choice or foreign exchange policy is made with Protection of Turkish Currency Laws and Decrees (Decision No:32) published in August 1989, which is an extremely liberal capital account regime (Demir, 2004). The Decision No: 32 can be accepted as the decision of transfer for full convertibility. According to this decision, residents of Turkey are given the rights of purchasing foreign exchange from banks, financial institutions and transferring this foreign exchange abroad. In addition to this, people settled outside of Turkey are given the rights of purchasing securities traded in Stock Exchange via banks and intermediary institutions operating according to Capital Market Law. Residents of Turkey can also purchase and sell securities traded in foreign stock exchanges and transfer the purchasing amount of these securities. In addition to this, residents of Turkey can get any type of credit from abroad and Turkish banks were permitted to open foreign exchange credits. The main reason for this regulation, (Decision No: 32), is the growing need for external capital inflows to finance public sector borrowing requirement. After this move, short-term capital entry has been accelerated in 1989 and 1990. Opening of the Turkish economy to the

rest of the world in the 1980s increased the funding options for the financial system and large firms. However, it also increased vulnerability of the domestic economy to external shocks. After 1989, the overvaluation of the Turkish lira and high interest rates attracted short-term capital inflows into Turkey. This hot-money mechanism had prepared a suitable environment for big economic crises.

3. Foreign Exchange Regimes and Policies during the Period of 1994-1999

Turkey has been exposed to the instabilities, the accompanying problems and the risks of financial liberalizations. These difficulties are seen obviously in three major crises in the post-1990 era. The weak and fragile nature of Turkish economy had led to three major crises in 1994, 1998-1999 and 2000-2001 each of which was followed by collapse of the economy and could be stabilized by IMF intervention.

With the 1994 Crisis, a very huge capital outflow was seen. As a result, TL was devalued in exchange for USA dollar by 13.6 percent. Then, by the program of 5th April 1994; some economic measures were taken. According to these measures, Central Bank has announced that foreign exchange rates that are used in commercial and non-commercial transactions will be determined freely under market conditions. In 1994, foreign exchange policy was as a tool to decrease the inflation as a part of the economic program. In this period; undervalued foreign exchange rate and high interest rate had encouraged short-term foreign exchange entry. However, the economy after the April 1994 program still suffered from high rates of inflation, increasing budget deficit and current account deficits (Arat, 2003; 41). In 25th November 1995, Futures Market had been established in the Central Bank in order to foresee foreign exchange risks in a stabilized market. The Central Bank had realized the first forward transaction in 27.11.1995 (Karluk, 1997; 514).

In 1996, The Central Bank had formed the Foreign Exchange Policy according to the Monetary Policy applied. In 1997 and 1998, the Central Bank had continued to determine the monthly nominal devaluation rate according to the

expected inflation rate. There was not a big change in foreign exchange and monetary policies during 1996, 1997, 1998.

The event having a big impact in 1998 was the Russian Crisis. After the Russian Crisis in August 1998, the Central Bank had to sell foreign exchange to the market, to stabilize the effects of rapid short-term capital outflows. At the end of 1999, a stand-by agreement has been made with IMF. According to this agreement, it was planned to decrease inflation number to "one digit number".

4. Stabilization Program After 2000

At the beginning of 2000, by signing a stand-by agreement with the IMF, a three-year disinflation and macroeconomic restructuring program was introduced. In this program, money and foreign exchange policy focused on decreasing inflation (Arat, 2003; 43).

According to the program introduced in 2000, foreign exchange policy aimed to achieve price stability. While from 1995 to 2000, foreign exchange rate determination was made according to the forecasted inflation, at the beginning of 2000 foreign exchange rate were determined according to the targeted inflation. The Central Bank act as a party in foreign exchange market as a buyer or seller to reach the targeted rates. It can be said that the Central Bank had begun to follow an "active" foreign exchange policy rather than a "passive" one.

With the foreign exchange program after 2000, a strategy with two phases had been followed. During the first 18 months, there was an exchange regime with announced foreign exchange rates whereas during the second phase of the program "band" application was started. In the band application, the forecasted bandwidth would be increased step by step. It was announced that the band would be increased step by step by 7.5 percent from June 1 2001 until December 31 2001, by 15 percent until June 2002 and by 22.5 percent until December 31 2002 (Arat, 2003; 44).

At the beginning, the 2000-2002 program was quite successful. Interest rates fell below expected levels, inflation slowed down and production and domestic demand started to increase. The stabilization program had seen the first shock in November 2000, which was a liquidity squeeze as a result of the extremely risky position of banks and the second in February 2001, which turned into the most serious financial and economic crisis Turkey has experienced in its post-war history (Özkan, 2005). The systematic banking crisis of late 2000 resulted in a currency crisis. The government abandoned the crawling peg regime under the original plan and floated the TL in February 2001.

5. The developments after "Free Floating Foreign Exchange System"

Landing to free floating system from fixed exchange system was not very smooth. In that period, the firms and banks with high level of open position faced with considerable amount of foreign exchange exposure.

The banks had difficulty in meeting their short-term foreign exchange liabilities due to the transition to the Free Floating Exchange Rate System. The Central Bank had given the permission of reserving foreign currency to commercial banks. In addition to this, the Central Bank had taken some measures to increase swap transactions between banks in order to increase foreign exchange liquidity.

In 2001, The Central Bank had become an active party to prevent dramatic floating in the foreign exchange by directly purchasing and selling foreign exchange in the foreign exchange market. Foreign exchange rates are determined in the market, but TL in real terms increased. TL was overvalued during this period as shown in Table 2. The Table 2 shows the real exchange rate for the period 2001-2005. High current account deficit was the result. In this case, it is expected that foreign exchange rates will increase. On the other hand, there was high level of cash inflow due to hot money entry and capital market and this cash inflow depressed the increase in foreign exchange rates. With the high return, Turkish money and

financial markets became attractive for foreigners, high level of capital inflow to the country led to a fragile Turkish economy.

In 2005, there are some positive improvements from the inflation side. Inflation had begun to decrease and TRY was introduced at the beginning of 2005.While passing from TL to TRY, six digits were dropped. Transition to TRY is evaluated as an indicator of desire for economic stability. Therefore, it is a very important step.

Table 2: **Real Effective Foreign Exchange Rate of TRY between "2001-2005"**

	2001	2002	2003	2004	2005
Real Foreign Exchange Rate Index	107.3	117.1	126.2	131.3	147.2

Source: Central Bank of Turkey

Shortly, until 1980, fixed exchange rate regime was applied in Turkey whereas after 1980, floating exchange rate regime was applied. The exchange rate regime was shaped by the IMF Programs after 1980 in order to achieve integration with international markets. The choice of foreign exchange rate regime is a very important factor in determining the real value of the currency of a country and affects the economy from many aspects. Turkey is a developing country and exposed to speculative capital movements and without being able to control these movements, none of the foreign exchange rate regimes will be successful. Success depends on concrete economic programs that will get the support from all economic units.

II. SECTION II
FOREIGN EXCHANGE EXPOSURES FOR COMPANIES

As it was mentioned before, volatility seen in foreign exchange rates causes foreign exchange exposure. This volatility creates three types of exposures for the firms. These exposures are:

-Translation Exposure

-Transaction Exposure

-Economic Exposure.

Before analyzing each exposure, timing of these exposures will be shown as follows:

Moment in time when exchange rates change

Accounting Exposure

Changes in reported owner's equity
in consolidated financial statements
caused by a change in exchange rates

Economic Exposure

Change in expected future cash
flows arising from an unexpected
changes in exchange rates

Transaction Exposure

Impact of setting outstanding obligations entered into before changes
in exchange rates but to be settled after change in exchange rates
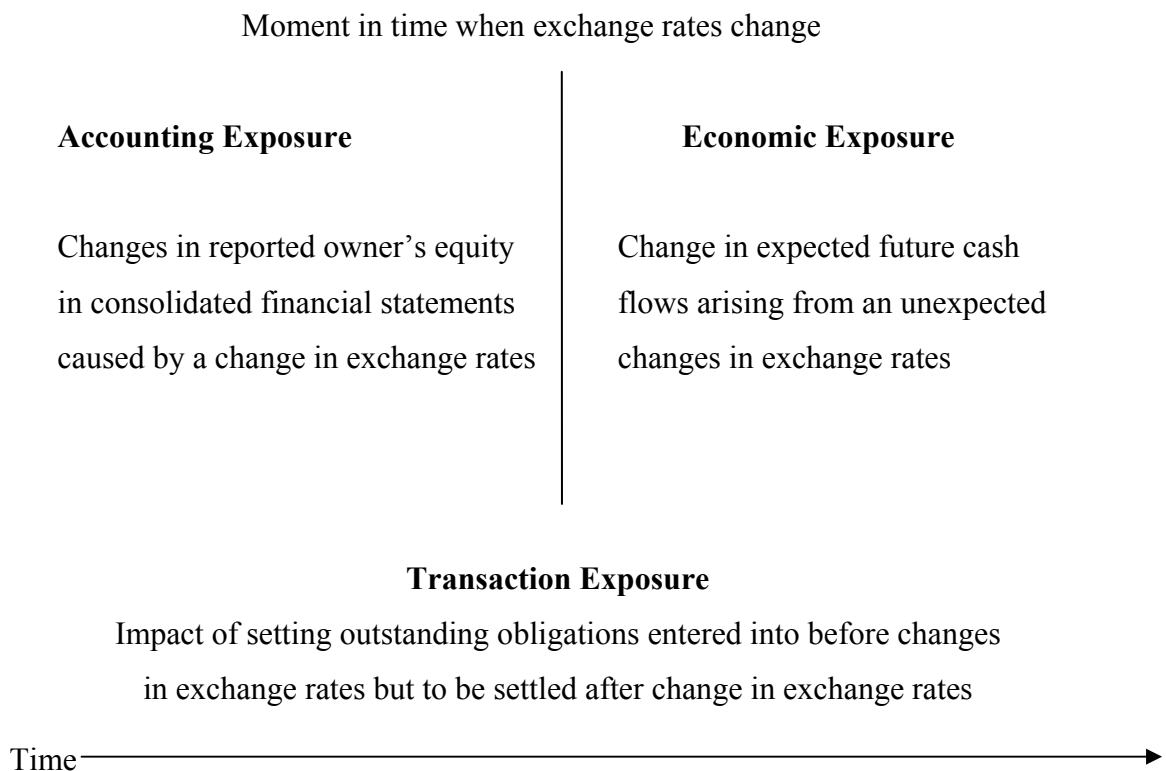
Time ⟶

Figure 1: Timing of accounting exposure, transaction exposure and economic exposure

(Source: Eitemann et al., 2004, 197)

A. Translation Exposure

Translation exposure, also called accounting exposure, arises because financial statements of foreign subsidiaries which are stated in foreign currency must be restated in the parent's reporting currency for the firm to prepare consolidated financial statements (Eitemann et al., 2004; 269). During this consolidation, due to the changes in foreign exchange rates, some changes in home currency term may be seen in financial statements of the companies. Both balance sheet and income statements must be consolidated and they both give rise to translation exposure. It can be said that translation exposure is the potential for an increase or decrease in the net worth and net income of the parent company caused by a change in exchange rates (Buckley, 2000;137).

A firm's cash flows are not affected by translation of financial statements for consolidation purposes. For this reason some analysts suggest that it is not relevant. On the other hand other analysts argue that consolidated financial statements are the indicators of firm performance and therefore translation exposure is relevant (Madura, 1992; 285). According to Choi, in the floating exchange rate system or in regimes in which rates are not permanently fixed, the firms accounting exposure is obvious. The reason is that changes in exchange rates affect the accounting value of the firm' exposed assets and liabilities after translation (Choi, 1989; 154).

Different translation methods exist for countries. Two dimensions are important in the determination of translation methods. The first one is the foreign subsidiary's independence on the parent firm and the second one is the definition of which currency is most important for the subsidiary's operations. These two important dimensions are also mentioned in the International Accounting Standards Board No: 21.

Subsidiary's characterization: The translation method used by the subsidiary is determined according to foreign subsidiary's business operations. For example a foreign subsidiary's business can be categorized as either an "integrated foreign

entity" or a "self-sustaining foreign entity". An integrated foreign entity is one that operates as an extension of the parent company with highly interrelated business operations and cash flows with those of the parents. A self sustaining foreign entity is one that operates in the local economic environment independent of the parent company (Eitemann et al., 2004; 270). The greater the percentage of a firm's business conducted by its foreign subsidiaries, the larger will be the percentage of a given financial statement item that is susceptible to translation exposure. For the logic of translation, this differentiation is important. The currency that is the basis of economic operations should be used for valuation.

Functional Currency: A foreign subsidiary's functional currency is the currency of the primary economic environment in which the subsidiary operates ad in which it generates cash flows. In the case of a hyper-inflationary country- defined as one that has cumulative inflation of approximately 100 percent or over for a three year period – the functional currency must be a hard currency (Shapiro, 1994; 192).

1. Translation Methods

There is an important issue while consolidating the financial statements. This issue is related with the date used in consolidating financial statements. It is important to decide whether to use the B\S (Balance Sheet) date or the date at which assets or liabilities are recorded. This choice depends on the translation method employed. Four methods for the translation of foreign subsidiary financial statements are employed: The current\non current method, monetary\non-monetary method, temporal method and current rate method.

Regardless of which translation method is used, a translation method not only indicates at what exchange rate individual balance sheet and income statements are remeasured but also indicates where any imbalance is to be recorded. The importance of this decision is that imbalances passed through the income statement affect the firm's reported current income whereas imbalances transferred directly to the balance sheet do not (Eitemann et al, 2004; 271).

a) Current\Non-current Method

This approach uses the traditional accounting distinction between current and long-term items and translates the former at the closing rate, the rate of the balance sheet date and the latter at the historical rate. According to the current-non-current method, the sum exposed is net current assets (Click and Coval, 2002; 138). A foreign subsidiary with positive local currency working capital will give rise to a translation loss (gain) from devaluation (revaluation) with this method and vice versa if working capital is negative.

The average foreign exchange rate of the period is used for translating the income statement. There is an exception for this rule: those revenues and expense items associated with non-current assets or liabilities, such as depreciation expense, are translated at the same rate as the corresponding balance sheet items (Shapiro, 1994; 188).

According to this method, inventory is exposed to foreign exchange risk whereas long-term debt is not. This assumption is not valid since long-term debt is also exposed to foreign exchange risk. This lack of logic supports the move away from this method.

b) Monetary\Non-monetary Method

This method differentiates between monetary assets and liabilities and non monetary or physical assets and liabilities. Monetary items are those that represent a claim to receive or an obligation to pay a fixed amount of foreign currency units. Monetary items (Cash, Accounts Receivable, Accounts Payable and Long-term debt) are translated at the current rate; non monetary items are translated at the historical rate (Shapiro, 1994; 189). Accounting exposure under this method is given by net monetary assets.

The reason of monetary\non monetary distinction for balance sheet items is that any translation gains and losses on monetary accounts are presumed to reflect meaningful components of expenses and revenue because the monetary accounts are denominated in nominal units of foreign currencies that closely approximates market values. However, transaction gains and losses from non-monetary assets are evaluated as less meaningful since these accounts reflect historic book values rather than actual market values (Click and Coval, 2002; 220).

Average foreign exchange rate during the period is used for the translation of income statement items except for revenue and expense items related to non-monetary assets and liabilities. These items are translated using the foreign exchange rate of the corresponding balance sheet items.

c) **Temporal Method**

This method is similar to monetary\non-monetary method. The distinction is seen in the translation of inventory and net plant and equipment. Temporal method assumes that a number of individual line item assets such as inventory and net plant and equipment are restated to reflect market value. However in monetary\non-monetary method, these items are remeasured at historical cost (Eitemann et al., 2004; 273).

The rationale for the temporal approach is that the translation rate used should preserve the accounting principles used to value assets and liabilities in the original financial statements (Buckley, 2000; 139).

Income statements items are normally translated at an average rate for the period. However, COGS (Cost of goods sold) and depreciation expenses related to Balance Sheet items carried at past prices are translated at historical rates (Shapiro, 1994; 189). Under this method, dividends are translated at the foreign exchange rate in effect on the date of payment. Common stock and paid in capital accounts are translated at historical rates.

Gains and losses resulted from remeasurement are carried directly to current consolidated income. Therefore, foreign exchange gains and losses arising from the translation process introduce volatility to consolidated earning.

d) Current Rate Method

All balance sheet items are translated at the current rate. Accounting exposure is given by net assets. "It is the most popular method all around the world (Buckley, 2000; 138). Under this method, if a firm's foreign currency denominated assets exceed its foreign currency denominated liabilities, a devaluation results in a loss and a revaluation in a gain.

All income statement items, including depreciation and COGS are translated at either the actual exchange rate on the dates the various revenues, expenses, gains and losses were incurred or at an appropriately weighted average exchange rate for the period. Dividends paid are translated at the exchange rate of the payment date. Common stock and paid-in capital accounts are translated at historical rates (Eitemann et al., 2004; 271).

Gains and losses caused by translation adjustments are not included in the calculation of consolidated net income. Rather, these translation gains and losses are reported separately and accumulated in a separate equity reserve account on the consolidated balance sheet. This account is titled as "Cumulative Translation Adjustment (CTA)" (Eitemann et al., 2004; 271). It is a necessary entity that will force the statement into balance. At any point in time, the CTA account represents the cumulative exchange rate changes since the foreign subsidiary was established.

The gain or loss on translation is not shown in the income statement but is directly shown in a reserve account. That is the greatest advantage of current rate method. By this way, variability of the reported earnings due to foreign exchange gains and losses is decreased. The other advantage of this method is that the relative proportions of individual balance sheet items remain the same. Thus, balance sheet

ratios such as current ratio or the debt-to equity ratio are not distorted. On the other hand, this method has a disadvantage of violating the accounting principle of carrying balance sheet accounts at historical cost.

2. International Accounting Standards Board No: 21

The standard requires comparative amounts to be translated as follows (IFRSs, 2004):

a) For an entity whose functional currency is not the currency of a hyper-inflationary economy

   a. Assets and liabilities in each balance sheet presented are translated at the closing rate at the date of that balance sheet (last year's comparatives are translated at last year's closing rate).
   b. Income and expenses in each income statement presented are translated at exchange rates at the dates of the of the transactions

b) For an entity whose functional currency is the currency of a hyper-inflationary economy, and for which the comparative amounts are translated into the currency of a different hyper-inflationary economy, all amounts (B/S and I/S amounts) are translated at the closing rate of the most recent balance sheet presented (last year's comparatives as adjusted for subsequent changes in the price level are translated at this year's closing rate.)

c) For an entity whose functional currency is the currency of a hyperinflationary economy and for which the comparative amounts are translated into the currency of a non-hyperinflationary economy, all amounts are translated into the currency of a non-hyper inflationary economy all amounts are those presented in the prior year financial statements (not adjusted for subsequent changes in the price level or subsequent changes in exchange rates.)

Reporting at Subsequent Balance Sheet Dates

At each balance sheet dates:

a) Foreign currency monetary items shall be translated using the closing rate.

b) Non-monetary items that are measured in terms of historical cost in a foreign currency shall be translated using the exchange rate at the date of the transaction

c) Non-monetary items that are measured at fair value in a foreign currency shall be translated using the exchange rates at the date when the fair value was determined.

Conclusively, translation exposure is related to the concept of translation of financial statements to the parent country's currency. The biggest advantage of this exposure is that it is easy to measure. On the other hand, it suffers from several deficiencies. The first one of these deficiencies is that it is too narrow, meaning that it concentrates on the balance sheet items, excluding the firm's ongoing operations. In addition to this, known future transactions are not included unless they are already posted to the balance sheet.

If different methods of translation are analyzed, it is seen that translation loss or gain is larger under the current rate method. The reason of this situation is that inventory, net plant and equipment, as well as all monetary assets are considered exposed. When net exposed assets are larger, gains and losses from translation are also larger.

B. Transaction Exposure

Transaction exposure, or contractual exposure, is the degree to which cash and known transactions denominated in a foreign currency and already entered into for settlement in a future date are affected by exchange rate changes (Click and Coval,

2002; 223). Transaction exposure is concerned with how changes in exchange rates affect the value, in home currency terms, of anticipated cash flows denominated in foreign currency relating to transactions already entered into.

Transaction exposure is a cash flow exposure. It may be associated with trading flows, dividend flows or capital flows (dividends or loan repayments) (Buckley, 2000; 137). Transaction exposure arises from;

1) Purchasing or selling on credit goods or services when prices are stated in foreign currencies
2) Borrowing or lending funds when repayment is to be made in a foreign currency
3) Being a party to an unperformed foreign exchange forward contract
4) Acquiring assets or incurring liabilities denominated in foreign currencies (Eitemann et al., 2004; 201).

Transaction exposure is composed of three parts: quotation, backlog and billing exposures. As the seller quotes a price in foreign currency terms, a transaction exposure called as "quotation exposure" is created. The potential exposure created at the time of quotation (t_1) is converted to actual exposure called as "backlog exposure" by the placement of an order. Backlog exposure lasts until the goods are shipped or billed (t_3), at which time it becomes "billing exposure". Billing exposure remains until actual payment is received by the seller (t_4). In Figure 2, the life span of the transaction exposure is shown.
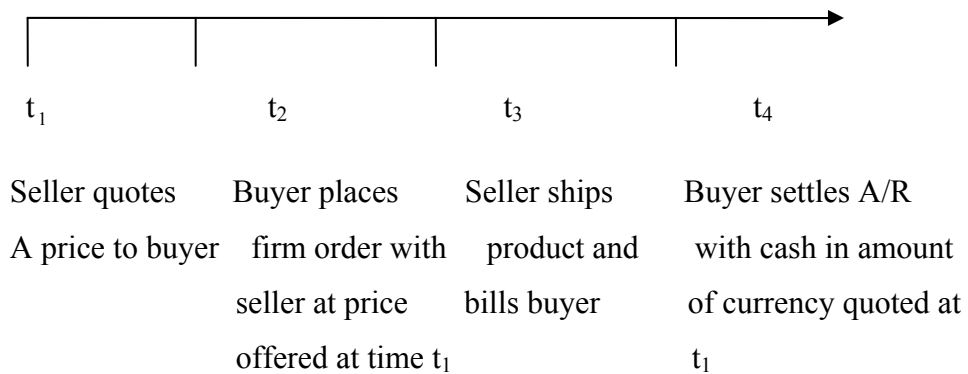
```
|           |           |           |           →
t₁          t₂          t₃          t₄

Seller quotes   Buyer places   Seller ships   Buyer settles A/R
A price to buyer  firm order with  product and    with cash in amount
                seller at price   bills buyer    of currency quoted at
                offered at time t₁              t₁
```

Figure 2: **The Life Span of a Transaction Exposure**
(Source: Eitemann et al., 2004, 203)

The most prevalent transaction exposure is seen as a result of purchasing or selling goods with credit in foreign currency. For example, a Turkish exporter sells textile to a French firm (importer). The value of goods is TRY 160,000. The Turkish firm will receive the payment after 90 days as EURO 100,000. The spot rate is €1= TRY 1.60. After 90 days, the Turkish firm will receive EURO 100,000. If there is a change in foreign exchange rates until the payment date, transaction exposure will arise. For instance, if foreign exchange rate decreases and becomes €1= TRY 1.55, the amount of TRY that the exporter can get will decrease to TRY 155,000 (1. 55*100,000=155,000). If the foreign exchange rate increases to 1€=1.65TRY, the exporter will receive more in TRY terms (1.65*100,000=165,000). The exporter may want to invoice sales in TRY to remove transaction exposure. If the French importer accepts this, the transaction exposure will not be removed. It will only be transferred to the French importer.

In the case of borrowing and lending debt in foreign currency, transaction exposure arises, too. If a Turkish firm receives debt from the bank in EURO and will pay the debt after 1 year, the payment will increase or decrease as TRY according to the foreign exchange rate. If TRY depreciates, the amount of debt payment in TRY will increase and if TRY appreciates, the amount of debt payment in TRY will decrease.

As a result of high volatility in exchange rates, transaction exposure has gained importance for firms. By failing to cover transaction exposure, a firm may incur a loss on a very large receivable or payable denominated in a foreign currency. This may result in an overall loss for the firm. In order to measure the effect of exposure on enterprises, two steps are followed (Madura, 1992; 266):

1) The amount of net cash inflow and net cash outflow for each currency should be determined
2) The overall impact of these currencies on the enterprises should be determined

Projections of the consolidated net amount of currency inflows or outflows for all subsidiaries are required for the measurement of transaction exposure. For instance; Subsidiary A may have net inflows of TRY 600,000 and Subsidiary B may have an outflow of TRY 700.000. The consolidated net inflow is TRY -100.000. If TRY depreciates, this will be a favorable situation for Subsidiary B while unfavorable situation for Subsidiary A.

Some multinational corporations use a non-centralized approach in which each subsidiary assesses and manages its individual exposure to exchange rate risk. This strategy can be used if subsidiaries are allowed to manage cash flows independently of the parent or other subsidiaries, but this strategy has a cost (Madura, 1992; 267). This strategy allows each subsidiary important responsibilities and it can cause redundancy in hedging activities. For example; as a result of hedging activity the subsidiary should pay a transaction fee, which would not be paid if a centralized exposure management were applied since the individual subsidiary exposures may offset each other. The other approach used in managing transaction exposure is the centralized approach. According to this approach, net cash inflows and outflows of each subsidiary are consolidated by parent company and parent company takes position against exposure. In this case, subsidiaries are open to exposures individually. This situation may affect their market value in the domestic market. For example if a subsidiary wants to take credit from the domestic market,

the lenders may not want to give credit or may give credit with high rates due to the open position of the subsidiary. Therefore, centralized approach has also a cost for the firm.

After analyzing the amount of net cash inflow and net cash outflow for each currency, the effect of each currency should be determined. This is accomplished by assessing the standard deviations and correlations of the currencies. Even if a particular currency is evaluated as risky, its effect on the firm's overall variability will not be very important if the firm has taken a minor position in that currency. In order to determine the potential degree of movement for each particular currency, historical data can be evaluated.

The standard deviation statistic serves as one possible way to measure the degree of movement for each particular currency. A currency with lower standard deviation shows less variability and therefore an open account is not important as an open position in other currencies (Madura, 1992; 269).

A firm cannot predict a currency's future variability with perfect accuracy, but it can identify currencies whose values are most likely to be stable or highly variable in the future.

Two highly correlated currencies act as if they are the same currency. In this case, transaction exposure to inflows of one currency and outflows of the other currency are then offset. Even if the currencies move in the same direction to a degree, a partial offsetting effect will take place when one currency represents an inflow while the other an outflow (Madura, 1992; 270).

When the firm has more than one inflow currencies, it can still benefit from assessing correlations. These inflows can be evaluated as a portfolio. In this case, the lower the correlations, the lower will be the variability of the portfolio of inflows. Firms would normally prefer to have a cash inflow portfolio that exhibits low variability, since there is less chance that the value of such a portfolio will

substantially deviate from what was expected. The same rule is valid for a portfolio of consolidated net outflows.

While analyzing currency correlations, the firm needs to assess whether there are consolidated net inflows or outflows in these currencies. High positive correlation between two currencies could decrease exposure when one of the currencies is an inflow and the other is an outflow. On the other hand, if both currencies represent future cash inflow or outflow, then the exposure is high (Madura, 1992; 273).

Transaction exposure can be assumed as an improvement over translation exposure. The first reason is that translation exposure deals with cash flows that are not actual. This means that fixed assets such as land, plant and equipment and physical inventory are excluded from the exposure measurement. The second reason is that all contractual agreements that do not show up on the balance sheet (off-balance sheet items) are included in the measurement. On the other hand, this report has also some deficiencies: The first one is that it ignores all the firm's ongoing operations assuming that non-contractual cash flows are not exposed. The second deficiency of transaction exposure report is that it ignores the economic valuation of fixed assets and inventory (Click and Coval, 2002; 225).

The transaction exposure report is a managerial report. Treasurers use the report to get an indication of what elements of exposure will lead to realized foreign exchange gains and losses in the near future. The gains and losses associated with the transactions are not posted to the firm's financial reports.

C. Economic Exposure

Economic exposure is the extent to which the market value of a firm or a subsidiary changes when exchange rates change. Economic exposure is an improvement over the other two concepts of translation and transaction exposures (Click and Coval, 2002; 234).

The concepts of translation and transaction exposure are useful for accountants faced with consolidating financial statements or finance managers who must make short-term decisions about how to deal with known contractual obligations denominated in foreign currencies. Both of them have some deficiencies when a long-term analysis is required. Translation exposure ignores all off-balance sheet commitments and includes exposure for fixed assets that are not associated with cash flows. Transaction exposure ignores the ongoing operations of the firm. Economic exposure is an improvement over transaction and translation exposures (Click and Coval, 2002; 234).

Economic exposure and transaction exposure is separated from each other by the timing of cash flows. Transaction exposure is a subset of economic exposure because gains ad losses due to foreign exchange changes from transactions already entered into may affect future cash flows of the company. The effects of foreign exchange rates on firm value and competitive power are more important for economic exposure analysis. In transaction exposure, short-term transactions that are known and already entered are evaluated whereas in economic exposure unknown and long-term transactions are evaluated.

Economic exposure may be visualized as the overall impact of foreign exchange rate fluctuations on stockholder wealth. Since the aim of the enterprise in the long-run is maximizing stockholders' wealth, managing economic exposure is vital for firms.

Economic exposure concept has two components: cash flow exposure and net worth exposure. Cash flow exposure, or income statement exposure or real operating exposure is the extent to which a company's real revenues and expenses are affected by exchange rate changes. The expenses do not include depreciation of real assets, debt repayment or interest payments. Depreciation should be excluded since it does not represent a cash flow and debt repayment should be excluded since it does not constitute an expense even though it is a cash flow. The second component of

economic exposure, net worth exposure, is the extent to which a company's real net asset position is affected by exchange rate changes. Net asset position is the market value of total assets net of the market value of the liabilities (Click and Coval, 2002; 246).

Some of the important variables representing a firm's cash flows subject to economic exposure are listed in the first column of Table 3. They are categorized as inflows and outflows. The second column of Table shows how each of these variables may be affected by appreciation of the firm's local currency, while the third column shows how the firm is affected by a depreciation of a local currency.

Table 3: Economic Exposures to Exchange Rate Fluctuations

Variables That Influence the Firm's Local Currency Inflows	*Impact of Local Currency Appreciation on Variables*	*Impact of Local Currency Depreciation on Variables*
Local sales (relative to foreign competition in local markets)	Decrease	Increase
Firm's exports denominated in local currency	Decrease	Increase
Firm's exports denominated in foreign currency	Decrease	Increase
Interest received from foreign investments	Decrease	Increase
Variables That Influence the Firm's Local Currency Outflows		
Firm's imported supplies denominated in local currency	No change	No change
Firm's imported supplies denominated in foreign currency	Decrease	Increase
Interest owned on foreign funds borrowed	Decrease	Increase

(Source: Madura, 1990; 277)

As a result of appreciation of a local currency, the firm's local sales may decrease. This is seen due to the increased foreign competition because local customers can purchase foreign products cheaply. The local sales will decrease according to the foreign competition in that market. Cash inflows from export sales may also decrease as a result of appreciation of the local currency. The reason is that foreign importers will need more of their own currency to pay for these products. Exports denominated in the foreign currency would also decrease due to an appreciation. In this case demand for the product by foreign importers would not change but when the firm received the foreign currency inflows; it would convert them to local currency. If the local currency had appreciated, these inflows would be converted to a reduced amount. Lastly, interest received from foreign investments will be less when the local currency appreciates. When cash outflows are analyzed, it is seen that firm's imported supplies in local currency terms will not change however the cost of imported supplies will decrease due to appreciation of the local currency. In addition, interest paid on foreign currencies will be reduced in local currency. Appreciation in the local currency causes a reduction both inflows and outflows. The net effect will be dependent on whether the inflow variables are more or less than the outflow variables.

If there is devaluation in the local currency, variables will be affected oppositely. Local sales should increase as a result of reduced foreign competition. The exports denominated in local currency will appear cheaper to the foreign customers and demand will increase to the products. In addition, the export denominated in the foreign currency increases cash flows since the conversion of it will be resulted with more local currency. Interest received will be converted to more local currency, too. In the cash outflow side, there will not be a change in imports denominated in local currency. On the other hand, the cost of import denominated in foreign currency will increase since the local firm needs to pay more in local currency terms for imported goods. Generally, depreciation of a local currency causes an increase in both cash inflows and outflows.

Many firms that seem to be uninvolved in international business are strongly affected by exchange rate movements, because such changes affect competitiveness of imports and domestic market share (Adler and Dumas, 1986). The strengthening of home currency can lead to a decrease in market share whereas a weakening currency can create a price advantage. The firm that is involved in international business has a more complicated economic exposure since exporters and importers are vulnerable in both foreign and domestic markets. Fluctuations in exchange rates not only affect domestic market share but also foreign sales. Importers face loss of domestic markets because of price increases of imports and the possibility of increases in the cost of inputs. In addition to these, commitments denominated foreign currency such as Accounts Payable and Accounts Receivable are affected by exchange rates. For example, for a Turkish firm, transaction exposure arises only when converting cash inflows to TRY or purchasing foreign currency for making payments. However, volatility in exchange rates not only affects transaction of exposures but also every change in future cash flows. So, economic exposure represents these changes on future cash flows resulted by foreign exchange rate volatility. For example if TRY appreciates, imported goods may take the place of domestic goods. This situation will change the cash flows of a company although it does not have a transaction of currency. Shortly, a firm faces operating exposure when it invests in servicing a market subject to foreign competition or in sourcing goods or inputs abroad. Transaction exposure arises later on and only if the company's commitments lead it to engage in foreign currency denominated sales or purchases (Shapiro, 1994; 228).

An expected change in foreign exchange rates is not included in the definition of economic exposure. It is very important to properly define exchange rate changes (Flood and Lessard, 1986). If the foreign exchange market is efficient, information about expected changes in exchange rates should be known and thus reflected in a firm's market value. (Eitemann et al., 2004; 243). The other important concept in economic exposure analysis is the purchasing power parity. Purchasing Power Parity indicates that changes in exchange rates would be offset by changes in prices in the long-run. This means that relative prices remain the same regardless of the exchange

rate (Mengütürk, 1994; 198). So, nominal changes in exchange rates will be balanced with the inflation rate and foreign exchange exposure will not be seen. On the other hand, real changes in foreign exchange rates affect the competitive power of the firm. The firm should take the period of this real change in foreign exchange rates into consideration. For example, assume that there is a real devaluation in the currency of a country. In this case exporters of that country would prefer to increase profit margin rather than market share by increasing the price. However, if this real change in foreign exchange rates is for short-term, the exporters would prefer not to increase price since they would not want to lose market share.

Economic exposure depends on whether an unexpected change in exchange rates causes unanticipated changes in sales volume, sales price or operating costs. The strategy undertaken depends on some factors that influence the strategic decisions of the firm. These factors are: type of firm, nature of products, monopoly power, firm size, pricing flexibility and ability to change location (Mengütürk, 1995; 199).

Type of Firm: The degree of economic exposure depends on the type of the firms; importer, exporter, MNC (Multinational Corporation), or purely domestic.

Nature of Products: Service firms such as restaurants and stores are not likely to be affected by the changes in exchange rates, because service provided is arranges and administered locally.

Monopolies: Firms possessing monopoly power are likely to have less economic exposure. Monopoly power can be achieved in different ways:

- It can be acquired through technological superiority and patents

- Some firms have achieved product differentiation by using advertising

- Monopoly power may also be created by governments (Trade barriers and etc.)

Size of Firm: Large firms can often use aggressive pricing and other marketing policies to protect their market share due to their resources. These firms are better equipped to endure fluctuations in exchange rates and keep up their prices despite of changes in exchange rates. Therefore it can be said that small and moderate size firms have greater economic exposure.

Pricing Flexibility: The less price elastic the demand the more price flexibility a company will have to respond to exchange rate changes. Price elasticity depends on the degree of competition and the location of key competitors. The more differentiated a company's products are, the less competition it will face and the greater its ability will be to maintain its domestic currency prices both at home and abroad. Conversely, the less differentiated a company's products are and the more internationally diversified its competitors are the greater the price elasticity of demand for its products will be and the less pricing flexibility it will have. These companies face the greatest amount of exchange risk (Shapiro, 1994; 234).

Ability to change location: The firm's ability to shift production and the sourcing of imports among countries is another important factor. The greater a company's flexibility to substitute between home country and foreign country inputs or production, the less exchange risk the company will face (Shapiro, 1994; 234).

III.SECTION III

MANAGING FOREIGN EXCHANGE EXPOSURE

In this section, the methods that can be used to manage transaction and economic exposure will be discussed. Managing transaction exposure has short-term results. On the other hand, managing economic exposure needs more strategic and dramatic decisions due to the long-term effect of economic exposure on enterprises. There is not an important measure for managing translation exposure. Therefore, managing translation exposure will not be discussed in this study.
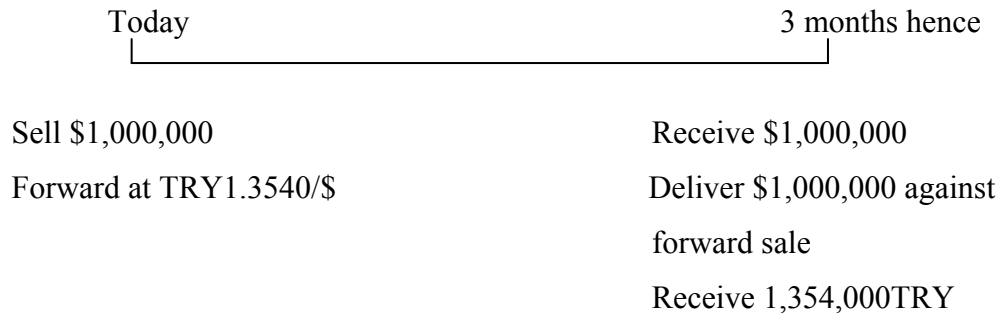
A. Managing Transaction Exposure

Transaction exposure can be managed by contractual, operating and financial hedges. The main contractual hedges involve forward, money, futures and options markets. Operating and financial hedges employ the use of risk sharing agreements, lead and lags in payment terms, swaps and other strategies (Eitemann et al., 2004; 203).

1. Forward Market Hedge

A forward market hedge involves a forward contract and a source of funds to fulfill that contract. The forward contract is made at the time the transaction exposure is created. In a forward market hedge, a company that is long a foreign currency will sell the foreign currency forward, whereas a company that is short a foreign currency will buy the foreign currency forward. In this way, the firm can fix the home currency value of the cash flow. It will be better to explain forward market hedge with an example. For instance, a Turkish manufacturer sells electronic goods worth of $1,000,000 to an American company. The sale is made in March with payment due in three months later, in June. If this Turkish company wants to hedge its

transaction exposure, it will sell $1,000,000 forward today at three months forward quotation of $1.3540 per TRY. In three months, the firm will receive $1,000,000 from the American buyer, deliver that money to the bank against its forward sales and receive 1,354,000TRY.

Today	3 months hence
Sell $1,000,000	Receive $1,000,000
Forward at TRY1.3540/$	Deliver $1,000,000 against forward sale
	Receive 1,354,000TRY

Forward exchange rate between two currencies is determined according to the net interest differential on the currencies. In general, forward rates are calculated by analyzing the difference in Eurocurrency interest rates (Yücel, 1997; 34).

2. Futures Contract Hedge

The concept of futures contract hedge is very similar to that of forward contracts, except that forward contracts are common for large transactions whereas future contracts may be more appropriate for firms that prefer to hedge in smaller amounts. It can be said that a futures contract is highly standardized forward contract (Mandacı and Soydan, 2002; 149). The basic differences between two contracts are:

- Futures contracts specify standardized amount and delivery dates, whereas contracts are customized according to the needs of the interested parties.
- Futures contracts are traded in established exchanges while forward contracts are traded between dealers.
- Participants can realize gains and losses daily with a futures contract while forwards are settled only at delivery.

- To enter into a futures market, a percentage of the face value must be put into an account (margin account) whereas there is not a requirement like this for forward contract.

A firm that buys a currency futures contract is entitled to receive a specified amount of a specified currency for a stated price on a specified date. A firm that sells a currency futures contract is entitled to sell a specified amount of a specified currency for a stated price on a specified date. By this way, the firm will fix the home currency amount

While currency futures can reduce the firm's transaction exposure, they sometimes create unexpected results for the enterprise. While trying to fix foreign exchange rate for its debt, the spot rate may be lower at the expiration date and the firm may purchase foreign currency at a higher rate due to the futures contract (Madura, 1992; 317).

3. Money Market Hedge

An alternative to a forward market hedge is to use a money market hedge. Like a forward market hedge, a money market hedge also involves a contract and a source of funds to fulfill that contract. The basic difference between these methods is that in money market hedge, the cost is resulted by the difference of interest rates between two currencies.

A money market hedge involves simultaneous borrowing and lending activities in two different currencies to fix the home currency value of a future foreign currency cash flow. A money market hedge can cover a single transaction as the example in forward contract or repeated transactions. Hedging repeating transactions is called "Matching" (Eitemann et al., 2004; 207). It requires the firm to match the expected foreign currency cash inflows and outflows by currency and maturity. For example, if electronics manufacturer in Turkey has numerous sales denominated in dollars to American customers over a long period of time, it would

have predictable US dollars cash inflows. The appropriate money market hedge technique would be to borrow US dollars in an amount matching the size and maturity of expected dollar inflows. Then if the dollar appreciated or depreciated, the foreign exchange effect on cash inflows in dollars would be approximately offset by the effect on cash outflows in dollars from repaying the dollar loan plus interest.

For example to hedge in the money market, Turkish firm will borrow dollars, immediately convert the borrowed dollars into TRY and repay the dollar loan in three months with the proceeds from the sale of electronic goods. The company will need to borrow just enough to repay both the principal and interest with the sale proceeds. For a sales of $1.000.000;

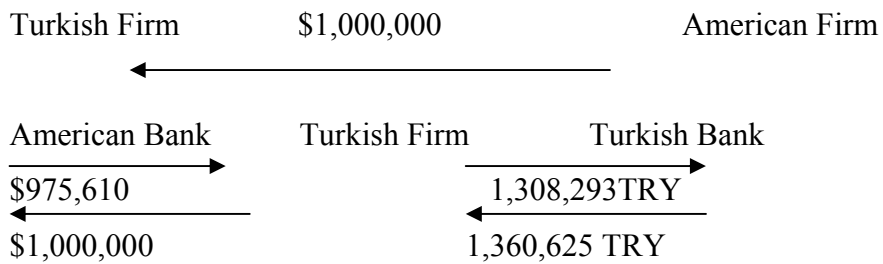| $	TRY
Interest rate	Interest rate
3 months	3 months
2.50 %	4 %

Spot rate: $1= TRY 1.3410
1- The company will borrow $1,000,000/1+0.025=$975,610
2- The company would exchange the $975,610 for TRY at current spot exchange rate of 1.3410 and receive TRY 1,308,293.
3- The Turkish firm can use this money in a TRY account with a maturity of 3 months. After 3 months, the firm will earn 1,360,624.72 (1,308,293* (1+0.04)).
4- After three months, the Turkish firm will bring the proceeds from export sale of $1,000,000 to the bank for its debt.

If the spot rate after 3 months is $1= TRY 1.3510, the gain of the Turkish firm will be 1,360,624.72/1.3510=1,007,124 and the gain from this transaction is 1,007,124-1,000,000=$7,124.

These transactions can be shown as follows

A		L	
A/R	$1,000,000	Bank Loan	$975,610
		Interest payable	$24,390
			$1,000,000

Turkish Firm $1,000,000   American Firm

      ←

American Bank   Turkish Firm   Turkish Bank

$975,610 →   1,308,293TRY →

$1,000,000 ←   1,360,625 TRY ←

After three months, if foreign exchange rate will not be realized as higher than $1= TRY 1,3606 (1,360.624,72/1,000,000), the enterprise will be profitable as a result of this money market hedge. If dollar depreciates, the exporter will be better off since the exporter has a dollar liability.

In an efficient market and with the assumption of interest rate parity, the gain from the money market hedge will be equal to forward market hedge (Shapiro, 1994; 216).

4. Options Market Hedge

In money market hedge or forward market hedge, some negative results may be seen if payable currency depreciates or receivables currency appreciates over the hedged period. In these situations, an unhedged strategy would bring better results. The ideal type of hedge would insulate the firm against adverse exchange rate movements but allow the firm benefit from favorable exchange rate movements. Currency options can achieve this.

An option permits the buyer to choose whether or not to exercise the option by a specified date. With an option the buyer purchases the right and the option seller (writer) takes an obligation. In a futures contract both sides take an obligation. The buyer of an option pays a premium and decides whether to exercise the option or not on the expiration date (Mandacı and Soydan, 2002; 159).

There are two types of options contract as call option and put option.

Call option: A call option gives its holder the right to buy a specified amount of foreign currency at a specified foreign exchange rate up to the option's expiration date.

Put option: A put option gives the holder the right, but not the obligation, to sell a specified amount of foreign currency at a predetermined rate up to the option's expiration date.

Hedging Payables with Currency Call Options

In a call option, different from forward contracts, there is not an obligation to buy. The buyer has a right to exercise the option. Consider a firm that has payables in EURO after 3 months. If the spot rate of the EURO remains lower than the exercise price, the firm could let the option expire and purchase EURO at the spot rate. On the

other hand, if the EURO appreciates, the call option allows the firm to purchase at the exercise price. By this way, the company can limit its loss.

Example: X Corporation has payables of 100,000 EURO in 90 days.

        P exercise: TRY 1.60/EURO

        Option premium: 0.04 TRY per unit

        Total premium: 100,000*0.04=4,000 EURO

Table 4: Scenarios for Call Options

Scenario	Spot Rate	Premium	Amount paid per unit when owning call option	Total amount paid per unit	Amount (TRY)
1	1.58	0.04	1.58	1.62	162,000
2	1.62	0.04	1.60	1.64	164,000
3	1.66	0.04	1.60	1.64	164,000

Hedging Receivables with Currency Put Options

The currency put option provides the right to sell a specified amount of a particular currency at a specified price within a given period of time. If the existing spot rate of the foreign currency is above the exercise price, the firm can sell the currency received at the spot rate and let the put option expire.

For instance assume that a firm expects to receive $600,000 in 90 days.

Price exercise: TRY1.38/$

Premium: 0.03 TRY

Table 5: Scenarios for Put Options

Scenario	Spot Rate	Premium	Amount paid per unit when owning call option	Total amount paid per unit	Amount (TRY)
1	1.36	0.03	1.38	1.35	810,000
2	1.37	0.03	1.38	1.35	810,000
3	1.39	0.03	1.39	1.36	816,000

Optimal hedging technique is dependent on exchange rate projections. If the projections cause the firm to believe that it will definitely be adversely affected by its transaction exposure, a forward hedge or money market hedge would be more appropriate. On the other hand, if the firm believes that it may benefit from its exposure, the option would be a better choice.
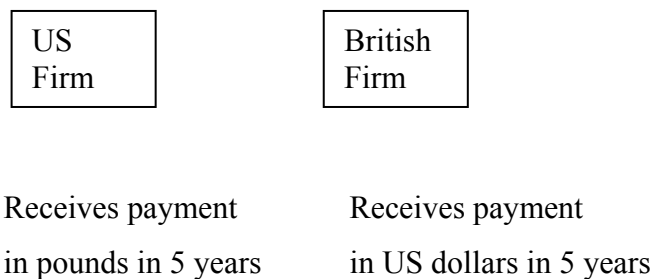
5. Currency Swaps

Swap is an agreement in which two parties repay each other's loans. Currency swaps is an exchange of debt service obligations denominated in one currency for the service on an agreed upon principal amount of debt denominated in another currency. Two enterprises can benefit from a currency swap transaction by using different credit opportunities in different financial markets in their own advantages. By swap arrangements, the firms find the opportunity to change foreign exchange rate, maturity and interest profiles (Madura, 1992; 337).

For instance, there is a US company that exports to Britain. This US Company receives payments in pounds in 5 years. On the other hand, there is a British firm that exports to US and collects receivables in dollars in 5 years. These companies could arrange a currency swap that allows for an exchange of pounds for

dollars in 5 years at some negotiated exchange rate. In this way, the US firm could fix the number US dollars and the British firm could fix the number of British pounds. Through an intermediary such as an investment bank, these firms agree to exchange repayment of each other's loans.

Since swaps are exchanges of fixed amounts of currency at specific future dates, they can be thought of as sequences of currency forward contracts. It can be said that the swap of one-year obligation is exactly one-year forward contract.

```
┌──────────┐          ┌──────────┐
│ US       │          │ British  │
│ Firm     │          │ Firm     │
└──────────┘          └──────────┘
```

Receives payment   Receives payment

in pounds in 5 years   in US dollars in 5 years

Currency swaps are used by firms for these reasons (Buckley, 2000; 255):

- Foreign exchange risk management: The firm that operates in a foreign country makes payments and collects receivables in foreign currencies. By offsetting a cash inflow from a currency with a cash outflow in the same currency, foreign exchange exposure can be minimized. Currency swap changes the cash flow without creating a new fund. This gives flexibility to the finance managers.

- Decreases the cost of debt: By having debt from a currency and translating this debt to another desired foreign currency, the cost of debt is decreased. With a swap agreement, a less costly debt is created with respect to having debt in that currency directly.

- By swap contracts, the enterprise has the opportunity to reach financing sources that cannot be reached in the home country due to low credibility. For example, an enterprise which has not a chance to have a debt from bond market can have

debt in a foreign currency and change this with a swap agreement will have the opportunity to create source in the desired currency.

There are two types of currency swaps as fixed interest rate currency swap and cross-currency swap. Fixed interest rate currency swap is the exchange of two currencies by the parties and returning the original amounts to the other party at the end of maturity. Cross-currency swap is similar to fixed interest rate swap. The only difference is that in fixed rate swap, both of the currencies have fixed interest rate while in cross-currency swaps, one of the currencies have a fixed interest rate and the other has floating interest rate (Shapiro, 1994; 544).

6. Leading and Lagging

Sometimes a firm is not able to completely eliminate its transaction exposure. For example, a firm cannot always accurately forecast the sales on products and the purchases on supplies denominated in foreign currencies. In addition, cost of hedging may be high to be worthwhile (Madura, 1992; 339).

When a perfect hedge is not available to eliminate transaction exposure, the firm should consider methods to at least reduce exposure. Leading and Lagging are such methods.

The act of leading and lagging represents an adjustment in the timing of payment request or disbursement to reflect expectations about future currency movements. For instance a British firm purchases some of its supplies from a subsidiary in Germany. These supplies are in EURO. If British firm expects the pound will soon depreciate against EURO, it may attempt to accelerate the timing of its payment. This is leading. The opposite situation is called lagging. If British firm expects that pound will appreciate, it may attempt to stall its payment until after the pound appreciates.

7.   Cross-hedging

Cross hedging is a common method to reduce transaction exposure when the currency cannot be hedged. For example, currency X is the currency that cannot be hedged. The firm may need to first identify a currency that can be hedged and is highly correlated with currency X. the firm then could enter into a forward contract on this currency. If two currencies are highly correlated relative to US dollar, for instance, then the exchange rate between these two currencies should be stable over time (Madura, 1992; 339).

The effectiveness of this strategy depends on the degree to which these two currencies are positively correlated. The stronger the positive correlation, the more effective will be the cross-hedging strategy.

8. Currency Diversification (Exposure Netting)

Exposure netting involves offsetting exposures in one currency with exposures in the same or another currency, where exchange rates are expected to move in such a way that losses (gains) on the first exposed position should be offset by gains (losses) on the second currency exposure. This portfolio theory to hedging recognizes that the total variability or risk of a currency exposure portfolio should be less than the sum of the individual variability of each currency exposure (Madura, 1992; 341).

Currency diversification could be done by different methods: A firm can offset a long position in a currency with a short position in that currency. The second method for currency diversification is offsetting a long position in one currency with a short position in a currency that is positively correlated with that currency. Lastly, if the currency movements are negatively correlated, short position can be used to offset each other (Shapiro, 1994; 209).

9. Risk Shifting

In risk shifting, the company reduces its transaction exposure by invoicing the amount in home currency terms. For example, a textile manufacturer in Turkey sells goods to USA. This company may price the goods in TRY. In this case, the risk is shifted from Turkish company to American company. Despite the fact that this form of risk-shifting is a zero-sum game, it is common in international business. Firms typically prefer to invoice exports in strong currencies and imports in weak currencies. (Shapiro, 1994; 206)

B.   Managing Economic Exposure

Economic exposure is very important for the enterprises due to its long-term effects. The effects of economic exposure are not seen in income statements or balance sheets. However, the effects of economic exposure are seen in long-term profitability and long-term operations of the firm.

If a currency appreciation\depreciation leads to changes in the relative prices of the inputs or the products, it affects firm's value. Economic exposure affects the sales volume, profitability, cost and total firm value as a result of all these changes. The changes in the relative prices affect the revenues and costs to the extent of the firm's involvement in international business, competitive environment and operational flexibility. The managers should closely examine all these changes and take necessary actions to minimize negative effects.

While taking measures for economic exposure, all business functions should be evaluated rather than evaluating only finance strategies. All of the departments should move in coordination.

In order to manage economic exposure unexpected foreign exchange rates should be estimated and negative effects of these changes should be minimized. To achieve this marketing, production and finance strategies are applied.

1. Marketing Management of Exchange Risk

Foreign exchange rate changes lead to changes in competitive power of the enterprises both in domestic and foreign markets. Marketing manager should evaluate foreign exchange rate changes to take advantage for competitive power or to minimize negative effects. The important points that should be examined in marketing management of exchange risk are given below (Shapiro, 1994; 255).

a) Market Selection and Market Segmentation

The choices of which markets to sell (market selection) and marketing effort for each market are important strategic decisions for an exporter. When the home currency depreciates, the exporter gains advantage in foreign markets and increases its competitive power. The exporter should analyze the domestic competitor in the market and the way how it can increase its market share. If home currency appreciates, competitive power of the exporter will decrease and in this case exporter may search new markets which can be more profitable.

Another important consideration for marketing managers is the issue of market segmentation within individual countries. A firm that sells differentiated products may not be harmed as much as a mass marketer firm by exchange fluctuations.

Market selection and market segmentation are the basic parameters for adjusting marketing mix over time. In the short run, these parameters cannot be changed. If it is understood that real exchange rate change is permanent, the firm should revise its marketing strategy.

b) Pricing Strategy

There are two issues in developing a pricing strategy: whether to emphasize market share or profit margin and how frequently to adjust prices.

Export firm has to maximize its profit in export sales as in domestic sales. The firm wants to reach optimum sales quantity which is the sales amount that equals marginal cost (MC) and marginal revenue (MR). Profit margin should be determined by using forward exchange rate that reflects the true expected home currency value of sales revenue (Shapiro, 1994; 257).

In the case of home currency devaluation, an exporter will gain a competitive advantage in the world market. An exporter has the option of increasing unit profitability (price skimming) or expanding its market share (penetration pricing).

This decision is influenced by many factors such as economies of scale, the cost structure, price sensitivity of consumers etc. the greater the price elasticity of demand, which is the change in demand for a change in price, the greater the incentive to hold down price and expand sales and revenue. In the case of economies of scale, it will be more appropriate to decrease prices, expand demand and lower unit production costs. If economies of scales are non existent or price elasticity is low, the reverse will be true. (Shapiro, 1994; 257)

The higher the price elasticity of demand for its product, the more currency risk a firm faces. If a firm is technologically innovative or differentiated, price elasticity of demand will be low and currency risk will be low, too.

While deciding whether to raise prices following foreign currency devaluation, companies must consider not just sales that will be lost today but also the likelihood of losing future sales.

Firms in international competition differ in their ability and willingness to adjust prices in response to exchange rate changes. Some firms continuously adjust their prices while others prefer stable prices over time to keep market share. In addition to firms operating in international business, firms serving only in domestic markets may need to make price adjustments. Because there will be a change in the prices of import products. Domestic firm can raise the prices consistent with import price increases or hold prices constant to improve market share. The strategy depends on the economic environment of the firm.

c) Promotional Strategy

An anticipated exchange rate change is an important data for promotional strategy. Promotional budget for advertising, personal selling is a key issue in any marketing program. For instance, due to the depreciation of home currency, the competitive power of an exporter increases since this firm can allocate more resources for promotion budget.

d) Product Strategy

Firms may change their product strategy after exchange rate changes. Product strategy includes new product introduction, product-line decisions and product innovation. Timing of the introduction of new product is very important while taking foreign exchange rate changes into account. For example, the period after home currency depreciation may be the ideal time to introduce a new product in international markets due to the increasing competitive power of an exporter.

Exchange rate fluctuations affect product line decisions, too. For example after home currency devaluation, a firm will be able to expand its product line and serve a larger number of customers both in domestic and international markets. In the opposite situation, an appreciation of home currency, a firm may restructure its product line and change target customers. It may target a higher income, more quality conscious, less price sensitive consumers. In addition to these, while home currency appreciates, the firms may allocate more resources for Research &

Development expenses to increase product innovation. By this way, they can produce more differentiated products and decrease foreign exchange risk.

2. Production Management of Foreign Exchange Risk

If exchange rates move too much, pricing or other marketing strategies cannot save the product. Firms facing this situation must drop uncompetitive product or cut their costs. To manage competitive risks that cannot be solved with marketing strategies, firms may use production strategies which can lead to decreased cost and increased efficiency. Production strategies involve changing input mix, shifting production plants, changing plant location and raising productivity (Shapiro, 1994; 260).

a) Changing Input Mix

Input mix could be changed when there is a change in foreign exchange rates is seen. If the home currency appreciates, sourcing inputs from domestic market may be shifted to foreign markets to decrease the input cost. If home currency depreciates, domestic inputs should be used to achieve cost saving.

For a long term result, the firm should consider the option of designing new facilities that provide increased flexibility in making substitutes available to use.

b) Shifting Production among Plants

Firms which have worldwide production systems can allocate production among their several plants in line with changing cost of production in home currency terms. The firms can increase production in a nation whose currency has devalued and decrease production in a country where there has been a revaluation. Strategy of production shifting assumes that the firm has a portfolio of plants worldwide.

c) Changing Plant Location

An exporter that exports to a competitive market may lose profitability if home currency of that market depreciates continuously. In this case rather than exporting to that market, the firm may choose to invest directly to that market or in a third country depending on the labor intensity of production.

d) Raising Productivity

If the home currency of the country which the firm exports to depreciates or the home currency of the exporter appreciates, the competitive advantage of the firm decreases. Therefore, the firm will need some measures to increase efficiency. Modernization of production technology, capacity increase and using economies of scale are some methods for increasing efficiency.

3. Financial Management of Foreign Exchange Risk

It is very important to accomplish marketing and production adjustments in a cost effective manner. Finance manager has the responsibility to achieve this. Finance managers should structure the liabilities of the firm in such a way that cash inflows and cash outflows during a period of time are in the same currency or matched (Eitemann et al., 2004; 286).

For example, a Turkish exporter who sells goods to France will have revenues in terms of EURO. If the liabilities (cash outflows) of this exporter are in EURO, the exporter will face with less exposure. When TRY appreciates, the revenues will decrease however there will be a decrease in liabilities, too. By this way, foreign exchange exposure will be decreased.

The firms may also have liabilities in currencies that have a high correlation with the currency of inflows. The currencies of high correlation move in the same

direction. Therefore, this situation is similar with the positions of cash inflows and outflows in the same currency.

The firms should increase the variety of financial sources. This method is good for enterprises with high credibility in financial markets. According to foreign exchange rate changes, the firms can apply to financial institutions that give credit favorable price.

Another strategy for financial management of foreign exchange risk is that creating a portfolio of cash inflows and outflows with different currencies. In this case, gains resulted from changes in some of the currency rates will be offset by losses resulted from changes in other currencies. By this way, overall foreign exchange exposure is decreased (Madura, 1992; 341).

IV. SECTION IV
AN EMPIRICAL ANALYSIS ON TURKISH FIRMS

In this section, foreign exchange exposure faced by firms operating in Turkey will be analyzed. To achieve this, an empirical analysis is carried out.

In the literature, there are many studies both theoretical and empirical about the relation between firm value and foreign exchange risk. Some of these studies are discussed in order to construct the model and variables that will be used in the study.

A. Literature Review

Literature review is carried out by two sections: One of them is about theoretical studies and the other is about empirical studies.

1. Theoretical Studies

Adler and Dumas (1984)

Adler and Dumas had carried out a study, which defines exposure and risk, and includes a measurable technique of foreign exchange exposure. In this study, they argued that not only corporations that have foreign operations but also completely domestic firms are exposed to foreign exchange risk. The reason is that the competition in the industry, input-output prices and the demand for product may change due to changes in foreign exchange rates. Adler and Dumas mentioned that expected exchange rates could be anticipated. Therefore, unexpected exchange rate changes are problem. Foreign exchange exposure is the sensitivity of a financial asset in home currency terms to volatility in foreign exchange rate and this can be measured by regression analysis.

The model presented by Adler and Dumas (1984) is as follows:

P=a+ bS +e

P= dollar value of the asset

S= foreign exchange rate

b= regression coefficient

a=constant term

e=random error term

b is the regression coefficient and shows the sensitivity of the asset value to exchange rate changes.

Garner and Shapiro (1988)

Garner and Shapiro had proposed a model to measure foreign exchange exposure of multinationals that is similar to Adler and Dumas's. Garner and Shapiro had used "cash flows" of firm rather than the "dollar value of the asset" as the dependent variable. According to Garner and Shapiro, firms are faced with foreign exchange risk to the extent that their cash flows are floated. In order to measure foreign exchange exposure, the previous years' cash flows of firms in home currency terms and average foreign exchange rate are used to establish a regression model. Model is as follows:

$$C_{ft} = \alpha + \beta EXCH_t + \mu_t$$

C_{ft}: Total cash flows in dollars of the main company in period t

$EXCH_t$: Average nominal foreign exchange rate in period t

μ_t : Error term

Beta coefficient measures the sensitivity of cash flows to changes in foreign exchange rate. The size of beta coefficient shows the effect of changes in foreign exchange rate on cash flows.

Levi (1990)

Levi defined foreign exchange exposure as the sensitivity of the real domestic currency value of assets; liabilities or operating incomes to unanticipated changes in exchange rates. Therefore, there is a relationship between unanticipated changes in exchange rates and the assets, liabilities and operating incomes of the firm. The measurement of sensitivity of this relationship gives foreign exchange exposure. They had constructed a regression equation to measure this sensitivity:

Model:

$$\Delta V = \beta_0 + \beta_1 \Delta S + \mu$$

β_0 and β_1 are the regression coefficients.

β_0 is the constant term in the equation and shows how much ΔV changes on average when $\Delta S = 0$.

β_1 describes the systematic relation between ΔV and ΔS.

μ : random error term

ΔV is the change in assets, liabilities and operating income of the firm.

ΔS : Change in exchange rate

Buckley (2000)

Buckley defined the value of an overseas operation as the present value of expected future incremental operating cash flows discounted at the appropriate rate. Economic exposure is related with the present value of future operating cash flows

and how this present value (in home currency terms) changes with exchange rate movements. Therefore, Buckley pointed out a model as follows:

Model:

$$PV = \sum_{t=0}^{n} \frac{(CI_t - CO_t)e_t}{(1+r)^t}$$

PV= parent currency present value of the foreign business

CI= estimated future incremental net cash inflows

CO= estimated future incremental net cash outflows

e= expected future exchange rate

r=discount rate (rate of return that the investors require from an investment in the same risk class)

n= final period for which all cash flows are expected.

Marston (2001)

Marston has proposed a model to measure foreign exchange exposure of firms that is similar to Buckley's. A firm faces with economic exposure if changes in exchange rates affect the firm's value, which is measured by the present value of its future cash flows.

To develop a measure of economic exposure, the value of the firm should be given first. The value of a firm is as follows:

$$V = \sum_{t=1}^{\infty} \frac{CF_t}{(1+p)^t}$$

CF_t = the cash flows of the firm (After-tax profits + net investment)

P= discount rate

Under the assumption of zero net investment and constant cash flows;

$$V = \frac{CF}{p} = \frac{(1-t)\pi}{p} \; ;$$

π : Profit

$$\text{Exposure} = \frac{dV}{dS} = [(1\text{-}t)\backslash p] \; d\pi \; /dS$$

S: exchange rate

Therefore, according to Marston's model, economic exposure is proportional to the derivative of current profits with respect to the exchange rate $d\pi$ $/dS$ shows the exposure.

Five theoretical studies about measuring foreign exchange exposure are examined above. Most of them (Adler and Dumas (1986), Garner and Shapiro (1988) and Levi (1990)) argue that foreign exchange exposure is represented by beta coefficient in the regression equation and foreign exchange rate is the independent variable whereas firm value is the dependent variable in the equation. The other approaches argue that exposure is the derivative of current profits with respect to exchange rate. The second approach is more difficult to use since all of the cash flows of the firm should be used to reach current profits. This data is limited.

2. Empirical Studies

In this section, some of the articles about measurement of economic exposure will be discussed. These studies carry different properties with respect to level of analysis or country and measurement techniques.

Jorion (1990), Bodnar and Gentry (1993), Bartov and Bodnar (1994), Miller and Reuer (1998), Donnely and Sheey (1995) , Pritamani, Shame and Singal (2004), Bradley and Moles (2001), Choi and Prasad (1995), Dahlquist and Robertson (2001), Moles and Mathieson (1999), Glaum,Brunner and Himmel (2000), He and Ng (1998)

and lastly Booth and Rotenberg (1990) have some empirical studies about foreign exchange exposure.

Jorion had analyzed the foreign exchange exposure of US multinationals by using Adler and Dumas' model. 287 firms were analyzed over the period of 1971-1987. 3 sub periods were used as 1971-1975, 1976-1980 and 1981-1987. A trade-weighted exchange rate was used. He used a model as follows:

$$R_{it} = \beta_{0i} + \beta_{2i} R_{st} + \beta_{3i} R_{mt} + \varepsilon$$

R_{mt} is the rate of return on the value-weighted market index, which was not used in the Adler and Dumas' model.

He found that the relationship between stock returns and exchange rates differ systematically across multinational firms. There are only 190 firms with same sign for the first and second sub periods and 159 for the second and third sub periods. As the percentage of foreign operations increases (the ratio of foreign sales to total sales) stock return movement with respect to exchange rates increases and becomes significant for more periods.

After Jorion's study, which was a firm-level analysis, Bodnar and Gentry made a study to examine industry level exchange rate exposures for Canada, Japan and the USA. The relation between changes in exchange rates and industry values is examined by using industry portfolio returns. Industry characteristics such as trade ratios, use of internationally-priced inputs and foreign investment are used in the regression equation. Therefore, exposure is modeled as a function of industry characteristics. According to Bodnar and Gentry, whether the industry exports or imports, the markets from which inputs are obtained and foreign investment affect the industry's linkage to international environment and affect exposure to exchange rate changes.

Nominal exchange rate is used since the correlation between nominal and real exchange rate was high for the period. The equation is as follows:

$$R_{i,t} - r_{f,t} = \beta_{o,i} + \beta_{1,i}(R_{m,t} - r_{f,t}) + \beta_{2,i}PCXR_t + \varepsilon_{i,t}$$

$R_{i,t}$: Return on industry portfolio

$r_{f,t}$: Risk-free rate of return in month t

$R_{m,t}$: Return of the national stock market in month t

$PCXR_t$: Percentage change in the trade weighted nominal exchange rate in month t

$\beta_{1,i}$: Market beta which measures the industry's exposure to change in the overall stock market index

$\beta_{2,i}$: measures the industry's exposure to changes in the foreign exchange rate

Positive $\beta_{2,i}$ means that industry benefits from an appreciation of the local currency. In all of the countries, at 10 percent confidence level, less than half of the industries give significant results. The ratios of significant industries are 28 percent, 21 percent and 35 percent in USA, Canada and Japan, respectively. The data suggest that the impact of exchange rate movements on industry returns is larger for Canada and Japan than for the USA. The reason is that the former two countries are smaller and more internationally-oriented. Bodnar and Gentry had also examined whether industry characteristics have an impact on foreign exchange exposure. Export ratio, import ratio, usage of international priced inputs and the ratio of foreign assets to total assets are used in the model. Moreover, it is tested if being a traded or non-traded good industry has an effect on foreign exchange exposure. It is found that these characteristics have influence on industry's exchange exposure. Export ratios are associated with negative exchange rate exposure and import with positive. The use of internationally-priced inputs results in positive exposure for Canada and Japan but negative for USA. Foreign denominated assets are significantly related with negative exposure to exchange rate changes. Lastly, it is found that except in USA, non-traded goods industries gain from an appreciation.

Bartov and Bodnar (1994) made a study on US firms to investigate a relation between abnormal returns of firms with international activities and changes in the dollar. They used the concept of "abnormal return". It is calculated by subtracting the realized equally weighted market return from the realized return for security *i*. Bartov and Bodnar tried to explain low exchange rate exposures found in the previous studies by mispricing failures and sample selection problems. They argued that lagged changes in the dollar should be used to explain current abnormal returns. They selected firms with same sign. By this way, firms with similar exposures are investigated. The final sample consisted of 208 companies over a broad range of industries. Their model consisted of a single regression of abnormal stock returns against a set of current and lagged changes in foreign currency value of the US dollar trade weighted index. Regression results show that contemporaneous changes in the dollar have little power in explaining abnormal stock returns. Lagged change in the dollar is negatively associated with abnormal stock returns. Overall, they failed to find a significant correlation between abnormal returns of firms with international activities and changes in the dollar.

By following Bartov and Bodnar (1994)**,** Donnely and Sheey (1995) had used the concept of "abnormal return". They made a study on big export firms operating in U.K to investigate the relationship between foreign exchange exposure and firm value. Their aim was to make a comparison with firms in U.K and firms in USA. Therefore, they compared their findings with Bodnar and Bartov's. They used firms that have at least 40 percent of their total sales as foreign sales. 68 firms meet this criterion. A test period of January 1980 to August 1992 was chosen. A model of investigating the effect of changes in sterling on abnormal returns of export firms was established. Abnormal return was found by subtracting market return from raw returns of export firms. Trade weighted foreign exchange rate was used. It is found that there is a significant negative relationship between current returns of export firms and changes in foreign exchange rates. Explanatory power of this test is very high as 0.69. When these results are compared with that of Bartov and Bodnar's, it can be said that British exporters are faced with higher foreign exchange exposures with respect to American exporters. The reason is attributable to the widespread

usage of dollar in international trade. This fact decreases US firms' exposure to exchange rates.

Choi and Prasad (1995) argued that previous studies were carried out a portfolio data and therefore these studies reported minimal or no evidence of exchange rate fluctuations affecting stock returns. Choi and Prasad thought that the exchange rate risk factor has the same affect on all firms. The exchange rate sensitivities of firms will depend on their profiles, financial strategies and other firm specific variables. Therefore, a firm-level study is needed. They examined individual stock return data of 409 US multinationals for the period of 1978-1989. Sample period is also divided into sub periods of strong and weak dollar as January 1978- March 1985 and April 1985- December 1989. Analysis is also carried out in the industry level and 20 industry groups are examined. The model used was similar to Jorion's model.

$$R_{it} = \alpha + \beta R_{mt} + \gamma e_t + v_{it}$$

e_t = foreign exchange risk factor

γ = measure of exchange rate risk sensitivity of firm

β = measure of market risk

R_{mt} = market return factor

R_{it} = the return of stock i for the period t

v_{it} = error term

They found that firm value is significantly affected by both real and nominal exchange rates. These effects vary in terms of the degree and direction across firms. A higher percentage of firms with significant exchange risk exposure gains with depreciation of the dollar. 61 firms have significant exchange risk sensitivities at the 10 percent level. 64 percent of these firms benefit from a depreciation. It was also found that sensitivity is higher for the weak dollar period.

In order to explain cross sectional variation, a model linking exchange risk exposure to firm specific foreign operational variables as foreign profits, foreign sales and foreign assets. A positive relation is found between these operational variables. The finding of industry level analysis is very interesting since only two industries have positive exposures. These are mining and retail. Choi and Prasad (1995) explained this situation with the effect of devaluation on cost. The effect of devaluation on cost is higher than the effect on income.

He and Ng (1998) investigated whether the value of Japanese Multinational Corporation is affected by exchange rate changes and whether lagged exchange rate changes have any explanatory power for current stock returns as proposed by Bartov and Bodnar. They tested this relationship by regressing stock return against both contemporaneous and lagged exchange rate changes. They used a sample of 171 Japanese multinationals. These multinationals were selected according to their export ratios(at least 10 percent in the sample period) Japanese value-weighted market portfolio was used .It is found that 25 percent of the firms have significant positive exposure effects for the whole period of January 1979 to December 1993. Sample period was divided into sub periods as January 1979-December 1986, January 1987-December 1993. Trade weighted index was used. The result is robust for two periods. It is also found that multinationals with significant exposures are concentrated in three industries: Electronic machinery, precision equipment and transport equipment. Differently from Bartov and Bodnar, they found that lagged variable has no effect. The first model was:

$$r_{it} = \beta_{i0} + \beta_{ix} r_{xt} + \beta_{im} r_{mt} + \varepsilon_{it}$$

r_{it} = the rate of return on the ith corporation's stock

r_{xt} = the rate of return on a trade-weighted exchange rate index (measured as Japanese yen price of the foreign currency)

r_{mt} = the rate of return on a market portfolio

ε_{it} = random error term

β_{ix} = slope of the regression (measure of exchange rate exposure)

They also investigated whether exchange rate exposure is determined by the level of a firm's international operations. It is found that exposure is positively related to a firm's export ratio. Another important finding is that firms with low short-term liquidity or with high financial leverage are less exposed to fluctuations in exchange rates. The reason may be the use of derivatives by these firms. They also found that foreign exchange rate exposure increases with firm size. While analyzing the relationship between firm characteristics and exchange rate exposure, some ratios were used.

These ratios are: DE (Long-term debt ratio), DIV (Dividend payout ratio), QR (Quick ratio), SIZE (Firm size), and BM (Book to market ratio). The hypotheses were as follows:

H1:As long-term debt ratio increases, hedging activities increases too and foreign exchange rate exposure decreases.

H2: As DIV decreases and QR increases, liquidity increases and hedging decreases. Therefore, foreign exchange exposure increases.

H3: As BM decreases, the incentive of firm to employ derivatives increases and foreign exchange exposure decreases.

The model was as follows:

$$\beta_{ix} = a_0 + a_1 \log SIZE_i + a_2 EXPR_i + a_3 DIV_i + a_4 QR_i + a_5 BM_i + a_6 DE_i + v_i$$

It was found that EXPR, DIV, QR, SIZE, BM and DE have a strong explanatory power. Among them, EXPR, DIV, QR, BM, and DE had expected signs. He and Ng (1998) had investigated a different feature which is peculiar to Japanese financial environment. This feature is "keiretsu". Keiretsu refers to a network of firms affiliated with a main bank in which firms have strong ties. They proposed that keiretsu firm will hedge less with respect to a non-keiretsu firm. It is found that non-keiretsu multinationals tend to be less exposed to exchange rate risk than do keiretsus.

Glaum, Brunner and Himmel (2000) examined the economic exposure of German corporations to changes in the DM\US dollar exchange rate since US dollar is a driving force in German economy. They used a model that investigates the effects of contemporaneous exchange rate change on security's return. By following Jorion (1990), they measured economic exposure in the following way.

$$R_{it} = \alpha_i + \beta_{iet} + \varepsilon_{it}$$

α_i = constant term

R_{it} = security i's return in period t

e_i = contemporaneous exchange rate change

β_i = sensitivity of company i's stock returns to exchange rate changes.

Then they had introduced market return to the equation. To eliminate interaction between market factor and exchange rate, they used orthogonolized exchange rate variable. Data for the period January 1974 to December 1997 was used. Nominal returns were used because of low inflation rate. The period was divided into 4 sub-periods as January 1974 to January 1980, January 1980-February 1985, March 1985-June 1987 and July 1987- December 1997. During sub periods I, III and IV; significant positive exposure was observed. This means that depreciation of DM yields an increase in market prices of shares. During sub period II, significant negative exposure was observed. For the whole period, 55 percent of firms have positive significant exposure. Therefore, contrary to US firms, German firms are significantly exposed to changes in DM\US dollar rate. However, results are unstable over time. Glaum, Brunner and Himmel (2000) explained this by increasing foreign direct investment (FDI) and decreasing sensitivity of firms to changes in exchange rates.

Pritamani, Shame and Singal (2004) made a study to explain insignificant total exposure for multinational or exporting firms. They proposed a dual effect

hypothesis to explain this result. They said that firms are affected by both the domestic economy and foreign markets. These effects are offsetting for exporters and additive for importers. It is thought that after an appreciation of the home currency, the stock price of multinational firm will decrease due to the competitive factors. However the value of local currency increases as a result of increasing Gross Domestic Product (GDP) and strengthening of the domestic economy. In this case, domestic demand for the product increases which creates a partially offsetting effect for the multinational company. Similarly, when the local currency weakens, the demand increases for the multinational's product abroad whereas decreases in the domestic market due to the weakening economy. On the other hand, these effects strengthen each other for importing firms. They had tested this dual effect for sub samples of export and import oriented firms and report insignificant exposure for exporting firms and significantly positive exposure for importing firms. Exporter firms were defined as the ones that have at least 50 percent of their total sales in foreign countries and\or have at least 50 percent of their assets located overseas. Importers are firms that import a significant part of their sales. Monthly data were used. Returns on the control portfolio are measured as value-weighted returns, equally-weighted returns and equally weighted returns on domestic firms. While value-weighted index was used, exposure was found insignificant for exporters and significantly positive for importers. On the other hand, with the use of equally-weighted index, exposure was found significantly negative for exporters and insignificant for importers. When equally-weighted portfolio of domestic firms was used, significantly negative exposure for exporters and significantly positive exposure for importers were found.

Miller and Reuer (1998) carried out a study about firm strategy and economic exposure to foreign exchange rate movements. They examined the effects of different strategies applied and industry structure for firm's economic exposure to foreign exchange rate movements. Contrary to previous researches, they used a multiple currency model. Exchange rate data from major US trading partners was used. They used firms as unit of analysis because aggregations may mask differences in firm specific strategies. A regression analysis which tests the effects of firm

specific strategies as export intensity, FDI, and R and D intensity and international product market integration on economic exposure to foreign exchange rate movements was used. The hypotheses are as follows:

H_1: The greater a firm's export intensity, the greater its economic exposure to exchange rates.

H_2: The greater a firm's FDI, the lower its economic exposure to foreign exchange rates.

FDI creates new opportunities for sourcing inputs and sales location. By this way it was hypothesized that FDI reduces exposure. To the extent that a firm concentrates its overseas investment in a particular foreign market, the firm could have significant exposure. Therefore, beyond some level of FDI, the relation with exposure may become positive.

H_3: The greater a firm's R&D intensity, the lower its economic exposure to foreign exchange rates.

The reason of this hypothesis is that differentiation creates competitive advantage for firms which are related with R&D applications.

H_4: Firm's economic exposure to foreign exchange rates increases with their industries' foreign sales intensities.

The extent of international market segmentation or integration in either input or output markets affects the economic exposures of firms. Industry average foreign sales to total sales was used as a proxy.

They analyzed 1992 trade data to reach major trade partners of US. 15 major trading partners are taken but only 12 of them used to form an index. According to factor analysis, 2 groups of currencies were formed. From each group, the currency

of the major trading partner was chosen. In the first group, there were Japanese yen, Canadian dollar and Mexican peso. German mark, South Korean Won and Hong Kong dollar were in the second group. Nominal monthly holding period stock returns were observed. The regression equation was as follows:

$$R_{j(t)} = b_{0j} + b_1 R_{Y(t)} + b2jRC_{\$(t)} + b_{3j}R_{P(t)} + e_{j(t)}$$

$R_{j(t)}$ = real stock return for firm j in month t

$R_{Y(t)}$, $R_{C\$(t)}$, and $R_{P(t)}$ are the percentage changes in the real dollar values of the Japanese yen, Canadian dollar, and Mexican peso, respectively.

$e_{j(t)}$:error term.

Then control variables of percentage change in interest rates and returns to the overall stock market were included in the regression equation.

$$Rj(t) = b_{0j} + b_{1j}R_{m(t)} + b_{2j}R_{r(t)} + b_{3j}R_{Y(t)} + b_{4j}R_{C\$(t)} + b_{5j}R_{P(t)} + e_{j(t)}$$

$R_{m(t)}$ = a real, value-weighted market portfolio return in month t

$R_{r(t)}$ = percentage change in the real US T-bill rate

Ordinary least squares regression was used. Results show that 13,6 percent of firms are exposed to movements in the yen, Canadian dollar, and Mexican peso at 5 percent significance level.14,6 percent of firms experience significant exposure to movement in DM, South Korean Won and Hong Kong dollar. When market and interest rates were added, this rate increases to 17, 3 percent. After this test, they investigated the relationship between firm strategy and foreign exchange exposure. The hypotheses 1 through 4 were tested. Regression model was:

$$F_i = \gamma_0 + \gamma_1 EXP + \gamma_2 FDI + \gamma_3 \ RD + \gamma_4 IND + \varepsilon$$

As a result, a negative relation between FDI and economic exposure was found, but they did not find a U-shaped relation between them. No support was

found for the other three hypotheses. Major trading partners' currencies (Yen, Mexican Peso and Canadian dollar) were significant but the other groups' currencies were insignificant.

Another study carried out in firm level is the Moles and Mathieson's (1999) study. They had analyzed the impact of economic currency exposure on UK share prices by using both daily and monthly data. Differently from other studies, survey data was used to identify two types of firms as exporters and importers. The period is from October 1990 to June 1997 with the sub periods of October 1990- August 1992 (Participation date of UK to ERM) and August 1995 to June 1997 (Sterling appreciation).In the survey, two characteristics of the firms are measured: the percentage of the company's sales made in foreign markets and the percentage of the company's inputs purchased in a foreign market. Importers were defined as the companies that purchase 41 percent of inputs in foreign markets and have foreign sales less than 60 percent. Exporters are defined as those whose percentage of inputs purchased in foreign markets were less than or equal to 40 percent and whose percentage of sales made in foreign markets was greater or equal to 41 percent. The survey of Bradley (1996) was used. From the respondents, 38 of the companies were defined as importer and 50 as exporter with the criteria given above. Trade weighted exchange index was used. Daily and monthly total share return data was used. Nominal exchange rates were used. For the whole period, 35 percent of importers have significant exposures. 68 percent of them have positive signs as expected for the daily data. 28 percent of exporters have significant exposures and 44 percent of them have negative signs as expected for the daily data.

A higher degree of exposure was observed for the ERM period. Lagged relationship was also examined but a significant relation was not found. Mathieson and Moles had also examined whether using individual currencies affect the results. They reported that between 6-32 percent of firms and between 6-34 percent of exporters were exposed at least one of the currencies at 10 percent confidence level. Therefore, they concluded that for some companies there is a significant relationship between firm value and specific exchange rates. Exposure is currency specific.

After Mathieson and Moles (1998), Bradley and Moles (2001) had carried out a study in UK, too. They examined the effects of economic exposure on a group of publicly-listed, non-financial UK firms. Information was obtained from the companies at two points in time, during a sterling appreciation and then depreciation. Bradley and Moles brought a different perspective to exchange rate sensitivities of firms by using estimates of firm's own exchange rate sensitivities rather than estimating them indirectly from share price. Two postal questionnaire surveys were sent to reach this data, the first on March 1996 and the second on March 1997. The study includes purely domestic companies that have no foreign currency transaction. Response rate was 51 percent, 629 companies were used. When sterling depreciated, firms experienced increased profit margins and/or sales volumes and increases in the foreign-sourced inputs. The opposite conditions were reported for sterling appreciation. Results are stable for two periods. To manage currency effects, 75 percent of exporting firms adjusted either margins or volumes or both in response to changes in the exchange rate. They reported a significant industry effect.

Dahlquist and Robertson (2001) had made a firm-level study on a sample of 352 Swedish firms. They found statistically significant exchange rate exposure for 40 percent and 70 percent of the firms depending on the return horizon. They also examined the exposure across industries and for several firm attributes. They found that large firms with high export rates and firms with large foreign ownership are more exposed to exchange rate fluctuations. Period of 1988 to 1998 was used. The period from 1988 to November 1992 was the fixed exchange period and 1992 to 1998 was the free-float period. Trade weighted index was used. It was found that 15-30 percent of Swedish firms are exposed to foreign exchange rate changes. On the other hand, when 3 currencies of major trade partners were used, this ratio increases to 40-70 percent (exposed for at least one of the three currencies). Dahlquist and Robertson analyzed whether exposure increases in firm level with respect to industry level. It was reported that significant exposure increases in firm level. They found that only two industries have significant exposures. In order to analyze firm specific factors, they hypothesized size, export rate, foreign ownership, foreign listing and

book to market ratio. It was found that large firms, firms with high export rates, and firms with large foreign ownership are more exposed to exchange rate fluctuations than other firms. They also analyzed horizons of return. When studying different return horizons, they found that longer the horizon, the larger is the fraction of exposed firms. Interestingly, exposure did not change dramatically between fixed and floating regimes.

Booth and Rotenberg (1990) examined the affects of the US\Canadian Dollar exchange rate on Canadian firms' share price returns rather than relying on a currency index. They reported negative coefficients which mean that depreciation of Canadian dollar yields a decrease in net value of the firms. Stock return data of 156 firms were used for the period of 1979-1983. 50 percent of firms had regression coefficients that were significant at 1 percent level. 67 percent at 5 percent and 97, 5 percent of the firms had negative coefficients. Larger Canadian firms suffer negative value effects on a depreciation of the Canadian dollar because of a runoff of US shareholder interest. Depreciation of Canadian dollar reduces US dollar value of Canadian holdings. Booth and Rotenberg had also carried out this study to examine firm specific attributes. Foreign assets, foreign sales and foreign debt are some variables tested. Firms with higher foreign sales yield positive exposure and foreign debt yield negative exposure. Foreign asset was also significant but its sign was not realized as expected. It was expected that foreign asset has a positive sign, which means that firms with higher foreign assets benefit from depreciation of the home currency but its sign was found negative.

Khoo (1994) had measured the foreign exchange exposure of mining firms in Australia, which were thought to be very sensitive to exchange rate changes. The analysis is carried out both in firm level and industry level. The percentage change in the price of bank bills (to denote interest rate changes) is added to the Jorion's model. Nominal foreign exchange rates are used. Selected exchange rates are used according to the specific features of the industry. The sensitivity of stock returns to exchange rate movements and proportion of stock returns explained by exchange rate movements are found to be small.

Abdalla and Murinde (1997) had made a country level study in the emerging financial markets of India, Korea, Pakistan and the Philippines to investigate interactions between exchange rates and stock prices. The data period is from January 1985 to July 1994. Jorion's model is applied. International Finance Corporation (IFC) stock index and real effective exchange rate were used. Granger causality test is conducted. The results show that unidirectional causality from exchange rates to stock prices exist in all the sample countries, except the Philippines.

Kasman (2003) made an analysis on Turkish firms to investigate whether there is a relationship between exchange rates and stock prices. This study provides evidence that a long-run stable relationship between stock indices and exchange rate exist. The analysis period is from 1990 to 2002. National 100, Financial Sector Index, Production Sector Index and Service Sector Index of Istanbul Stock Exchange (ISE) are used. In the second step of the study, Granger causality analysis is carried out. It is found that there is not any causality relationship between composite index and exchange rate, financial sector index and exchange rate and service sector index and exchange rate. There is a causal relationship between only industry sector index and exchange rate.

Another study which investigates the foreign exchange rate sensitivity of Turkish firms is made by Yücel and Kurt (2002). 152 companies listed in ISE were used in the study. They found that 11.8 percent of sample firms have a positive and significant economic exposure for the period of January 2000 and October 2002. It is also found that exposure coefficients are larger for exporter firms with respect to non-exporter firms.

Foreign exchange exposure was mostly measured by regression analysis by using stock returns in most of the studies analyzed above. Adler and Dumas (1986) is the basic model used to measure foreign exchange exposure. Jorion had added market return to this equation. Most of the studies used trade-weighted indices to

represent changes in exchange rates. Some studies, as Miller and Reuer (1998) and Khoo (1994) used multivariate modeling approach. There are also some studies which used models constructed with individual currencies as Booth and Rotenberg (1990), Glaum, Brunner and Himmel (2000), Kasman (2003).

Although most of the studies are carried out in firm level, there are also studies made in industry level. Bodnar and Gentry (1993) and Khoo (1994) are the studies made in industry level. He and Ng (2001), Choi and Prasad (1995), Dahlquist and Robertson (2001) are the studies carried out both in firm and industry level. Two of the studies are made in multiple countries. These are Bodnar and Gentry (1993)'s and Abdalla and Murinde's (1997) studies.

A summary of empirical analysis explored in this study are given in Table 6.

Table 6: The Summary of Empirical Studies

	AUTHOR	DATE	COUNTRY	CURRENCY INDEX	VARIABLES	PERIOD	UNIT OF ANALYSIS	NUMBER OF FIRMS OR INDUSTRIES
1	Jorion	1990	USA	Trade-weighted	• Stock return • Value-weighted market index	1971-1987	Firm	287
2	Bodnar and Gentry	1993	USA, Canada and Japan	Trade-weighted nominal	• Trade ratios • Use of internationally priced inputs • Foreign investment	1979-1988	Industry	USA: 39 Canada: 19 Japan: 20
3	Donnelly and Sheey	1995	United Kingdom	Trade-weighted	• Abnormal stock return • Return on sterling • Market return	1980-1992	Export Firms	68
4	Bartov and Bodnar	1994	USA	Trade-weighted	• Abnormal stock return • Exchange rate index • Market return (Equally weighted)	1978-1989	Firm	280
5	Glaum,Brunner and Himmel	2000	Germany	DM/US-dollar rate (nominal)	• Stock return • Market index (Value-weighted	1974-1997 (Sub-periods)	Firm	71

6	Pritamani, Shame, and Singal	2004	USA	Currency index	• Stock return • Exchange rate index • Market return (equally weighted and value-weighted)	1975-1997	Firm	28 Importer Firms 67 Exporter Firms 91 Domestic Firms
7	He and Ng	1998	Japan	Trade-weighted	• Export ratio • Dividend pay-out ratio • Size • Debt ratio • Quick ratio • Book to market ratio	1979-1993	Firm and Industry	171
8	Choi and Prasad	1995	USA	Trade-weighted basket of ten currencies	• Stock return • Exchange rate index • Market return • Foreign profits, sales and assets	1978-1989 (Sub periods)	Firm and Industry	409
9	Miller and Reuer	1998	USA	Multiple currencies	• Export intensity • Foreign direct investment • Research and Development Expenses • International product market integration	1988-1992	Firm	404

10	Moles and Mathieson	1999	UK	Trade-weighted	• Stock return • Exchange rate index • Market return (Daily and monthly data were compared)	1990-1997 (Sub periods)	Firm	38 Importer 50 Exporter
11	Dahlquist and Robertson	2001	Sweden	Trade-weighted	• Size • Foreign Ownership • Export rate • Foreign listing • Book to market ratio	1988-1998	Firm and Industry	352
12	Booth and Rotenberg	1990	Canada	Canadian $/US $	• Foreign Asset • Foreign Sales • Foreign Debt	1979-1983	Firm	156
13	Khoo	1994	Australia	Multiple exchange rates	• Stock return • Market return • Change in exchange rate	1980-1987	Industry (Mining companies)	77
14	Abdalla and Murinde	1997	India, Korea, Pakistan and Philippines	Real effective exchange rate	• Stock return • Market return • Change in exchange rate	1985-1994	Firm	

15	Kasman	2003	Turkey	TL/US dollar rate	• Stock return • Four market indices: National 100, financial, industry ad service sector indices • Change in exchange rate	1990-2002 (Sub periods)	Firm
16	Yücel and Kurt	2002	Turkey	Real effective exchange rate	• Stock return • Market return • Change in exchange rate	2000-2002	Firm	152

B. Research Model

In this section of the study, an empirical analysis about foreign exchange exposure of Turkish firms will be carried out. This section consists of two parts. In the first part, the relationship among changes in stock return, changes in exchange rate and changes in market return will be examined by using Jorion (1990)'s model. The second model examines whether firm specific attributes have an effect on the sensitivity of firm's stock return to changes in exchange rate.

1. Measurement of Foreign Exchange Exposure

The first model used in the research is given as follows:

$$\Delta SR_i = \beta_0 + \beta_{1x}\Delta FX + \beta_{2x}\Delta MR + \varepsilon \ (Equation\ I)$$

The definitions of the variables in the equation;

ΔSR : change in monthly return (TRY based) of stock i

ΔFX : change in real effective trade weighted index of TRY

ΔMR : change in market return (ISE-100 index)

β_0 : constant term

β_{1x} : measures the sensitivity of changes in stock returns to changes in foreign exchange rates

β_{2x} : measures the sensitivity of changes in stock returns to changes in market return

ε : random error term

Real effective exchange rate index is used for exchange rate. This index is the nominal effective exchange rate deflated by price index. According to the definition of IMF, real effective exchange rate is the weighted geometrical mean of the ratio of the price level of the country to the price level of its trade partners (Zanello and Dominique, 1997). This data is gathered from the Central Bank of Turkey. An increase in this index means that TRY appreciated with respect to other currencies.

On the other hand, a decrease in this index means the depreciation of TRY. Therefore, positive value of β_1 means that appreciation of TRY results to an increase in the value of the firm. On the other hand, negative value of β_1 means that a depreciation of TRY results to a decrease in the value of firm i. If β_1 is zero, it means that there is not any relationship between ΔSR and ΔFX. The hypotheses that will be tested are as follows:

H_0: $\beta_1 = 0$

H_1: $\beta_1 \neq 0$

H_0: Null hypothesis (there is not any relationship between changes in foreign exchange rate and stock return of firm)

H_1: Alternate hypothesis (there is a relationship between changes in foreign exchange rate and stock return).

In the literature, it is seen that different exchange rate indices are used. In some of these studies nominal exchange rate is used and in others real exchange rate is used. Real exchange rates are nominal exchange rates adjusted for changes in price level. In some studies (Bodnar and Gentry (1993), Glaum,Brunner and Himmel (2000) and Khoo (1994)), nominal exchange rate index is used because the correlation between real and nominal exchange rate is very high and the inflation is low. However, in Turkey inflation is high. As a result of that, real exchange rate is used in the analysis. In some of the studies as Glaum,Brunner and Himmel's (2000), Booth and Rotenberg's (1990) and Kasman's (2003) , particular currencies are used.

The market index used is the ISE 100 company index because the companies are selected from this index. Monthly closing price of ISE 100 index is used to represent the independent variable- MR. The starting date for market index is taken as September 30, 1997 and the ending date is September 30, 2005.

Monthly stock return data is collected from ISE. Stock return is the percentage change in the stock price with respect to previous month. The companies existing in the ISE-100 index are chosen. From these companies, financial ones are excluded. There are 100 companies in this index as of May 2006. When financial companies are excluded, 76 companies remain. 54 companies, which have full data for the period of September 1997-September 2005, form the sample.

The unit of analysis is individual firm. In the previous studies, it has been observed that making analysis in portfolio level may not give true results due to the aggregation problems. Different firms have different properties. While making a portfolio level analysis, the changes in one firm may mask the changes in other firms. A firm level study is needed to understand whether and why individual firms have varying sensitivities to changes in exchange rates. Bartov and Bodnar argued that previous studies had failed due to the aggregation problems. By following their approaches, a firm level analysis is carried out.

The analysis is carried out for the full period, sub period I and sub period II. The first sub period starts from September 1997 and ends in September 2001. The second sub period is between October 2001-September 2005. The reason for using sub periods is to observe the sensitivity of stock return to exchange rate in different period. In the analysis, Ordinary Least Squares (OLS) method is used at the 0.05 confidence level.

Table 7 shows the cross sectional distribution of the 54 Turkish firms' estimated β_{1x} as defined in Equation 1 for the full sample period. It shows minimum and maximum values of β_{1x} together with the significant coefficients obtained.

It is found that for the full sample period about 17 percent of the 54 firms (9 firms) yield significant exposure coefficients. From these 9 firms, 67 percent (6 firms) have negative exposure and 37 percent (3 firms) have positive exposure. The negative β_{1x} coefficient means that an appreciation of TRY against other foreign currencies has a negative impact on stock returns of Turkish companies whereas a

positive β_{1x} coefficient means a positive impact of TRY appreciation on stock return of Turkish companies. As it is expected, most of the firms (67 percent) have negative β_{1x} coefficients. However, there are also a few firms with positive β_{1x} coefficients (37 percent). This means that some of the firms experience an adverse valuation effect when the TRY depreciates and gain when the TRY appreciates. The reason may be that the firms in the sample are not classified as net exporter or net importer. If net exporters could be separated from net importers, a more complex analysis could be carried out. However, in general, Turkish companies' exposure to exchange rate changes is negative, which means that firms benefit (are hurt) when the TRY depreciates (appreciates). When two sub periods are examined separately, it is seen that results are different. The first sub period is from September 1997 to September 2001 and the second sub period is from October 2001 to September 2005. As it is seen from Table 7, in the first sub period for the 43 percent of firms, positive exposure is seen and for the 57 percent of firms negative exposure is observed. 9 percent of firms (5) have significant exposure and 60 percent of them (3) have negative sign, as expected. When the second sub period is analyzed, the situation is different. In this case, 57 percent of firms have positive exposure and 43 percent have negative exposure. During this sub period, 17 percent of firms (9) have significant exposure and 44 percent of them (4) have negative sign as expected. However, 56 percent of them have positive signs. The reason may be the importer firms. During this period, due to the appreciating TRY, their effect may be greater than those of exporters. There are only two firms that have significant betas with the same sign for the sub period I and sub period II. There are also two firms with significant betas during both of the full period and sub period I and six firms with significant betas during both of the full period and sub period II.

Minimum beta is -0.1440 and maximum beta is 0.2480 for the full period. In the sub period I, minimum beta is -0.2020 and maximum beta is 0.2800. In the sub period II minimum and maximum beta are -0.4570 and 0.2420, respectively. Mean of Beta coefficients of the sample firms is -0.0086, -0.0171 and 0.0059 for the full period, Sub Period I and Sub Period II, respectively. This means that 1 percent increase in the foreign exchange index yields a 0.86 percent decrease, 1.71 percent

decrease and 0.50 percent increase in the stock return for the full period, Sub Period I and Sub Period II, respectively. The sign of beta coefficients for the full period and the Sub Period I is as expected. However, for the Sub Period II, the sign is not negative, which means that stock return increases with the increase in foreign exchange rate index. The analysis is carried out without making a distinction between net importer firms and net exporter firms. Since the firms are not classified as net exporters and net importers, this result may be observed. The effect of importer firms may be higher for this period because after 2001, the nominal import expanded and openness of economy increased after 2001.

Table 7: Results of the Firm Level Analysis

	Full Period (1997-2005)		*Sub Period I (1997-2001)*		*Sub Period II (2001-2005)*	
Statistics						
Mean	-0.0086		-0.0171		0.0059	
Standard Deviation	0.0740		0.0933		0.1255	
Minimum	-0.1440		-0.2020		-0.4570	
Median	-0.0060		-0.0170		0.0065	
Maximum	0.2480		0.2800		0.2420	
Positive Exposure	25	46 %	23	43 %	31	57 %
Negative Exposure	29	54 %	31	57 %	23	43 %
Companies in Sample	54		54		54	
Significant Exposure (Total)	9	17 %	5	9 %	9	17 %
Firms (%) exposed at 1% level	1	2 %			1	2 %
Firms (%) exposed at 5% level	5	9 %	1	2 %	3	6 %
Firms (%) exposed at 10% level	9	17%	5	9 %	9	17 %
Average R^2 (Full Period)	0.58					
Significant Exposure (Expected Sign)	6	67 %	3	60 %	4	44 %

Coefficient of Determination; R^2 measures the total variability that is explained by the regression model (Newbold, Carlsen, Bold; 2003). The higher the R^2, the better the variables explain the model. R^2 takes value between 0.184 and 0.815. The mean R^2 is 0.58. These R^2 values are very high.

The exposure of Turkish companies in the industry level is also analyzed. 8 industries are defined as production, holding, technology, chemistry, food, service, paper and tourism. The result of this analysis is given in the Table 8. However, it is found that none of these industries have significant exposures. This proves that aggregations may mask differences in firms and a firm level analysis is better to explain foreign exchange exposure.

Table 8: Results of Industry Level Analysis

	Industry	*Coefficient*	*t-value*
1	Production	-0.02	-1.432
2	Holding	0.07	0.273
3	Technology	0.049	1.379
4	Chemistry	0.028	1.138
5	Food	-0.051	-1.197
6	Service	0.007	0.258
7	Paper	-0.026	-0.564
8	Tourism	-0.021	-0.508

Lagged relationship is also investigated by following some studies (Amihud (1994) and (Bartov and Bodnar (1994)) which argue that lagged changes in the foreign exchange have a significant effect on stock performance with respect to current changes. They suggest financial information spreads of with a time lag; it would take longer for exchange rate changes to have an effect on stock performance. However, for Turkish companies, adding one month lagged foreign exchange change has no substantial effect on the stock's exposure to foreign exchange movements.

Table 9 : The Results of Lagged Effect

Statistics	Full Period (1997-2005)	
Mean	0.0028	
Standard Deviation	0.0650	
Minimum	-0.1070	
Median	0.0050	
Maximum	0.1660	
Positive Exposure	29	54 %
Negative Exposure	24	44 %
Companies in Sample	54	
Firms (%) exposed at 10% level	4	7 %
Significant Exposure (Total)	4	7 %
Significant Exposure (Expected Sign)	1	25 %

2.   Determinants of Exchange Rate Exposure

In this part of the research, it will be analyzed whether exchange rate exposure is determined by the characteristics of the firms. Some of the variables in the previous studies are chosen to analyze the relationship between firm characteristics and sensitivity of stock return to exchange rate changes. However, the choice of the variables is constrained by the availability of firm specific financial variables.

The data used in the research is taken from the financial statements of firms that are used in the first equation. Therefore, the 54 firms used in the first analysis are examined. The financial tables of these firms are gathered from ISE. The values

as of September 2005 are used since the beta value in the first equation is calculated until this date.

Most of the existing studies show that there is a significant relationship between a firm's foreign operations and foreign exchange exposure. For instance, Jorion (1990) found that dollar depreciation exposure is positively related to the ratio of a firm's foreign sales to total sales. Choi and Prasad (1995) had also found that there is significant relationship between foreign profits, foreign sales and foreign assets. Allayannis and Ofek (1998) have found that a firm's exchange rate exposure is positively related to its ratio of foreign sales and total sales. By following these studies the ratio of foreign sales to total sales (EXP) is taken as a variable for explaining firm's sensitivity to foreign exchange rate changes.

Another important firm specific attribute that has an significant effect on exchange rate exposure is firm size. Allayannis and Ofek have found that firms with larger size are more exposed to foreign exchange exposure. He and Ng have also found that the bigger the firm, the larger the exchange rate exposures since bigger firms deal with more foreign activities. Therefore, SIZE is another variable that will be used in the analysis. Other studies argued that smaller firms are more exposed to changes in foreign exchange rates since these firms cannot use hedging due to cost factors. Larger firms have more chance to make hedging. However, this approach is not valid for Turkey since Turkey does not have a developed derivative market. Therefore, the first approach that suggests that bigger firms are more exposed to foreign exchange risk will be adopted in this study.

Dahlquist and Robertson (2001) had pointed out that the owners of a firm may affect the exchange rate exposure. They argued that an appreciation of the home currency brings a competitive disadvantage for the firm relative to its competitors and this may cause a drop in the stock's price. This situation is unfavorable for domestic owners. On the other hand, foreign owners will not be affected as badly as domestic investors since they will translate the home currency value of the holding to their depreciating currency. Therefore, owners of a firm may want to influence the

hedging policy differently according to their national origin. The relation between the exchange rate exposure of firms and their ratio of foreign ownership (FO) will be the third variable in the model. Pantzalis, Simkins and Laux (2001) had suggested that Multinational Corporations with greater network breadth (degree of a network's concentration across many foreign countries) are less exposed to currency risk whereas firms with highly concentrated network (greater depth) are more exposed.

The second model is as follows:

$$\beta_i = a + bSIZE_i + cEXP_i + dFO_i + \varepsilon \quad \text{(Equation II)}$$

$\beta_i =$ the sensitivity of changes in stock returns to changes in foreign exchange rates

$SIZE_i =$ Total asset value of firm i

$EXP_i =$ the ratio of export sales to total sales for firm i

$FO_i =$ the ratio of foreign stockholders to total stockholder's for firm

Hypotheses:

H₁: The bigger the firm, the greater its foreign operations and the greater its economic exposure to foreign exchange rates.

H₂: The greater the export sales, the greater the economic exposure to foreign exchange rates.

H₃: The greater the foreign ownership, the greater the economic exposure to foreign exchange rates by affecting hedging policies.

The independent variables are SIZE, EXP, and FO. SIZE is measured by the natural logarithm of total asset value. EXP variable is the foreign sales/ total sales ratio of the firms. Lastly, FO is measured by the ratio of foreign stockholders to total stockholders. The dependent variable is beta of the stock which was measured by the first equation. Equation two is estimated via OLS.

The regression results of the equation (2) are given in Table 10. Table 10 presents results using β from equation (1) calculated by using the real effective index of Central Bank of Turkey.

Table 10: Results of the firm specific variables on foreign exchange exposure

Variable	Coefficient	T-value
Intercept	0.0624	0.629
Firm Size	-0.064	-0.412
Export Ratio	-0.444	2.829
Foreign Ownership	0.12	0.808
R^2	**0.172**	
F-value	**2.776**	

Table 10 shows that from the independent variables, only EXP is significant. It is significant at 5 percent level. The other variables are not significant. EXP has negative sign. It means that EXP and Beta have inverse relationship. As the ratio of foreign sales to total sales increases, the sensitivity of stock return to exchange rate changes decreases. This result is not as expected according to the hypothesis. It was hypothesized that Beta increases as export ratio increases.

3. Results

Foreign exchange exposure of Turkish companies is explored in the study. By following Jorion (1990), a model is established. In this model, stock return is the dependent variable and changes in foreign exchange rate index and market return index are the independent variables. It is found that only 17 percent of firms (9 firms)

have significant exposures. Most of these firms (67 percent) have negative exposure as expected. When the analysis is carried out for two sub periods, for the sub period I, 5 firms have significant exposure. From these firms, most of them (3) have negative exposure. The results are different for the sub period II because 9 firms have significant exposure and 44 percent of these firms (4) have negative exposure and 66 percent have positive exposure. This result may be seen due to the increasing share of import in foreign trade. The analysis is made in industry level, too. However, none of the industries have significant exposure. By following, Bartov and Bodnar (1994), lagged relationship is investigated but the result did not change noticeably.

In the second section of the analysis, determinants of foreign exchange exposure are investigated. The effects of firm specific factors such as export ratio, size and foreign ownership's on beta, which is calculated in the first model, are analyzed. From these variables, only export ratio is significant to explain the sensitivity of stock return to changes in foreign exchange rate. The sign of this variable is found negative, which is contrary to the hypothesis. This result may be observed due to the sample size. Sample is formed by 54 firms and among these firms, only 9 of them have significant exposure. In addition to this, export firms also import and therefore a further analysis is required to separate net exporters and net importers in order to reach robust results.

CONCLUSION

Foreign exchange exposure has been a very important concept for every firm including the ones that have no international business because the changes in foreign exchange rates may affect the competitive power of the firms and input-output prices. Therefore, foreign exchange rates not only determine the profitability of firms, but also their survival in the market. This concept is more crucial for firms operating in a developing country as Turkey. Turkey has experienced many economic crises and during each of these economic crises, foreign exchange rates showed considerable volatility. Thus, the foreign exchange exposure of Turkish firms is investigated. Then, firm specific factors affecting the sensitivity to changes in exchange rates are analyzed.

To achieve this objective, the foreign exchange exposure concept and its relationship between monetary systems is discussed theoretically in the first section of the study. Alternative exchange rate regimes, a brief history of international monetary system and the foreign exchange rate regimes applied from the establishment of the Republic are evaluated. In the second section of the study, three types of foreign exchange exposure that have place in the literature are studies. These are translation, transaction and lastly economic exposure. In the third section of the study, the methods for managing transaction and economic exposures are explored. The fourth and last section of the study consists of two economic models constructed to investigate foreign exchange exposure of Turkish firms. The first model investigates the effects of market return and change in exchange rate on the stock return of the company. To make this analysis, 54 firms are chosen from the ISE 100 index and this index has been used to characterize market return. Real effective exchange rate index, which is a trade-weighted index, is used to represent changes in exchange rates. The data for the period between September 1997 and September 2005 is used in the analysis. In the second step of the analysis, firm specific factors having impact on the sensitivity of stock return to exchange rate changes are explored. So, the effects of firm size, export ratio and foreign ownership ratio are investigated.

The results of the first analysis which investigates the relationship of stock return with market return and changes in exchange rates show that 17 percent of the sample firms have significant exposure for the period between September 1997 and September 2005. From these significantly exposed firms, 67 percent have negative exposure as expected and 33 percent have positive exposure. This means that as the YTL appreciates, mostly stock returns of the exposed firms decrease fitting the literature. In the literature, there are studies carried out in industry level. By following these studies, industry level foreign exchange exposure is analyzed, too. The firms are classified according to 8 industries. However it is observed that none of the industries have significant foreign exchange exposure. This proves that aggregations may hide firm-specific activities.

Some of the studies in the literature analyzed the foreign exchange exposure with respect to different periods. To analyze, whether foreign exchange exposure of Turkish firms change dramatically, two sub periods are identified. The results show that the ratio of significantly exposed firms decreases to 9 percent for the first sub period. However, in the second sub period, it did not change and was observed as 17 percent. Another important finding is that the sign of significantly exposed firms change noticeably from the first sub period to second sub period. In the first sub period, 60 percent of the significantly exposed firms had negative sign and 40 percent of them had positive sign. On the other hand, 44 percent had been negatively exposed and 56 percent had been positively exposed. The ratio of negatively exposed firms decreases in the second sub period. This reason may be observed due to the increasing share of import in foreign trade during the second sub period. According to the literature, importer firms are positively affected from the appreciation of the home currency. As the ratio of importers increases, the ratio of positively exposed firms increases, too. Lastly, lagged effect of change in foreign exchange rate on stock return is analyzed. One month lagged foreign exchange rate data is used and found no important change.

In the second part of the study, the effects of firm size, export ratio and foreign ownership ratio on the stock returns' sensitivity to changes in foreign

exchange rate changes are analyzed. The sensitivity of stock return to changes in exchange rates is the dependent variable of the first model. It is found that only export ratio is significant to explain the model. Its sign is negative. As export ratio increases, the sensitivity of firm to changes in exchange rates decreases. This result is conflicting with the hypothesis established by following literature. The net exporter and net importer firms were not defined in the analysis. This result may be attributable to this comparison. The exporter firm may also make import. Therefore, foreign exchange exposure of these firms may be minimized by matching cash inflows in a currency with cash outflows in the same currency. This relationship can be analyzed by using net importer and net exporter firms in the analysis.

Foreign exchange exposure faced by Turkish firms can be managed by applying strategies in the finance, marketing and production areas. In the finance area, the management of cash flows is a very important issue to minimize exposure. The managers can create a portfolio of cash inflows and outflows, match cash inflows in a currency with cash outflows in that currency and increase the variability of financial sources. From the marketing perspective, differentiation strategy can be adopted to minimize foreign exchange exposure. Market selection is also an important concept to decrease foreign exchange exposure. By operating in different markets with diverse attributes, risk can be minimized. From the production perspective, foreign direct investments, changing product mix and shifting production among plants are some strategies that can be taken into account to manage foreign exchange exposure.

Turkish firms should devote more effort to manage foreign exchange exposure because Turkish economy is more vulnerable to foreign exchange risk with respect to a developed country's economy. Therefore, the usage of derivative instruments should be promoted among Turkish firms. The establishment of Futures and Options Market is an important development for Turkish Financial Market. The benefits of derivative instrument can be explained to Small Medium Sized Enterprises to promote their usage. By this way, the foreign exchange exposure faced by these fragile firms can be minimized.

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APPENDIX 1: The List of Firms in the Sample

Number	Firms	Industry
1	Adana Cimento C	Industry
2	Advansa Sasa	Industry
3	Akçansa	Industry
4	Aksa	Industry
5	Alarko Holding	Holding
6	Alcatel	Technology
7	Anadolu Isuzu	Industry
8	Arçelik	Industry
9	Aselsan	Technology
10	Aygaz	Chemistry
11	Bagfaş	Chemistry
12	Banvit	Food
13	Beko Elektronik	Industry
14	Bolu Çimento	Industry
15	Boyner Mağazacilik	Service
16	Brisa	Chemistry
17	Ceytaş Maden	Industry
18	Çelebi	Service
19	Çimsa	Industry
20	Deva Holding	Holding
21	Doğan Gazetecilik	Paper
22	Doğan Holding	Holding
23	Döktaş	Industry
24	Dyo	Chemistry
25	Eczacibaşi Ilaç	Chemistry
26	Ereğli Demir Çelik	Industry
27	Ford Otosan	Industry
28	Gima	Service
29	Hürriyet Gazetecilik	Paper
30	Ihlas Holding	Holding
31	İzmir Demir Çelik	Industry
32	Kartonsan	Paper
33	Koç Holding	Holding
34	Mardin Çimento	Industry
35	Migros	Holding
36	Net Holding	Tourism
37	Net Tourism	Technology
38	Netaş Telekom	Industry
39	Otokar	Industry
40	Park Elektronik Madencilik	Industry
41	Petkim	Chemistry
42	Petrol Ofisi	Chemistry
43	Pinar Süt	Food

44	Sabanci Holding	Holding
45	Şişecam	Industry
46	Tansaş	Service
47	Tat Konserve	Food
48	Tofaş Oto Fabrikası	Industry
49	Trakya Cam	Industry
50	Tüpraş	Chemistry
51	Türk Hava Yollari	Tourism
52	Usaş	Tourism
53	Uzel Makina	Industry
53	Vestel	Industry
54	Zorlu Enerji	Industry