MANAGING FOREIGN EXCHANGE RISK WITH DERIVATIVES AND IMPLEMENTATION OF CORPORATE HEDGING FOR THE SME'S IN TURKEY

ÇAĞRI MOLLAOĞLU
106664041

İSTANBUL BİLGİ ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
ULUSLARARASI FİNANS YÜKSEK LİSANS PROGRAMI

Supervised by:
Dr. ENGİN KURUN
2011

MANAGING FOREIGN EXCHANGE RISK WITH DERIVATIVES AND
IMPLEMENTATION OF CORPORATE HEDGING FOR THE SME'S IN
TURKEY

TÜREV ÜRÜNLERLE DÖVİZ RİSKİ YÖNETİMİ VE
KÜÇÜK VE ORTA ÖLÇEKLİ İŞLETMELERDE KURUMSAL
KORUNMA YÖNTEMLERİNİN UYGULANMASI

ÇAĞRI MOLLAOĞLU
106664041

Dr. Engin Kurun	:	....
Prof. Dr. Oral Erdoğan	:	....
Kenan Tata	:	....
Tezin Onaylandığı Tarihi	:	....
Toplam Sayfa Sayısı	:	....

Anahtar Kelimeler (Türkçe)
1) Türev ürünler
2) Döviz kuru riski
3) Korunma
4) Döviz kuru opsiyon stratejileri
5) Kobiler

Anahtar Kelimeler (İngilizce)
1) Derivatives
2) Foreign exchange risk
3) Hedging
4) FX option strategies
5) SMEs

MANAGING FOREIGN EXCHANGE RISK WITH DERIVATIVES AND IMPLEMENTATION OF CORPORATE HEDGING FOR THE SME'S IN TURKEY

TÜREV ÜRÜNLERLE DÖVİZ RİSKİ YÖNETİMİ VE KÜÇÜK VE ORTA ÖLÇEKLİ İŞLETMELERDE KURUMSAL KORUNMA YÖNTEMLERİNİN UYGULANMASI

ÇAĞRI MOLLAOĞLU
106664041

Dr. Engin Kurun	:	
Prof. Dr. Oral Erdoğan	:	
Kenan Tata	:	

Tezin Onaylandığı Tarihi   :

Toplam Sayfa Sayısı   :

Anahtar Kelimeler (Türkçe)	Anahtar Kelimeler (İngilizce)
1) Türev ürünler	1) Derivatives
2) Döviz kuru riski	2) Foreign exchange risk
3) Korunma	3) Hedging
4) Döviz kuru opsiyon stratejileri	4) FX option strategies
5) Kobiler	5) SMEs

ABSTRACT

In this study; risk, risk management, exchange risk, derivative types that are known and used in practice and theory while hedging and their strategies are explained.

As all around the world, in Turkey Sme's make up the most of the enterprises. However they are not in the direct proportion effect to their volumes regarding risk management and use of derivatives. The goal of this study is to bring in perspective for Sme's in regards of risk management and derivatives and show them that the exchange risk is manageable.

In practice, in risk management sense value-at-risk of an export company has been calculated by approaching the portfolio of it that has been exposed to an exchange risk. Value-at-risk shows how much capital at least an enterprise should have against the risk its the porfolio has. The ratio that is obtained by calculated value being divided into portfolio value is an indicator which enables you to make a decision. In this study value-at-risk has been calculated by Parametric VAR method.

Protection with derivatives does not mean gaining profit but insuring the potential loss. With this perspective, with the premiums that make up the basic logic of options and zero cost collar products limitless loss has been prevented. Each product has both advantages and disadvantages. However it has been concluded that zero cost collar is the most reasonable one for the smes amongst the three methods that are applied.

Keywords: Derivatives, Foreign Exchange Risk, Hedging, FX option strategies, SMEs

ÖZET

Bu çalışmada, öncelikle risk, risk yönetimi, kur riski, kur riskinden korunurken teoride ve pratikte en çok bilinen ve kullanılan türev ürün çeşitleri ve stratejileri açıklanmıştır.

Dünyada olduğu gibi Türkiye'de de işletmelerin büyük çoğunluğunu kobi'ler oluşturmaktadır. Ancak risk yönetimi ve türev ürünlerin kullanımı konusunda hacimleri ile doğru orantılı etkiye sahip değillerdir. Bu çalışmanın amacı, kobi'lere, risk yönetimi ve türev ürünlere yönelik bakış açısı kazandırmak ve kur riskinin yönetilebilir olduğunu göstermektir.

Uygulamada, risk yönetimi anlamında; ihracat yapan bir firmanın kur riskine maruz portföyü ele alınarak Value at Risk'i hesaplanmıştır. Value at Risk, işletmenin elinde bulundurduğu portföyün taşıdığı risk karşısında en az ne kadar sermaye bulundurması gerektiğini gösterir. Hesaplanan değerin, portföy değerine bölünmesiyle elde edilen oran firma için karar aldırıcı bir göstergedir. Bu çalışmada Value at Risk, Parametric VAR yöntemiyle hesaplanmıştır.

İşletmenin maruz kaldığı kur riskine yönelik uygulamada; Futures, options türev ürünleri ve zero cost collar opsiyon stratejisi ile yapılan hedging işlemi vade, kur, alınan pozisyon stratejisi, volatilite ve prim bazında irdelenmiştir. Türev ürünlerle korunmanın anlamı kar elde etmek değil, potansiyel zararın sigortalanmasıdır. Bu bakış açısıyla, options ve zero cost collar ürünlerinin temel mantığını ve korunmanın maliyetini oluşturan primlerle, sınırsız zararın önüne geçilmiştir. Her ürünün kendi içerisinde avantaj ve dezavantajları bulunmaktadır. Ancak portföye uygulanan üç ürün arasında kobiler için en makul olanın bir opsiyon stratejisi olan zero cost collar olduğu sonucuna ulaşılmıştır.

Anahtar Kelimeler: Türev Ürünler, Döviz Kuru Riski, Korunma, Döviz Kuru Opsiyon Stratejileri, Kobiler

ACKNOWLEDGEMENT

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

FX   :   Foreign Exchange

CMB   :   Capital Markets Board of Turkey

ISE   :   Istanbul Stock Exchange

OTC   :   Over-the-Counter

PPP   :   Purchasing Power Parity

SME   :   Small and Medium Sized Enterprises

TURKDEX :   Turkish Derivatives Exchange

VAR   :   Value at Risk

EU   :   European Union

TABLE OF CONTENTS

1. INTRODUCTION

In 1972 by having eliminated a fixed exchange rate system called Bretton Woods, exchange rates have been started to be determined by the market. Exchange rate risk management and derivatives concepts that developed in 80s were recognized in Turkey after February 2001 crisis by having shifted to flexable exchange rate. With the impact of globalization, it became inevitable for finance and real sector companies to estimate their FX risks and have them under control. Derivatives that is used intensively in developed countries by big companies and SME's.

Sme's make up 95% of the enterprises in Turkey. Companies that export is approximately 50.000. Sme's make up 98% of these companies as well. Although derivatives has increased in the last ten years, as from 1998 Derivatives/Total Asset average of developed countries is fifteen times more than Turkey. Accordingly it is seen that companies maintain their activities by being exposed to exchange rate risk. It is important that the Sme's playing an important role in developing based on the export to manage the exchange risks.

Today, we live in a world where the effects of the incidents go beyond the borders of the countries. In implementation, it is aimed that an awareness should be raised on this issue. With this purpose in mind the path and vision a company that exports should be created for risk management and hedging the exchange risk. Results have been evaluated with their advantages and disadvantages.

Companies can decrease their hedging costs by evaluating the current conjuncture and turning to the instruments that they pay less premium for. According to Allayannis and Ihrig (1999) sectors in which the competition is high are exposed to the Exchange rate risk more. Because they cannot reflect their hedging costs to their prices. However these companies are more interested in derivatives when compared to companies in oligopoly sectors.

Final purpose of the companies is to gain profit. They gain this profit as a result of its sales. In order for the companies to make sale they should have good competitive capacity, they should determine their price policy clearly and take their liquidity under control. Hence companies should determine a risk management strategy. According to Charles W. Smithson and Clifford W. Smith (1990) a company should answer two questions when it decides to apply a risk management strategy.

1- Which risks does my company is exposed to?

2- Will risk management strategy increase the value of my company?

Froot,Scharfstein and Stein (1994) says that the main aim of a risk management programme is making investments for value-enhancing therefore a company should be ensure that have the cash available. Basicly risk management can be investigate under two questions. First question is; Which risks should be hedged or not hedged? Second question is; What kinds of instruments and strategies are suitable for company structure?

Risk management is very important that can not handed off to the ordinary financial staff authority. That approach can cause to reduce overall corporate value. To make a good investment devising a risk management strategy is critical for achieve the goals of company.

Modigliani and Miller (1958) on the other hand say that if risk management policies increase the value of a company, these policies should decrease the transaction costs and transaction taxes or increase the investment profits.

It is certain that Sme's in Turkey have little knowledge about derivatives and hedging is not yet adopted. Marshall Blake and Nelda A. Mahady (1991) observed that contrary to the corporate big companies, Sme's have less knowledge about derivatives and generally decisions are made according to just one person's opinions. They say that there is horizontal hierarchy and there are discussion in the world on this issue.

Black and Scholes (1973) proved that a call option could be duplicated by forward contracts and risk-free securities which form a continuously adjusting portfolio of two securities.

John J. Pringle and Robert A. Connolly (1993) argued that there is a kind of foreign exchange risk infact. It is economic exposure. It emerges when changes in foreign exchange rate affect the cash flows. ''Relative price levels'' between two countries change and this change is not balanced by ''nominal exchange rate'', so ''real exchange rate'' changes as well.

It sees translation exposure as the attemp of account system to predict the economic exposure on composed datas. The most crucial mistake that is made is acting upon historical data.

Transaction exposure emerges as a result of the cost change of price that is stable for a period depending on exchange rates so it is not different that economic exposure.

Nguyen and Faff (2003) argued about two factors which are leverage and firm size are helps to persuade a firm to make use of financial derivatives. Logically, it is worth to hedging financial distress costs to get rid of costs such as foreign exchange, interest rate, commodity and so on. In addition derivative activities are more attractive for larger size firms. Therefore they can achieve synergies with using relative type of instruments.

The rest of this paper is organized as follows; in second section basic concepts such as risk managenent, reasons of being exposed to a exchange risk, history of derivatives, its features, types and hedging strategies are explained. In third section Sme and Basel II are defined and how Basel II will affect Sme's, development of derivatives in the world with the reports that have been published and comparison with Turkey are carried out. In fourth section by calculating the Value at risk of an export company that has been exposed to exchange rate risk, hedging with futures, options and zero cost collar options; a perspective for derivatives and risk management concepts have been tried to be gained. In fifth section result and comments are written.

2. GENERAL REVIEW OF RISK CONCEPT AND HEDGING WITH DERIVATIVES

2.1. Risk

Measuring the possibility of losses by the mathematical and statistical methods that can occur at anytime in the future.

It is a fact that can be managed.Fundemental components of risk are; possibility of emergence and in case of its emergence how and to what extent it affects the result. However, it is wrong to think that risk is a notion which only has negative effects. Risk should be considered as an opportunity to gain profit, a systematic effort should be made to turn risk into an opportunity.

2.2. Risk management

Risk management is a process which covers all the stages from the opinion stage to the stage where it can be presented to the customer as a product.

- to prepare plans that prevent losses,
- to use a measuring method to prevent losses,
- to form an information system for the senior management
- to form the systems that require making quick decisions and indicate which risks should be managed primarily.

Risk management enables the company to take risks it can handle, so the company will grow as much as possible. Risk management maximizes the optimist risk while it minimizes the negative risk.

In order to form risk management in companies; the following structures should be formed;

1. Organizational structure of risk management
2. Capital allocation
3. Corporate-wide risk management

4. Credit risk management

5. Market risk management

6. Assets and liabilities risk management

7. Operational risk management

8. Business continuity management

9. Risk systems and technology substructure

2.3. Why risk management should be used?

Nowadays, world economies have become risky and competition between companies is increasing as a result of globalization. So this situation causes to get round crisis easily.

Risk management can provide to companies to take on debt in suitable conditions . Also goverments study on lots of convenience by legal regulations especially in emerging markets. So companies can obtain tax advantages and suply its increasing capital needs.

Companies in Turkey generally face the risks are interest rate risk, credit risk, liquidity risk, foreign exchange risk and operational risk.

2.4. Relation between foreign exchange, foreign exchange rate and foreign exchange market

In general use, currency of foreign countries is called ''foreign exchange''. However, technically cash money is called ''effective'', others that can be converted into cash (bank transfer, payment order, foreign exchange policy, certificates of deposit, traveller's cheque etc.) are called ''foreign exchange''.

People resident or not resident in Turkey can transact on foreign exchange and Turkish Lira. People are free to have foreign exchange and source of this foreign exchange cannot be questioned. So the following establishments can make transactions with each other freely on foreign exchange;

- Real persons,

- Corporations,

- Banks

- Authorized establishments,

- Private finance constitutions,

- Precious mine mediators and companies.

Foreign exchange rate is the price of a foreign country's currency in terms of the home country's currency and this price changes according to supply and demand.

Today, foreign exchange markets are not active in physical places, it is a market connected to each other with an electronic connection network and composed of participants that are active from their work places. In foreign exchange market, participants usually get in touch with each other by means of telephones or computers, so they can contact the participant immediately who gives the optimum price and then the transaction begins.

In this market, foreign currency supply and demand can be provided, a domestic currency can be converted into another one. Members of the market are; banks, financial institutions, exporters and importers, companies, public institutions and central banks.

Organized markets are located in this system that is generally called foreign exchange market. For instance; in our country there is an interbank foreign exchange market which the banks formed and in addition to this, within the scope of central bank there is a foreign exchange and effective market. Establishment reason of this market is to arrange interbank foreign exchange and effective transactions, to enable foreign exchange and effective sources in a bank system to be used in a productive way.

By forming this system, central bank mediates foreign exchange and effective trade in a safe system. Through the above mentioned markets, a fund flow has become faster from the units with surplus foreign exchange to the economic units with foreign exchange deficit and exchange rates are enabled to be determined at market conditions.

Private finance institutions and authorized institutions can make transactions in the foreign exchange and effective markets within the scope of central bank.

2.5. Factors and theorems that affect the exchange rate

There are several theorems which affect the exchange rate. The most important of these are; a. balance of international payments b. interest rate parity theorem c. fisher effect d. international fisher effect.

2.5.1. Balance of international payments

Doğukanlı states that (2001), if the export rate of a country is higher than its import rate, then there will be a surplus in foreign trade balance. In this case, since the foreigners will make the payment in that country's national currency to buy their goods, demand for that country's national currency will increase and gains value in foreign exchange market. If a country's import rate is higher than its export rate, demand for that country's national currency in foreign exchange market will be higher than its presentment, thus national currency of that country is devalued. Relationship between foreign exchange rate and balance of payments can be shown with the model below.

$\text{Balance of Payments} = (X - M) + (CI - CO) + XR\Delta$

X; export of goods and service,

M; import of goods and service,

CI; capital inflow,

CO; capital outflow,

XR Δ; change in the official reserves.

2.5.2. Interest rate parity theorem

According to Baker (1998), interest rate parity analyses the relationship between spot and forward exchange rate and interest rate. According to interest rate parity, in forward market, currency of the country

with a low interest rate is at a premium in the amount of this difference against the currency of the country with a high interest rate. Currency of the country with a high interest rate is exposed to a discount in the amount of interest difference.

According this theorem, exchange rates balance themselves in such a manner that an investor invests in risk free rate of a country and drives as same as profit of the investment in interest rates of other countries.

This theorem is used in the pricing of the forward contracts:

$$F = S * \frac{(1+r_d)}{(1+r_f)}$$

F: Future Exchange Rate

S: Spot Exchange Rate

r_d: Domestic Interest Rate

r_f: Foreign Interest Rate

2.5.3. Fisher effect

There is a special relationship between Purchasing Power Parity Theory and Interest Rate Parity Theory. Source of this relationship is the relationship between inflation rate and interest rate. According to the analysis of Irwing Fisher; nominal interest rate is subject to two elements. These are real interest rate and expected inflation rate. Mathematically this relationship can be explained as follows;

$$(1 + r_n) = (1 + r^*)[1 + E(I)]$$

r_n : Nominal Interest Rate

r^* : Real Interest Rate

E(I) : Expected Inflation Rate

2.5.4. International fisher effect

Increase in the inflation rate of a country compared to another country means that country's currency is devalued against the other

country's currency. In other words, currency of the countries with a low interest rate will gain value and others will devalue.

There are several factors which take place in and form the basis of mentioned theorem affect the exchange rate. The most important of these are; a. inflation b. real interest c. growth d. speculation.

2.5.5. Impact of inflation

According to Çepni (2003), one of the most important factors that affects the exchange rate is differences in country's inflation rate. Supposing that inflation rate of England is lower than the inflation rate of the United States of America. This means; English goods have become relatively cheaper comparing to the American goods. Therefore Americans demand for English goods increases so demand for English currency increases as well.

According to the law of demand which is the fundamental law of economy; assuming that other conditions do not change (ceteris paribus), if the demand for a good increases, accordingly price of a good increases as well. In our example; since the exchange rate is the price of British currency in terms of dollar; the exchange rate will increase. The exchange rate which we initially assumed as 1£=2$ will increase to 1£=3$.

Americans have to pay more dollars in order to receive 1£. Thus, the currency of the country with a higher inflation rate decreases in value against the other country's currency.

Although there is a fixed exchange rate system, the country with a higher inflation rate has to devalue its currency. Suppose that there is a fixed exchange rate system in Turkey and 1$=2.5 TL. Let's say price of 1 kg potatoes is 2.5 TL. An American can buy 1 kg potatoes when he pays 1 $. However, if there occurs a period with high inflation rate and price of 1 kg potatoes increase to 5 TL (100% inflation), in this case since the exchange rate is fixed (1$=2.5 TL) an American will be able to buy only half kg of potatoes when he pays 1$. Whereas an American is interested in his own purchasing power not in inflation problem of Turkey. In order for Turkey to

sell as much potatoes as before, it has to devalue its national currency against dollar equating it to the minimum inflation.

If the government makes 100% devaluation and announces the new exchange rate as 1$=5 TL then the problem will be solved. Then an American can buy 1 kg of potatoes at 1$.

Therefore whether an exchange rate is fixed or volatile, inflation rate of the companies are one of the most important factors that affects the exchange rate.

2.5.6. Real interest rate

Real interest rate indicates the premiums and losses of the investment after deducting the impact of inflation.

When making an investment decision , real interest is taken into account, not nominal interest. If the nominal interest in England is 10% and in the United States 20%, this does not give us any idea about which country is more adventageous in terms of investment. Even if the interest seems high in the United States, you need to know the inflation rates in order to make a final decision. If the inflation is 5% in England and 20% in the United States, investors will prefer England since there will be positive real interest.

Since the real interest is higher in England comparing to the United States, investments will be inclined to England so Americans demand for pound will increase and the English presentment for pound will decrease. In any case, pound will gain value and dollar will decrease in value.

2.5.7. Growth

At first, one might think that a country's currency with a higher growth rate need to gain value however, a country with a better growth performance increases its production and income. As a result of imported goods used in production and income growth, demand for imported goods increase so demand for foreign country's goods and currency increases. An entity with an increased demand gains value.

While England grows 1%, if the United States grow 10% , Americans demand for English goods will increase so their demand for English currency will increase accordingly.

Impact of speculation on foreign currency will be in this way: if people believe that dollar will gain value, the demand for it will increase so its price will start to increase as well.

If everyone in Turkey believes that dollar will gain value, it will gain value in this case even if it won't. Everyone would demand for dollar and avoid TL (assuming that the other factors stay the same) so the price of dollar will increase.

2.5.8. Purchasing power parity

According to Officer (1976), PPP theory is the oldest and simplest theory about foreign exchange rate. This theory was first suggested by Gustav Cassel and tested empirically. Theory is based on the fact that the currency of different countries should have the same or similar purchasing power. PPP is described as the value of the currency in terms of goods and services. According to PPP theory; changes in the prices of goods and services also change the value of the currency. Thus, foreign exchange rate is described as the relative price of the currency of two countries.

In PPP theory, relationship between foreign exchange rate and price is explained in two different ways: absolute and relative.

Absolute PPP indicates that general price level rate of two countries is equal to the foreign exchange rate between these two countries, on the other hand relative PPP indicates that changes in the foreign exchange rate are affected by the relative price movements.

Vergil and Özkan (1997) contend that in the PPP applications, since there is no common index in the countries where homogenous goods are bought at an equal weight generally Consumer Price Index is used as a price level related to domestic and foreign countries. In order for absolute PPP to determine the equilibrium exchange rate correctly, same products of the two countries need to be of the same weight which is impossible so absolute PPP

is then disfunctionable. In the relative PPP theory, since relationship between the foreign exchange rate and prices are modelled with relative prices (inflation rate) as a result of empirical studies; relative PPP, under specific conditions like inflation-even there is high rate of financial growth and rare presentment shocks can substantially explain the changes in the exchange rate.

2.6. Foreign exchange rate risk and reasons for being exposed to an foreign exchange rate risk

Risks that the companies have against exchange rate fluctuations on foreign exchange items. In order to eliminate the exchange rate risk generally can be used swap, forward, futures, option and exotic options. Protection against exchange rate risk can be obtained by following the foreign exchange position regularly.

Today, exchange rate management, by getting out of the control of accounting department, has become a subject that should be evaluated with all units of the enterprise.

There are three reasons for being exposed to an exchange rate.

2.6.1. Economic risk (Economic exposure)

Economic risk is real however, its evaluation is very difficult. Enterprises are exposed to economic risk as a result of the risks they are exposed to in their business field and the changes in cash flow. When we say enterprise activity, products that we produce or the products that we trade come to our minds. Prices of these products are determined by inflation, interest, transportation cost, raw material prices, tax regulations that are made by the goverment, etc.

Nazlı (2006) emphasizes that it indicates the total exchange rate risk on the cash flow of a company whether it is dependent on contracts or not. Changes in the exchange rate reveal itself in a short time in company's liquidity position and in long term in companies all transactions, financial structure and profitability.

Campbell and Kracaw (1993) rephrase that economic risk is related to the effect of real changes in exchange rate on cash flow and this emerges with the change of purchasing power parity in the country.

Purchasing power parity is the thought that there is one valid price in case of a value of the good is evaluated in terms of same currency unit worldwide. This is also called "law of one price''.

Purchasing power parity is evaluated in two ways:

a)   Absolute purchasing power parity: If we have up-to-date exchange rate when we divide the sum of a product basket (same products) in two countries then it means the absolute purchasing power parity is sustained.

b)   Relative purchasing power parity: Some products are available in one country but not in another. Thus they cannot be compared.

2.6.2. Transaction risk (Transaction exposure)

It is the change in the national currency as a result of exchange rate changes of a forward commercial or financial transaction made with a foreign exchange.

The most well-known ways of hedging this risk are forward,futures, option and swaps. However, there might me profits or losses arising from these transactions. Purpose of using these instruments is to reduce uncertainity to a minimum level and eliminate the additional profit or loss.

2.6.3. Accounting risk (Translation exposure)

It is the risk that emerges during exchanging the cash flows obtained from currency units of other countries, statements, recognition of profits and losses by converting into national currency.

Accounting risk does not provide us a forecast for future. It only shows us what we gained and lost in the past.

2.7. Hedging

Hedging is the securing of the investment against reverse price movements by using the tool in the financial markets correctly with the aim of protection from investment risk. Investor, with the aim of decreasing the possible risks to a certain value, might buy forward contract with the help of forward contracts by taking a long position and expecting a price increase or sell a forward contract by taking a short position and expecting a price decrease.

2.8. Description and history of derivatives

2.8.1. Description and advantages of derivatives

We can describe the derivative instruments as follows:
- A new financial instrument that is derived from more than one traditional product,
- It is dependent on the traditional financial products it includes with a specific formula,
- They are instruments that obtain their value from the price change of the aforementioned financial instrument,
- Without making an investment in the amount of the capital, it can create positions that gain profit or make loss from the price change in the capital,
- Since it provides leverage advantage, in international markets transaction volumes of derivative transactions are much higher than the spot volume of the instruments,
- By combining derivatives with standard ones, endless combinations can be reached in terms of product variety.

Although derivatives do not have any value alone, we can list their advantages as follows:
- Protection against price fluctuations by gaining their value from another esteem,
- Decreasing the loan cost,

- Increasing the net cash flow of the companies.

2.8.2. History of derivatives

First records related to the usage of derivatives can be found in the writings of Greek philopsopher Aristotle (384 BC-322 BC). In that writing, predicting Thales' olive crop, he made the first known option contract with the farmers 2500 years ago and gained great profit. According to Aristotle , Thales predicted that the olive crop would be much better compared to the previous years. Accordingly, he made a deal with the olive oil producers in return for a little deposit to use their ateliers during harvest. During harvest, olive oil producers had to turn to Thales concerning the usage of their ateliers to farm the crops because during harvest, Thales had the usage right. He leased that usage right at a high price. Aristotle wrote with the help of a philospher poorer than Miletus how he became rich easily. If the crop had been low during harvest , Thales would have made a loss in the amount of the deposit he paid and then it would not have made any sense using the ateliers that he leased.

Forward contracts were first formed in 12th century in Europe among traders with the development of trade and called letter of the fair. First proofs belonging to the futures transactions came from Japan. During that era, feudal Japanese landowners transferred the extra rice they had to the warehouses in the city and with the printed tickets they confirmed the future delivery of the rice. Those tickets guaranteed the right of receiving the rice with the preconcerted quality at a determined price. Those tickets were dealt in the Dojima rice market near Osaka in 1730. Transaction rules in Dojima market are similar to the ones in today's modern futures stock-exchange.

Since the monetary system could not meet the requirements of the rapidly developing economies, countries made decisions which destroyed the system, people tried to sustain the fixed exchange rate system by various decisions and meetings, the fixed exchange rate system that was called Bretten Woods in its last period was eliminated in 1972. From that date,

exchange ratios of the countries' currency has been determined by the market under the market conditions. Exchange ratios in short term determined by capital movements and in long term determined by purchasing power parity were exposed to great speculative movements and decisions that tried to avoid that movement. After that date, especially in, outward-oriented economies, exchange rate- a significant cost element- has become an element which should be considered carefully by decision maker units. Likewise, both foreign trade companies and other units that carried foreign exchange position faced significant risks as a result of exchange rate movement. During that period, interest rates showing great fluctuations emerged as a risk element.

Especially in 1980s and after, derivatives markets in accordance with increased demand showed great improvements as a tool and transaction volume.

Bolgün and Akçay (2005) states that Turkish finance sector's meeting with derivatives happened in 1980s. The first product type that became a current issue in this respect is the forward technique which could not gain wide currency. It is known that developed risk management tools like futures and option were used by ''Tahtakale'' and '' Kapalıçarşı'' before our banks. In 1992, attempt of founding İzmir TURKDEX and regulations that were formed initially by CMB of Turkey were cornerstones for the improvement of financial markets. Derivatives that began trading within ISE in 2001 could not lead the development of organized derivatives market as a result of financial crisis. However, with the opening of TURKDEX in 2005, Turkey had an organized derivatives exchange.

2.9. Characteristics of derivatives

Derivatives markets are used within three principal purposes; hedging, arbitraging and speculating.

2.9.1. Hedging

Derivatives provide hedger a chance to set either a maximum buying price or minimum selling price in the future. Derivatives are a useful tool for hedger because allow hedgers to know in advance at what price they will buy or sell. This allows the hedgers to plan their returns and costs.

2.9.2. Arbitraging

Arbitrage is a transaction that making profit in different markets by differences between prices of similar financial instruments.

2.9.3. Speculating

Speculator profits by buying options for a low premium and selling them for a high premium. As compare to future contract, the risk of options is limited for speculator because the maximum amount they can lose is equal to the premium. Speculators give liquidity to a market.

2.10. Classification of derivatives

Derivatives are usually broadly categorised by:

1) The relationship between the underlying and the derivative. (E.g. forward, option, swap)

   a) First Generation derivatives based on linear mathematics; forward,future,swap.

   b) Second Generation derivatives based on non-linear mathematics and probability theory; options, credit derivatives.

   c) Third Generation derivatives are hybrid products that combination of more than one traditional or derivative instruments. (E.g. investment products with capital guarantee, credit baskets, dual currency deposit)

2) The type of underlying (e.g. freight derivatives based on Baltic Exchange shipping indices), equity derivatives, foreign exchange derivatives, interest rate derivative, and credit derivatives)

3) The market in which they trade (e.g. exchange traded or over-the-counter)

   a) Organized Exchange; a securities market place wherein purchasers and sellers regularly gather to trade securities according to the formal rules adopted by the exchange.

   b) Over the counter markets; markets which are not organized and gathered under a certain structure. Transactions are carried out through agreements between parties.

2.11.   Foreign exchange derivatives

2.11.1. Forwards

A forward contract is signed by the buyer and the seller and includes delivery of an entity at a certain date in future at a price determined before.

If domestic exchange rate is higher than foreign exchange rate, then foreign country's currency will be at a premium in forward market. If domestic exchange rate is lower than foreign exchange rate, then foreign country's currency will be discounted in forward market. Following formula is used to calculate forward exchange rate:

$$F = S * \frac{1 + r * (T - t)}{1 + r_f * (T - t)}$$

F: Forward price
S: Spot price
r: Domestic interest rate
r_f: Foreign interest rate
T-t: Time to maturity

Example;

$/TL spot rate   : 1,4770

TL interest rate   : % 7,70

USD interest rate   : % 0,22

Forward contract duration   : 90 days

$$F = 1,4770 * \frac{1 + 0,077 * (90/360)}{1 + 0,0022 * (90/360)}$$

$$F = 1,5046$$

2.11.2. Futures

A futures contract includes the standard time and amount, is traded in organized stock-exchanges and dependent on daily equilibration procedure. In the daily equilibration, in every trading day, the losing party has to make payment to the other party.

Futures contracts have two important advantages. These are trading speed and liquidity. A futures contract can be easily changed between parties and traded in huge amounts without affecting the price.

An investor does not necessarily need to have the assets within the scope of those contracts to buy a futures contract.

There are two parties in a futures contract; a buyer and a seller. Generally, seller is known as having a short and buyer having a long position.

Futures contracts are classified in two groups; merchandise futures contracts and financial futures contracts.

Forward markets form the basis of financial markets. Futures markets were evolved out of forward markets. Thus, they have many things in common. For instance; they are both contracts related to the purchasing and sales of an entity at a certain date and price. The differences between them are;

1- Contract Amount

Futures: Futures contracts have standard amounts.

Forward: Forward contracts' amount is determined after individual negotiations.

2- Organization

Futures: Futures contracts are traded in well-organized and rule-bound official stock-exchanges.

Forward: Forward contracts are individual and transactions are performed by banks and financial institutions.

3- Delivery

Futures: Futures contracts can be delivered at maturity (expiry), instead of this they can be traded as well. Delivery is not the purpose in futures contracts.

Forward: Forward contracts need to be delivered at maturity. Here, delivery is the purpose.

4- Date and procedure of delivery

Futures: In Futures contracts, there are certain delivery dates. Delivery takes place at certain places.

Forward: Delivery of forward contracts take place at a certain date and place that is determined by both parties.

5- Price volatility

Futures: Price is same for every participant regardless of transaction volume

Forward: Prices might change as a result of credit risk, transaction volume.

6- Pricing

Futures: Price are determined by market powers.

Forward: Prices are determined by negotiations with banks.

7- Transaction method

Futures: Transactions are carried out in session rooms of stock-exchange

Forward: Transactions are carried out among individual buyers and sellers by using telephone,fax,etc.

8- Declaration of prices

Futures: Prices are announced publicly.

Forward: Prices are not announced publicly.

9- Deposit and margins

Futures: Beginning margin and daily equilibration margin are required for futures transactions.

Forward: Mortgage amount in the amount of the loans taken is determined by bargain. No margin is taken for daily price volatility.

10- Barter transaction

Futures: There is a clearing house connected to the stock-exchange. Here transactions like daily arrangements, cash payments and delivery are carried out. Clearing house has a guarantee for non-payments.

Forward: There is no application such as clearing house and no guarantee for risks.

11- Transaction volume

Futures: Information related to transaction volume is published.

Forward: Information related to transaction volume is not easy to determine.

12- Daily price fluctuations

Futures: Maximum price change that can occur in futures prices in just one day is determined by stock-exchanges. If this limit is exceeded, transaction will be stopped. The reason for these limitation to the prices is preventing speculations and panic as a result of great price volatility, avoid huge losses for investors, hauls

Forward: There is no daily price limitation.

13- Market liquidity and easiness of cancelling the position

Futures: As a result of standardized contracts, market liquidity is quite high and closing out a position with other market participants is quite easy.

Forward: As a result of volatile contract periods, market liquidity and easiness of closing out a position is limited. Positions are generally closed out with the actual transaction party, not with other market participants.

14- Credit risk

Futures: Clearing house undertakes credit risk.

Forward: One party has to undertake other's credit risk.

15- Daily cash flow

Futures: In order to decrease the losses arising from financial difficulty and price volatility, clearing house makes daily equilibration by transferring profits and losses arising from price volatility in futures contracts to the losing and winning parties and uses determining daily market system for this.

Forward: No payment is made till the maturity date of the contract.

16- Transmissibility

Futures: Can be bought and sold again till maturity.

Forward: Can not be transferred.

2.11.3. Swap

There are the contracts in accordance with preconcerted formula and maturity providing the cash flow between two or more parties.

Alpan (1999) states that swap means mutual exchange. In swap contracts parties agree to change the income flows of two asset like cash or interest at a specific date in future. Swap transaction is a transaction that creates arbitrage difference between markets and enable parties to change their determined payment schedule.

According to Çonkar and Ata (2002), in swap transactions, goal is to decrease the debt cost, minimize the risks that fluctuations in interest rates and exchanges rate.

2.11.4. Options

An option is a contract that gives a right its buyer against premium, the right to buy or sell an asset on a future date at a preconcerted price.

Options are traded both in over-the-counter markets and organized stock-exchange. There are some differences between these two markets.

- Strike prices, transaction dates, financial amounts, position and transaction limits in stock-exchanges are standard. Options in over-the counter-markets are carried out as mutual agreement.
- Financial amounts of options in over-the-counter markets are higher.

- Foreign currency range traded in over-the-counter market is higher.
- Over-the-counter markets are exposed to risks more than organized stock-exhanges. There is credit risk and there is no clearing house that undertakes the risk.
- Commission for the transactions traded in over-the-counter market is higher.

Table 1: Rights and obligations in call and put option

	CALL	PUT
BUYER	Right to Buy	Right to Sell
SELLER	Obligate to Sell	Obligate to Buy

Source: Nurgül Chambers, "Türev Piyasalar", 2009.

2.11.4.1.   Basic principals of options

There are six factors affecting the option price:
- Price of current equity
- Strike price
- Price volatility of equity
- Risk-free interest rate
- Expected premium during option period

In the money options:

Howcroft and Storey (1989) states that when the strike price in the call options is below the spot rate, in case an option is performed, option buyer can gain profit. In these conditions, purchasing option has the ''in the money'' feature. By applying aforesaid foreign exchange option, buying at a low exchange rate (strike price) and selling immediately at a higher market exchange rate, option buyer makes profit.

At the money options :

Howcroft and Storey (1989) states that when such an option is performed, it does not define the option that a profit or loss is made from and it shows that the strike price is same with the market price. In American type ''at the money'' options, strike price is equal to current market price

and in European type options strike price is equal to forward rate. ''At the money'' options do not have any intrinsic value.

Out of the money options :

If strike price in purchasing option is higher than the market price and in selling option lower than the market price; options have the ''out of the money'' feature and have no intrinsic value.

Exercise date or strike date :

Exercise date is the date in which the option holder can choose to exercise the right to buy or sell

Maturity date :

The date on which the borrower repays the principal amount of the obligation to lenders

Exercise price:

The price at which the underlying security can be purchased (call option) or sold (put option).

Call option:

A call option gives the holder the right -but not the obligation- to buy the underlying currency at a preagreed strike price from the seller and gives full participation in the appreciation of the underlying currency.

Call options are of great importance for the investors who are of the opinion that the price of option topic underlying asset will increase.There are two types of call option transaction.

a) Buy a call option

The figure below shows the profit and the loss an investor makes as a result of buying a call option. According to the figure below, the investor who buys call option may obtain limitless profit and limited loss. The speculator taking that position expects the price to increase. If his expectation becomes true, cost of this position will be equal to the premium amount he has paid.

Figure 1: The profit gained from the buying of a call option (Long position in call option)

Source: www.theoptionsguide.com

b) Write a call option

The figure below shows the profit and the loss that an investor makes as a result of selling a call option. According to the figure, an investor selling a call option expects limitless loss and limited profit. The speculator taking this position expects the prices to decrease. If his expectation becomes true, his profit will be equal to the difference between the premium he has bought initially plus spot price and exercise price.
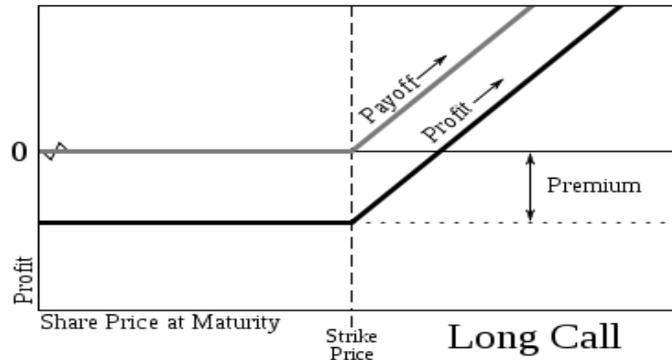
Put option:

A put gives the holder the right – but not the obligation – to sell the underlying currency at a pre-agreed strike price to the seller and gives full participation in the depreciation of the underlying currency.

Figure 2: The profit gained from the sale of a call option (Short position in call option)
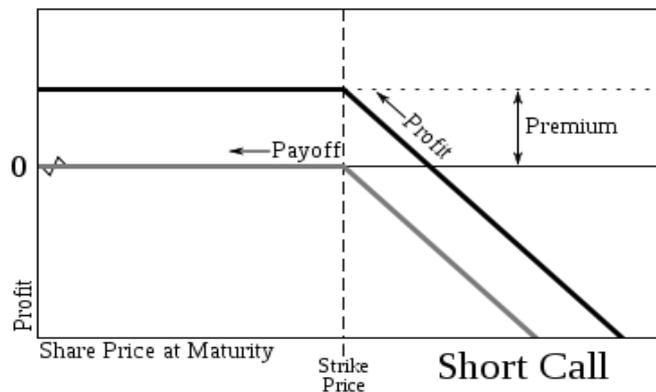
Source: www.theoptionsguide.com

a) Buy a put option

The figure belows shows the profit and loss an investor makes as a result of buying a put option. According to the figure, an investor buying a put option might gain limitless profit and limited loss.

Figure 3: The profit gained from the purchase of a put option (Long position in put option)
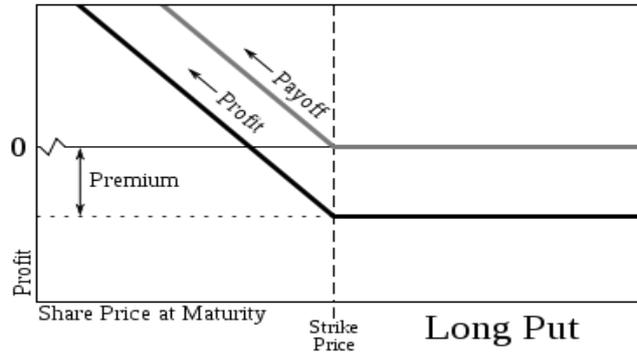
Source: www.theoptionsguide.com

b) Write a put option

The figure below shows the profit and loss an investor makes as a result of selling a put option. If prices increase, the party selling a put option will make profit in the amount of the premium. If prices decrease, the party selling a put option will make a loss.

Figure 4: The profit gained from the sale of put option (Short position in put option)
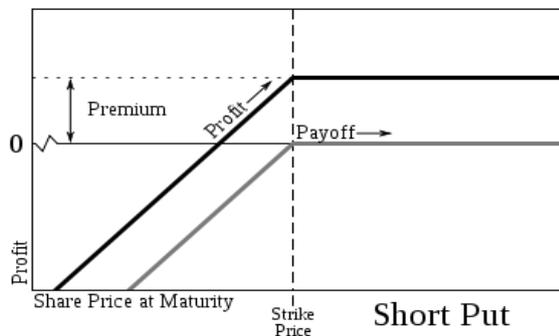
Source: www.theoptionsguide.com

Put/call parity :

      The same underlying asset sets balance between European type call option that has maturity and strike price and put option. This balance is expressed as call-put option parity. This balance enables us to calculate the other one on condition that we know one of the option premiums. If there is no balance then there will be an arbitrage.

$$S + P = \frac{C + X}{(1 + r)^{(T-t)}}$$

C: Call premium   X: Strike price of call and put   T-t: Time to maturity

P: Put premium   r: Annual interest rate   S:Spot price of underlying

      By using this formula, producing call option synthetically is possible, i.e. without buying a put option, put option can be obtained.

$$C = \frac{P + S - X}{(1 + r)^{(T-t)}}$$

      According to this formula, we obtain call option when we make the transactions below;

1) A call option is purchased,
2) Underlying asset is purchased,
3) Treasury bond in the amount of discounted value of strike price is purchased,
4) At the end of these procedures, there will be extra money to buy call option initially.

The value of an option :

      The price paid for an option contract is called option premium. This premium shows the value of the option. Value of the option consists of two parts: ''intrinsic value'' and ''time value''.

$$The\ Value\ of\ an\ Option = Intrinsic\ Value + Time\ Value$$

Intrinsic value develops as a result of price movements of the related underlying asset. Factors that make up the value of an option are underlying asset price, option's strike price and .

The contribution of the options with deep in the money intrinsic value and deep out of the money intrinsic value to the option premium is less than the contribution of at the money options to the time value. Since the premiums of the options with deep in the money intrinsic value is developed on intrinsic value, time value has a small part in time value premium.

At the money options are the options in which every possibility may occur depending on time. Aforementioned option from time to time can be deep out of the money intrinsic value and sometimes deep in the money intrinsic value so the high possibility of the option having deep in the money intrinsic value or deep out of the money intrinsic value contributes more for the increase in the premium.

Factors that make up the **time value** of the option are; transportation cost calculated according to days to maturity and effect of underlying asset price volatility.

The much longer maturity of option, the more fluctuation possibility of underlying asset and moving of option that could return profit and loss will be. Therefore, the seller of the option will demand for an extra premium in order not to make loss from this sale and protect himself, so the price of the option will increase.

As the maturity date of the option comes closer, investors who sell option lose their faith that the risks they take as a result of their tendency to make more sale will not become true so they are more inclined to sell options. In this case, by devaluing the option they want to sell, they would like to sell to the buyer at a more appealing price. Therefore time value of the option decreases rapidly as the maturity date comes closer.

Figure 5: Options' time value and expiration graphic
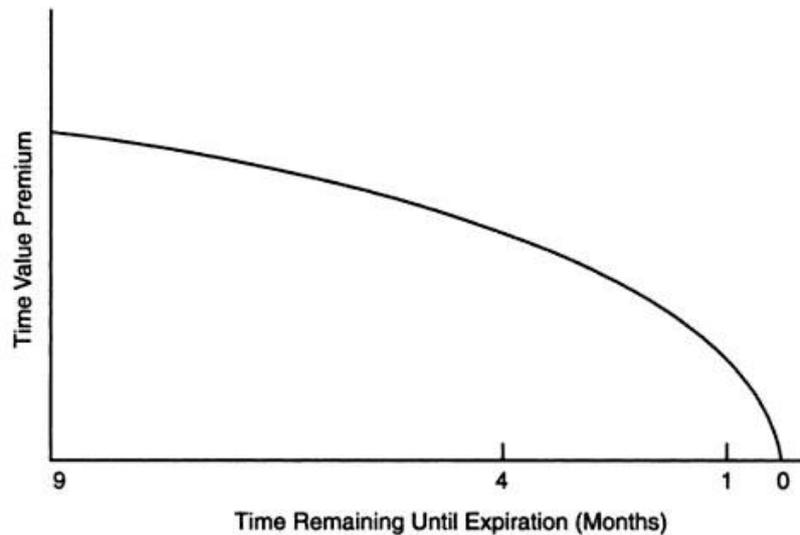
Source: www.optionsuniversity.com

Volatility measures :

In option pricing models, the expected change in the profit of the related entity is crucial in pricing the option. If the expected change is higher, option sellers demand more premium and if the buyer is of the same opinion accepts paying more premium.

Two methods are developed to predict the volatility:

Implied volatility is the volatility value obtained by using the available option prices in the market.

As the underlying asset volatility increases, possibility of underlying asset's prices bringing the option to in the money intrinsic value level increases as well thus as a result of the increase in the volatility, option premium increases whether it is a call or a put option, in case of a decrease, option premium increases.

Market volatility of deep in the money intrinsic value or deep out of the money intrinsic value is higher than at the money options' market volatility.

Historical volatility supposes that changes occurred in the past in the underlying asset prices on which the option is written will be valid in the future.

Historical volatility is simply the annualised standard deviation on the underlying equity return, obtained from daily observations of the return in the past:

$$\sigma_R = \sqrt{J * \frac{1}{n} \sum_{t=1}^{n} (R_t - \bar{R})^2}$$

Here, the factor J represents the number of working days in the year; n is the number of observations and Rt is the return on the underlying equity. It is easy to calculate, but the major problem is that it is always 'turned towards the past' when it really needs to help analyse future developments in the option price.

Sensitivity parameters (Greeks) :

Delta indicates how much an option premium will increase or decrease as a result of a one unit change in the spot price of option's underlying asset.

Gamma indicates change that may occur in option delta as a result of one unit change in the spot price of option's underlying asset. It may be considered as the sensitivity of delta

Vega indicates how much an option premium may change as a result of the 1% change in option's implied volatility.

Theta is determined by Lawrance (1996), which indicates how much an option price will decrease as the maturity date comes one day closer. Since time movement devalues the time value of the option, it is always implied in minus value. As the option maturity day comes closer, theta value increases. As theta increases, cash flow will increase as well.

Rho indicates the amount of change in option premium as a 1% change in the interest rate.

Risk-free interest rate:

Edwards and Ma (1992) explained that in simply meaning, buying of a call option means that underlying asset is bought at lower price than its market value. By paying an option premium, difference between strike price and premium is economized. As the interest rate increases, interest profit gained from this economized amount will increase as well. Therefore when interest rates increase, buying a call option is more advantageous than buying the asset itself. Relationship between put options and interest rates is contrary to call options.

Dividends:

Dividends is a factor that causes the decline of securities. Likewise, it also causes the decline of call option. While the owner of call option expects the price of securities to increase, as a result of dividends the owner of the call has to pay the premium by not using the option in out of the money position. Thus, Chambers (2009) clarify that dividends payments makes buying securities more appealing than buying an option. Since the liquidity of securities owner will increase as a result of dividends payment, this is out of question in options. Regarding put options, this situation is just vice versa. Dividends payment increases the put option value. The effect of each factor that affects the option price can be shown as follows on condition that the other factors stay the same.

Table 2: Comparison of value of call and put options

Price Factors	Value of Call Option	Value of Put Option
1. When the equity price increases	Increases	Decreases
2. When strike price increases	Decreases	Increases
3. When option period extends	Increases	Increases
4. When volatility increases	Increases	Increases
5. When interest rate increases	Increases	Decreases
6. When dividends are paid	Decreases	Increases

Source: Nurgül Chambers, "Türev Piyasalar", 2009.

2.11.4.2. Types of options

A European Option is a contract that can only be exercised at expiry date. An American option is a contract that can be exercised at any time during its life.Exotic options are more complicated than European and American type options and traded in the over-the-counter markets that are drawn for specific needs of institutions.

Below you can find the most used exotic options:

An Asia Option is known also as an Avarage Option. Asia option is a financial contract between the buyer and seller that gives the buyer the right to buy a currency or receive a payment at expiry.

The distinctive characteristic of this contract is that its pay-off is linked to an average rather than an individual spot observation or a strike.The average rate is calculated over the averaging period by including a series of exchange rate fixings with a predetermined periodicity.

A digital option is a contract where the purchaser receives a fixed amount of currency on a specific date if spot is above or below a predefined strike price on that date.

A Digital call is an option that pays the holder a fixed amount at expiry, providing that spot is trading at or above the strike at expiry.

$$S_T \geq K \rightarrow 1$$
$$S_T < K \rightarrow 0$$

Figure 6: An asian option diagram

Source: http://wiki.thetaris.com
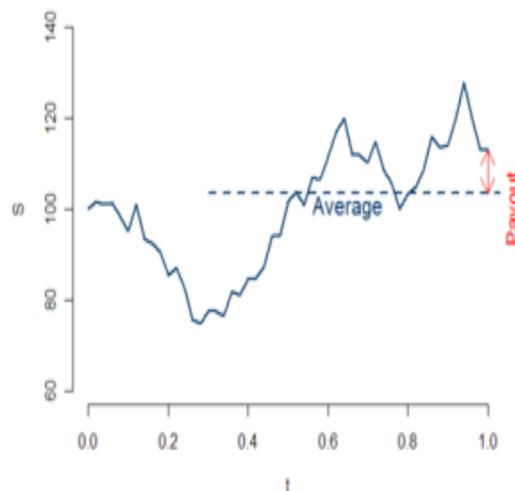
Figure 7: A digital call option

A digital put is an option that pays the holder a fixed amount at expiry, providing that spot is trading at or below the strike at expiry.

$$S_T \leq K \rightarrow 1$$
$$S_T > K \rightarrow 0$$

Figure 8: A digital put option

Barrier options are those products whose pay-off depends on the underlying currency trading at or beyond a predefined level. These options were developed as a way of cheapening vanilla options.

There are two types of barrier option;

1) Knock-out options

   a) Down and out call/put

   Also called knock-out. This is a standart option that is cancelled if spot trades at or beyond a predetermined barrier or knock-out level at any time during the life of the trade. The barrier set below the initial spot for a call option and above for a put option.

   b) Up and out call/put

   Also called reverse knock-out or kick out. A reverse knock-out is a standard option that is cancelled if spot trades at or beyond a predetermined barrier or knock-out level at any time during the life of the option. The barrier is set above the the initial spot for a call option and below for a put option.

Figure 9: A call option with a knock-out barrier
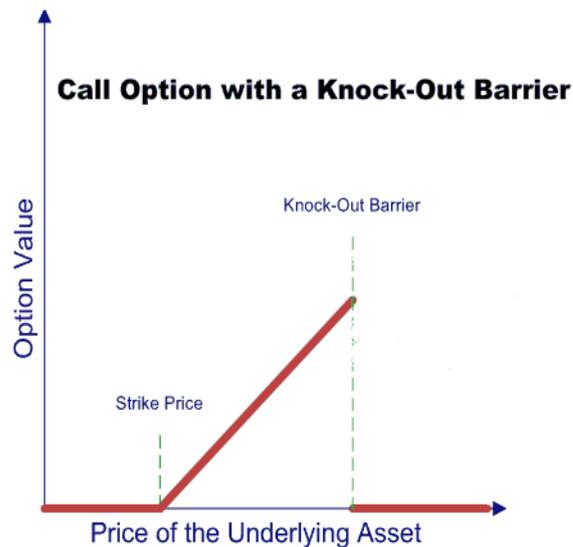
Source: www.thismatter.com

Figure 10: A put option with a knock-out barrier

2) Knock-in options

    a) Down and in call/put

Also called knock-in.This is a standard option that can only be exercised provided that spot has traded at any time at or beyond a predetemined barrier or knock-in level. The barrier is set below the initial spot for a call option and above for a put option.

    b) Up and in call/put

Also called reverse knock-in. A reverse knock-in is a standard option that can only be exercised provided that spot has traded at any time at or beyond a predetermined barrier or knock-in level. The barrier is set above the initial spot for a call option and below for a put option.

    Quanto Options is an option that comprises exchange rate guarantee. There is an exchange rate guarantee situation which equates the currency used for payment and underlying asset that the contract depends on. Therefore, except the underlying asset exchange type, intrinsic value of the option is paid on the other foreign exchange type.Quanto options is a Hybrid over-the-counter instrument. As a result, the person who have the option receives the payment on quanto exchange rate besides having the using the option right.

2.11.4.3. Option Strategies

In Bull Spread Strategy, investor expected the price of the underlying asset will go up in a near time . A Bull call spread can be built by buying an in the money call at strike1, selling higher an out of the money call at strike2 of the same underlying asset and same expiration date.In the call position strike1 < strike2 .

As the strike price increases, price of call option will decrease so value of the put option will be lower than call option. Thus, initial capital is needed in this strategy.

Bull spread can be formed by using put option as well. A Bull put spread can be built by buying an out of the money put at strike1, selling higher an in the money put at strike2 of the same underlying asset and same expiration date.In the call position strike1 < strike2 .

In bull put spread formed by using put option, an initial capital is not needed unlike bull call spread. Because as the strike price increases, price of put option will increase so value of put option will be higher than call option.

Figure 11: A bull call spread formed by using call option
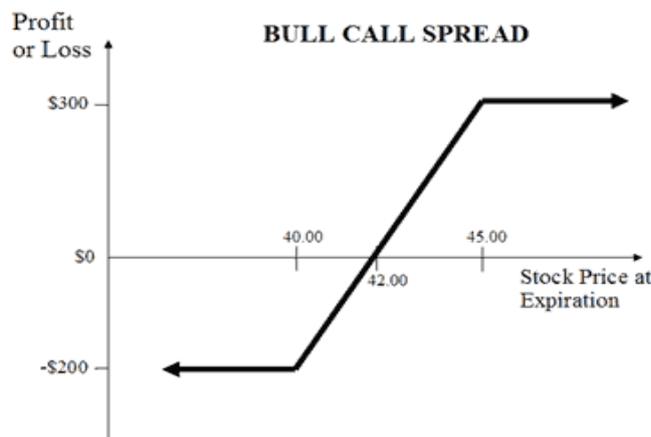
Source: www.theoptionsguide.com

Figure 12: A bull put spread formed by using put option

BULL PUT SPREAD
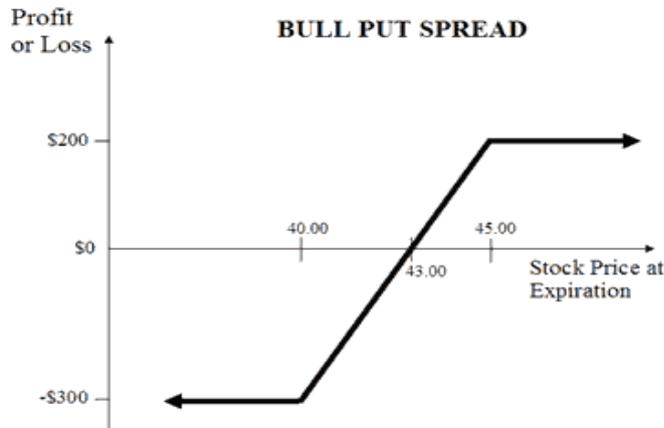
In Bear Spread Strategy, investor expected the price of the underlying asset will go down in a near time. A Bear call spread can be built by buying an out of the money call at strike1, selling an in the money call at strike2 of the same underlying asset and same expiration date.In the call position strike1 > strike2. There is no need to initial capital in this strategy.

Bear spread can be formed by using a put option as well.A Bear put spread can be built by buying an in the money put at strike1, selling an out of the money put at strike2 of the same underlying asset and same expiration date.In the call position strike1 > strike2 .

Figure 13: A bear call strategy
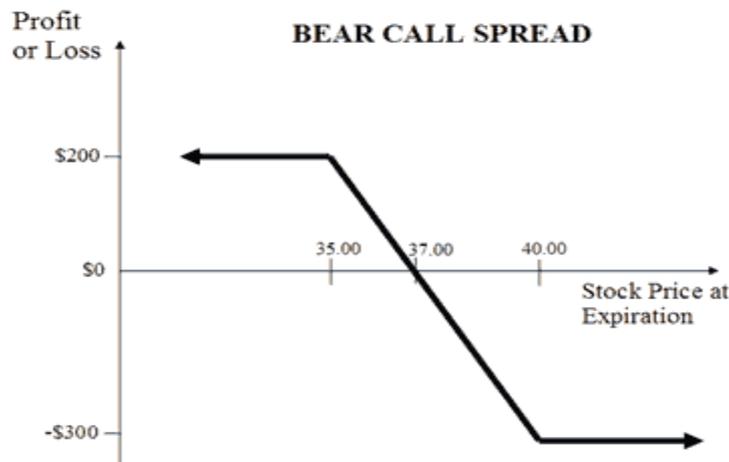
BEAR CALL SPREAD

Figure 14: A bear put strategy
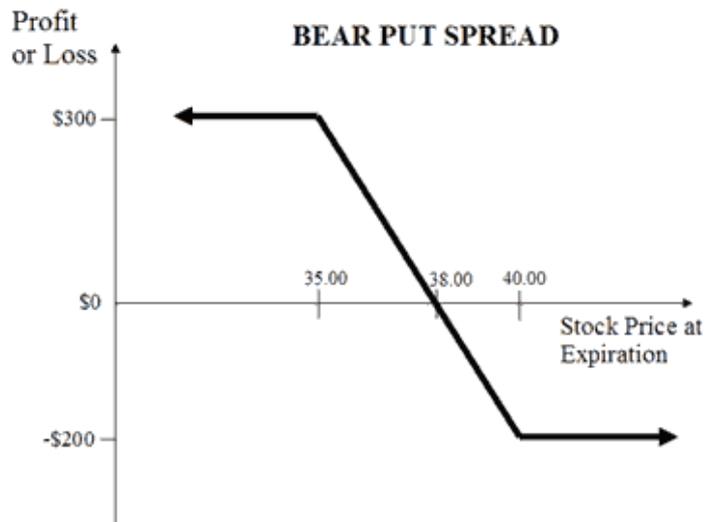
Source: www.theoptionsguide.com

In the bear spread strategy formed by using a put option, initial capital is needed unlike bear call spread.

A butterfly spread is designed for investors who think that spot will remain within a tight range.

A long butterfly can be built by buying an in the money call at strike1, selling an at the money call at strike2 on twice the notional and buying an out of the money call at strike3. In the call position strike1 < strike2 < strike3.

A put butterfly can be built by buying an out of the money put at strike1, selling an at the money put at strike2 on twice the notional and buying an in the money put at at strike3. In the put position strike1<strike2<strike3.

In this strategy, investor will benefit if the exchange rate remains stable and if the volatility goes down. Loss is limited to the premium paid.

The butterfly spread is a strategy that is a combination of a bull spread and a bear spread.

Figure 15: A long butterfly
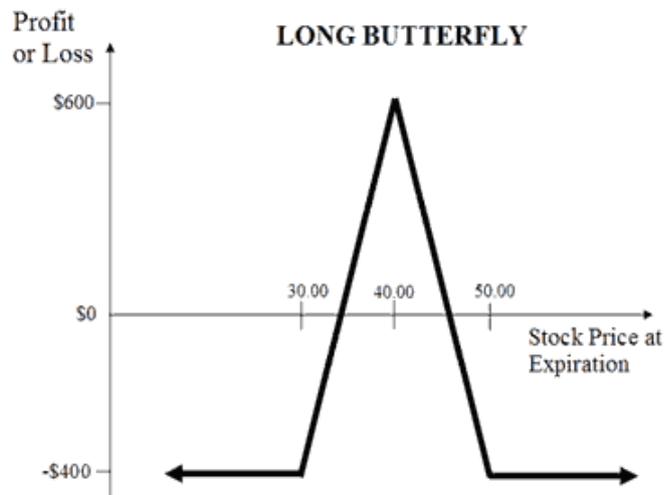
A short butterfly can be built by selling an in the money call at strike1, buying an at the money call at strike2 on twice the notional and selling an out of the money call at strike3.

A condor call spread is designed for investors who think that spot will remain within a tight range. A long condor is built by buying an in the money call at strike1, selling an in the money call at strike2, buying an out of the money call at strike3, selling an out of the money call at strike4. Strike1<strike3<strike2<strike4

There is limited profitability in condor spread. To make profit, we should expect that the volatility will be low. To make maximum profit, strike price in maturity date should be between strike2 and strike3.

A condor put spread is designed for investors who think that spot will move within a large range.A short condor is built by selling an in the money call at strike1,buying an in the money call at strike2,selling an out of the money call at strike3,buying an out of the money call at strike4.

Figure 16: A short butterfly
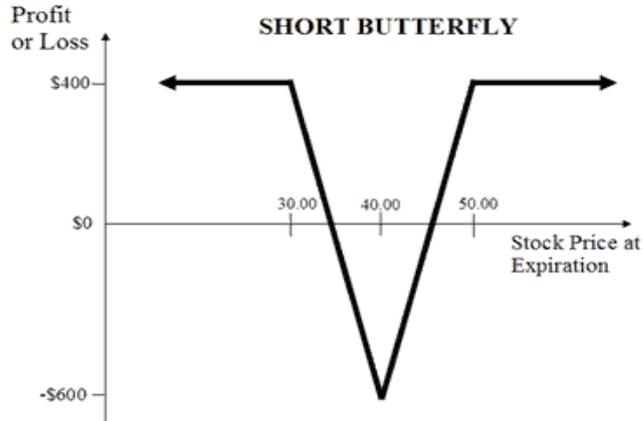
Figure 17: A condor call spread strategy
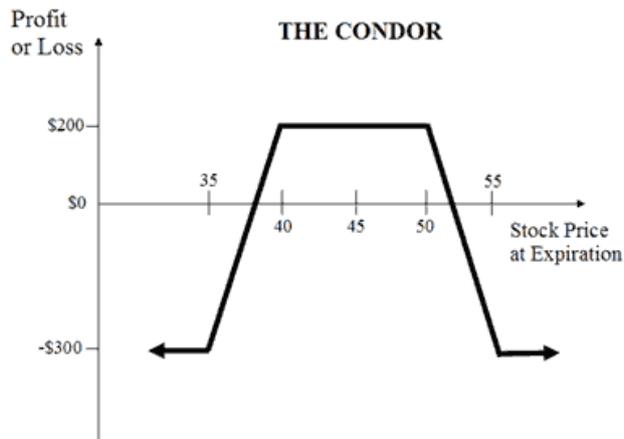
Figure 18: A condor put strategy

A backspread call position is constructed by selling one in the money call and buying two higher out of the money calls of the same underlying stock striking price and expiration date. This is a bulish strategy and has an unlimited profit and limited risk.

Figure 19: A call backspread
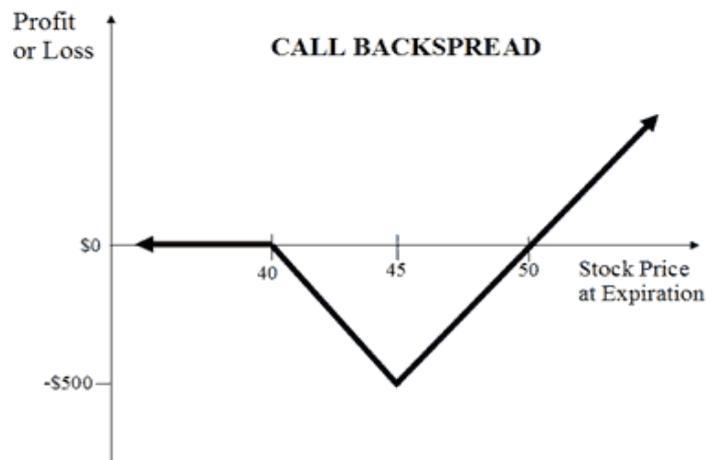
Source: www.theoptionsguide.com

Figure 20: A put backspread
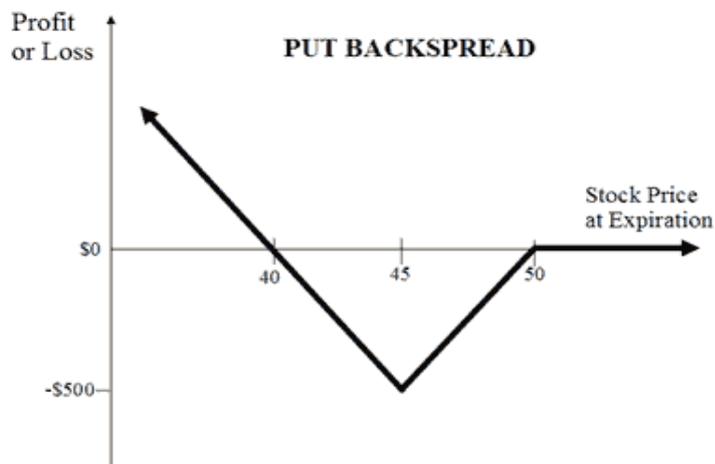
Source: www.theoptionsguide.com

A Backspread put position is constructed by selling one in the money put and buying two lower out of the money puts of the same underlying stock striking price and expiration date. This is a bearish strategy and has an unlimited profit and limited risk.

A straddle is formed by purchase of a call option and put option which has same transaction dates and strike prices. It provides limitless profit. Loss is limited to the amount of the premium that has been paid.

This strategy is designed to take advantage of increases in volatility or large moves in spot. A straddle is a strategy designed for investors who do not have a view on which direction the exchange rate will move, but do have a view on how volatile the market will be. This trade can be used when an investor believes that the market will be volatile enough to move the exchange rate away from the strike rate either up or down.

An investor buying a straddle thinks that volatility will increase. An investor, whose expectation becomes true, will gain profit whether prices decrease or increase. Writing straddle investor expects that there will not be a small or any change in prices.

Figure 21: A long straddle position
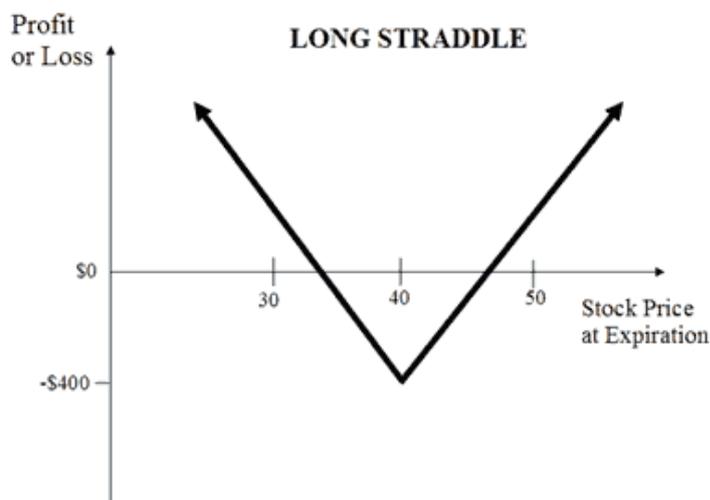
Figure 22: A short straddle position
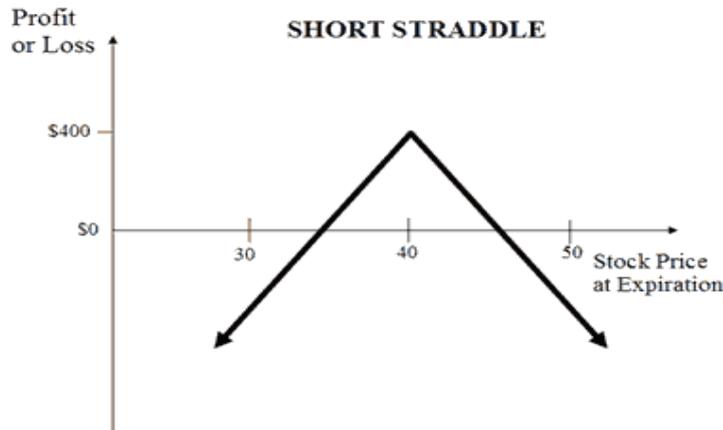
A strangle is formed by the purchase of a call option and a put option of which strike prices are different but maturities are the same.

A strangle is similar to a straddle but has two out of the money rather than one. For this reason a strangle costs less upfront than a straddle, but the exchange rate at expiry has to be further away from the current spot rate to benefit. Loss is limited to the initial premium paid.

In the strangle position spot rate has to move more to generate a profit because the strikes are further away. The closer the strikes, the more expensive the strategy becomes. The most expensive position is when both strikes are the same the strangle the becomes a straddle.

Figure 23: A long strangle position
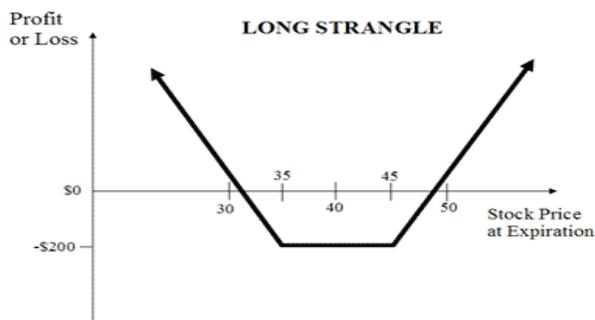
Figure 24: A short strangle position
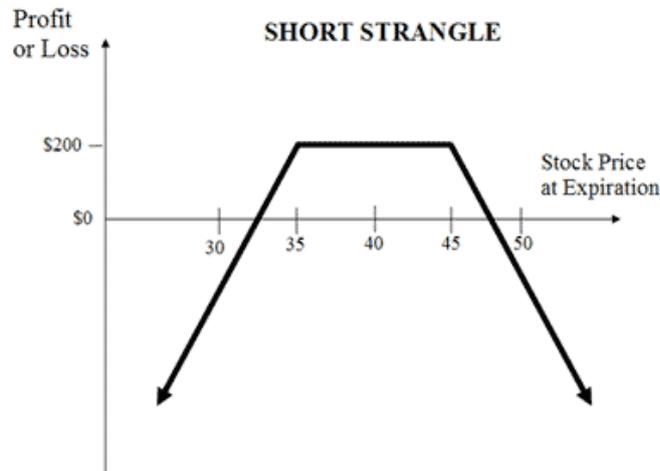
Source: www.theoptionsguide.com

Risk reversal (Collar); as is evident from its name, risk reversal means that it has the feature of reversing the risk. Besided being a hedging strategy, it enables making leveraged speculative movements.

Risk reversal is a commonly used term in the foreign exchange markets. A risk reversal is an option strategy combining buy of out of the money calls(puts) with the sell of out of the money puts(calls). The options will have the same expiration date and similar deltas. A risk reversal provides a market view on both the underlying currency and implied volatility.

If risk reversal position is positive; i.e. if the premium of call options are higher than the premium of put options because of implied volatility, investors' expectations related to underlying asset tend to rise quickly. Determining the direction of risk reversal depends on implied volatility. Thus, risk reversal values supply important information regarding the risk appetite that reflects the future market expectation.

The collar is a product designed for investors and corporations who wish to hedge an foreign exchange exposure and wants to enjoy some upside potential.In order to benefit from a favourable spot move, client is willing to accept a guaranteed hedge rate worse than the forward.

Figure 25: A risk reversal pay-off diagram
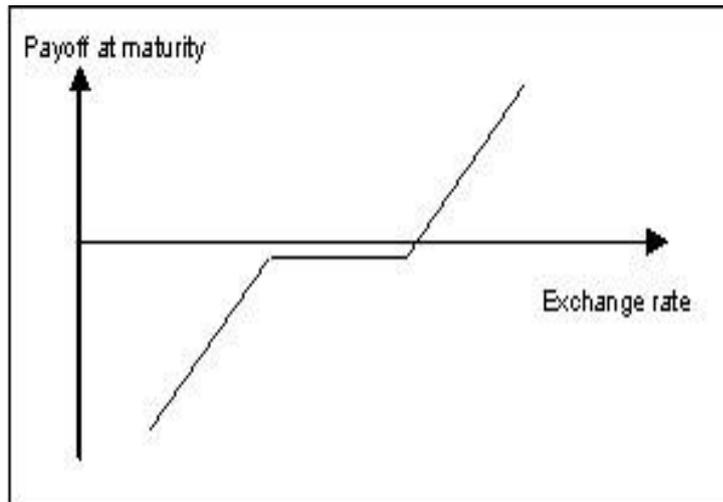
Source: www.bba.org.uk

In Zero Cost Collar Strategy, develops by taking long position in a caps or floor options written on underlying asset, and at the same time taking short position in a caps or floor options. Thus, the potential risks in upward and downward directions will be eliminated. Premium obtained from put and offsets call cost. The reason why this strategy is called zero cost caller is that the premiums and number of call and put are the same.

Caps and floor options are;

Caps is a short position hedging strategy. In caps strategy, in addition to short selling, call option is bought as well. The purpose is hedge against possible loss from short selling, so price increase.

Floor is a long position hedging strategy. In floor strategy, put option is purchased in addition to long position. The purpose here is to avoid the loss from long position because of price decrease by buying a put option.

A strip position is constructed by buying one at the money call and two at the money puts of the same underlying stock striking price and expiration date. Investor thinks that the underlying stok price will generate big volatility movements in the near term and go downwards.

Figure 26: A zero cost collar strategy
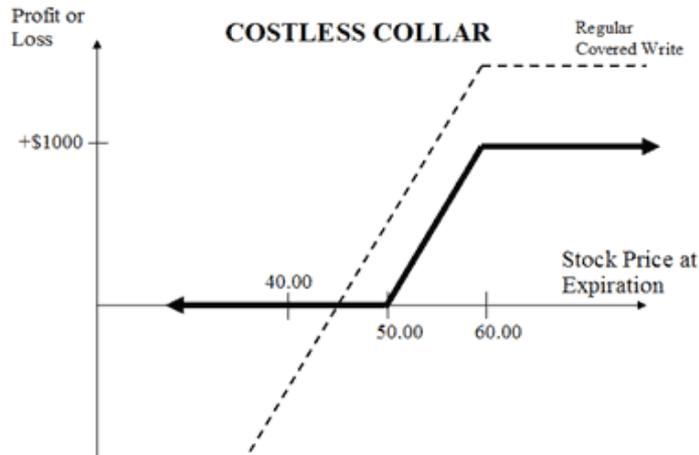
Source: www.theoptionsguide.com

In Strip strategy, investor has a chance to generate unlimited profit and limited loss. If the underlying stock price answers expectations to go downwards, investor makes more profit than to go upwards in a short time.

A Strap position is constructed by buying two at the money calls and one at the money put of the same underlying stock, striking price and expiration date. Investor thinks that the underlying stok price will generate a big volatility movement in the near term and go upwards.

In Strap strategy, investor has a chance to generate unlimited profit and limited loss. If the underlying stock price answers expectations to go upwards, investor makes more profit than to go downwards in a short time.

Figure 27: A strip strategy
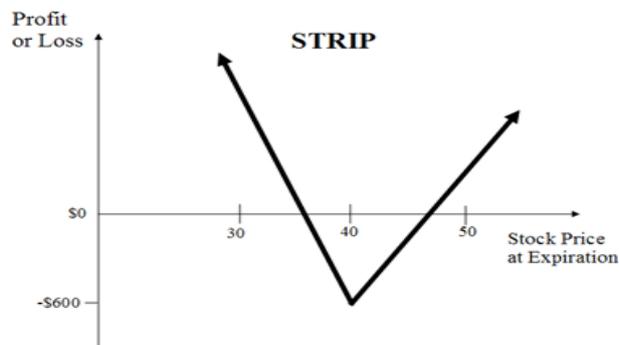
Source: www.theoptionsguide.com

Figure 28: A strap strategy
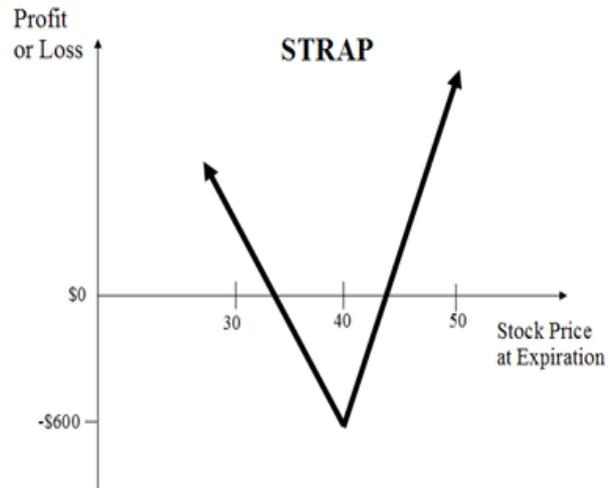
Source: www.theoptionsguide.com

3. SME'S IN TURKEY

3.1. Descriptions of SME

SME's are described in different ways by several institutions. However, in November 18, 2005 by cabinet decision, it has been brought into conformity with EU standards and now has a common description. According to this decision;

a) Micro-company: Small scale enterprises having less than 10 employers and sales revenue or financial balance sheet not exceeding 1 million TL,

b) Small company: Enterprises having less than 50 employers and sales revenue or financial balance sheet not exceeding 5 million TL,

c) Medium sized company: Enterprises having less than 250 employers and sales revenue or financial balance sheet not exceeding 25 million TL.

According to Basel II criterias, enterprises of which annual turnover is below 50 million euro are called SME. As seen from the table above, SMEs have a place in all countries regardless of their development level. Contribution of SMEs in Turkey to employment is almost at the same level as developed countries. However the investment rate is really low and this shows that SMEs do not have sufficient capital. In Turkey, besides having limited capital, SMEs cannot get a bank loan enough. Naturally, their share in export is low. As a result, in Turkey holdings and institutions with strong capital make investments, export and get a bank loan from banks. On the other hand SMEs have to be the subcontractors of those enterprises.

3.2. Importance of integration of SMEs, Basel II with risk management tools

3.2.1. Description of Basel II

Basel II is composed of standards connecting capital efficiencies that are arranged against risks with certain rules in order to make risk assessments at banks effectively.

Table 3: Situation of SMEs' in other country

Situation of SMEs in Other Country						
Countries	All Companies %	Employment %	Investments %	Production %	Export %	Extended Credit %
US	97,2	50,4	43	36,2	32	43
Germany	99,8	64	44	49	31,1	35
India	98,6	63,2	27,8	50	40	15
Japan	99,4	81,4	40	52	38	50
England	96	36	25	25,1	22,2	26
S. Korea	97,8	61,9	35,7	34,5	20,2	47
France	99,9	49,4	45	54	23	30
Italy	97	56	36,9	53	-	-
Türkiye	98,9	45,6	6,5	37,7	8-10	5-10

Source: OECD

3.2.2. Description and classification of SMEs according to Basel II

According to Basel II, enterprises of which total annual turnover is below 50 million euro are described as SME.

SMEs gather under two sub-classes. SMEs of which total cash and noncash credits in a bank are below 1 million euro will be described as ''Retail SME'' for that bank. SMEs of which total cash and noncash credits in a bank are above 1 million euro will be described as ''Corporate SME'' for that bank.

With Basel II, an obligation of getting rating grade will be imposed on SMEs. Banks will make loan pricing according to the rating grade and they will reserve on the credit they use. In case corporate SME does not

have a rating grade, the bank liquidity requirement reserved by the bank will be 100%. Even if the company finds the opportunity to get a bank loan, the conditions will be more harsh. For an SME of which rating grade is good, the capital reserve will decrease to 20%. As a result, the cost of the credit loan such a company will use is much lower. In retail SMEs, without a rating grade the capital reserve rate is 75%.

3.2.3. Impacts of Basel II to SMEs

With the launching of the standards formed in Basel II by banks, besides consolidating of substructure of banking sector, it will also contribute to the financial disciplines and development of risk cultures of enterprises that are in contact with the bank.

In Basel II, credit risk will determined according to the rating grades of loans. Rating grade is the criteria that how much a company risky. If the company has a good rating grade, banks will make lower credit loan pricing, so the company will have the opportunity to use credit loan in better conditions.

Several companies will be affected by this situation in a negative or positive way. While the SMEs with strong capitals use a low cost credit, SMEs with a limited capital will not have the opportunity to use any credit.

With the launcing of Basel II, a decrease in the informal economy rate is expected. With the decrease of informal economy, tax incomes of goverment will increase and the unfair competition between enterprises will decrease. However, until the system gets in order, it is certain that there will be problems between banks and companies in pricing. Since the informal economy is common in our country, advantages of Basel II in this sense will be seen in long term. With the development of technological substructure, the increase in the financial applications on the internet contributed alot. This application should be focused on in order to arrange financial statements in accordance with transparent, accounting principles and to decrease informality. Shortening in process lays a burden to a great extent on state as well as on company owners.

Another impact of Basel II is on the collateralised. SMEs have to strengthen their collateral structures. Banks will accept cash, securities or real estates that can be turned into cash in a short time or do not lose their value in a short time as a collateral. According to Basel II, the guarantee of individuals cheque and who is a partner with corporate is not deemed as a pledge.

In order for enterprises to go through the period easily where they shift to Basel II, they should start immediately to their substructure practices. Substructure practices, as it is mentioned earlier, should be strenghtening collateral structure, arranging financial statements in compliance with accounting principles, analyzing financial statements by providing regular information flow in order to be able to predict the future of management, using financial instruments, securing technological infrastructure, investing in qualified human resources and infusing corporate management culture into all organization.

3.3. Development of derivatives in the world

Çonkar and Ata (2002) demonstrate that volume of derivatives of banks of developed countries are much more higher than their financial statement volumes. While in all these countries, share of derivatives is very high in banking activities, in Turkey derivatives volume of bank are much beyond the total financial statement volumes. From a total asset volume view; in Sweden which is very close to Turkey derivatives volume has occurred 6,5 times more that total assets. In countries like USA and Switzerland volume of derivatives are 14 times higher than total assets.

When we compare two figures below, we see that foreign exchange derivatives increase more than double between the end of June 1999 and June 2010, and the usage of total derivatives increased more than sevenfold.

3.4. Reason for global economic crisis; derivatives (!)

It is certain that the global crisis occurred in 2008 did not emerge all of a sudden. As it is seen in every crisis, the reason for the emergence of this

crisis is the mistakes that have been made before. Derivatives are products that are inclined to eliminate risks in terms of their structure and intended use. As a result of the mistakes made, instead of eliminating the risk, they have been increased. Finance sector gets its strength from real sector. Finance sector can maintain its existence with the real development that the economic dynamism in real sector brings and the increase in financial needs. The reason for the crisis is finance sector's attempts to go beyond real sector. The high demand for derivative products, hedge funds' committing more premium to gain more income and lacking the control system to avoid this caused an enviroment of greediness. Giving free rein to performers paved the way for them to act against the logic of finance and derivative products.

Table 4: Some developed countries' and Turkish Banks' derivatives volume (Mio $)

Country	Total Assets	Notional Amounts of Derivatives (USD)	Not. Der./ Assets
Belgium	535.909	1.626.057	3.0
Canada	819.560	4.538.470	5.5
France	1.904.509	11.459.469	6.0
Germany	2.744.340	11.539.386	4.2
Italy	746.496	938.675	1.3
Japan	2.528.134	13.650.972	5.4
Holland	1.119.784	3.926.012	3.5
Sweden	201.008	1.303.516	6.5
Switzerland	1.096.714	15.572.351	14.2
England	1.831.854	10.777.207	5.9
ABD	2.468.882	36.274.069	14.7
Turkey	117.396	48.414	0.41

Source: BIS ve IOSCO ,"Trading and Derivatives Disclosures of Banks and Securities Firms in 1998" and The Bank Association of Turkey

Derivative products that were about to launch emerged with the crisis left a question mark in people's minds. However, as long as the investors become self-aware on this subject and use these products for their real purpose, several advantages of them will be seen. These advantages are;

composing the price equilibrium in future, real sector's hedging itself, public and private sector institutions' loan at fair prices, enabling real sector companies' investing in different countries without financial fear.

Table 5: The global OTC derivatives markets between end June 1998 – end June 1999

The global over-the-counter (OTC) derivatives markets[1] Amounts outstanding, in billions of US dollars	Notional amounts			Gross market values		
	End-June 1998	End-Dec. 1998	End-June 1999	End-June 1998	End-Dec. 1998	End-June 1999
A. Foreign exchange contracts	18,719	18,011	14,899	799	786	582
Outright forwards and forex swaps	12,149	12,063	9,541	476	491	329
Currency swaps	1,947	2,253	2,350	208	200	192
Options	4,623	3,695	3,009	115	96	61
B. Interest rate contracts[2]	42,368	50,015	54,072	1,160	1,675	1,357
FRAs	5,147	5,756	7,137	33	15	12
Swaps	29,363	36,262	38,372	1,018	1,509	1,222
Options	7,858	7,997	8,562	108	152	123
C. Equity-linked contracts	1,274	1,488	1,511	190	236	244
Forwards and swaps	154	146	198	20	44	52
Options	1,120	1,342	1,313	170	192	193
D. Commodity contracts[3]	451	415	441	38	43	44
Gold	193	182	189	10	13	23
Other	258	233	252	28	30	22
Forwards and swaps	153	137	127	..	..	..
Options	106	97	125	..	..	..
E. Other[4]	9,331	10,388	10,536	393	492	400
Grand total	72,143	80,317	81,458	2,580	3,231	2,628
Gross credit exposure[5]				1,203	1,329	1,119
Memorandum item: Exchange-traded contracts[6]	14,256	13,549	15,501	..	..	..

Source: BIS

3.5. Benefits of using derivative products in SMEs and the consciousness of using that products' brings

SME's will not be affected by the price fluctuations in future and will not be exposed to capital erosion.

Financial products such as forward, swap and option's applying to a bank by estimating their theoric and market prices will enable these products to be used at better prices. Therefore, cost of borrowing will decrease and this will lead to a competitive superiority.

Table 6: Global OTC derivatives market, end June 2009

Table 4: Global OTC derivatives market, end-June 2009[1]
In billions of US dollars

	Forwards and swaps				Options			
	Total	with reporting dealers	with other financial institutions	with non-financial customers	Total	with reporting dealers	with other financial institutions	with non-financial customers
				Notional amounts outstanding				
All contracts[2]	529,893	179,430	298,471	49,777	74,729	35,088	31,040	6,580
Foreign exchange	38,179	14,033	17,370	6,777	10,596	4,858	4,071	1,666
US dollar	32,521	12,671	14,953	4,898	8,216	3,961	2,985	1,269
Euro	16,794	5,723	7,484	3,587	3,859	1,753	1,297	809
Japanese yen	7,141	3,248	2,826	1,067	4,297	2,106	1,662	529
Pound sterling	5,600	1,780	2,573	1,246	613	233	255	125
Other	14,303	4,644	6,904	2,755	4,206	1,663	1,943	600
Up to one year	23,752	9,270	9,871	4,611	6,551	3,190	2,293	1,068
Over one year	14,427	4,763	7,499	2,165	4,045	1,669	1,779	597
Memo: Exchange-traded[3]	136	.	.	.	104	.	.	.
Interest rate	388,684	124,323	229,108	35,253	48,513	23,827	20,961	3,726
US dollar	136,993	45,569	79,202	12,222	17,174	7,590	8,123	1,460
Euro	136,441	41,261	85,662	9,518	24,204	12,607	9,859	1,739
Japanese yen	54,271	18,404	28,508	7,359	3,181	1,990	1,069	121
Pound sterling	30,285	8,174	18,919	3,192	2,306	927	1,177	202
Other	30,694	10,915	16,816	2,964	1,649	712	733	203
Up to one year	150,630	58,058	78,782	13,790	8,513	4,578	3,141	794
Over one year	238,054	66,265	150,326	21,463	40,001	19,249	17,820	2,931
Memo: Exchange-traded[3]	18,812	.	.	.	38,921	.	.	.
Equity	1,709	447	979	283	4,910	2,209	2,298	403
Memo: Exchange-traded[3]	737	.	.	.	4,569	.	.	.
Commodities	1,950	...	...	...	1,779	...	...	...
Credit default swaps	36,046	19,184	15,347	1,516	...	...	...	...
Unallocated	63,325	21,443	35,669	5,949	8,930	4,193	3,709	786

Source: BIS

Figure 29: Percentage of derivatives usage by the world's largest 500 companies (2003)

Don't Use Derivatives 8% (38 Companies)

Use Derivatives 92% (459 Companies)

- Use Derivatives
- Don't Use Derivative
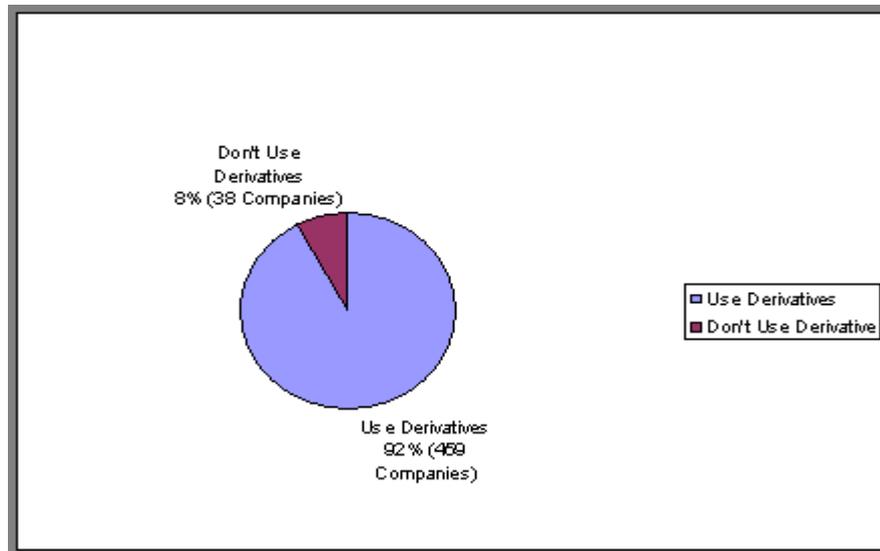
Source: ISDA, 2003

Among the ten countries with the largest number of the 500 companies surveyed, all companies based in Canada, France, Great Britain,

Japan and The Netherlands report using derivatives while 97 percent of German companies and 92 percent of US companies report using derivatives. Companies in South Korea and China were least likely to report using derivatives, but 87 percent of Korean companies and 62 percent of Chinese companies nonetheless do report using these instruments (ISDA, 2009).

Figure 30: Percentage of derivatives usage by the world's largest 500 companies (2009)

Derivative Usage (Global Fortune 500)

5.8% Companies (29) Do not use Derivatives

94.2% Companies (471) Use Derivatives

■ Use Derivatives ■ Don't use Derivatives
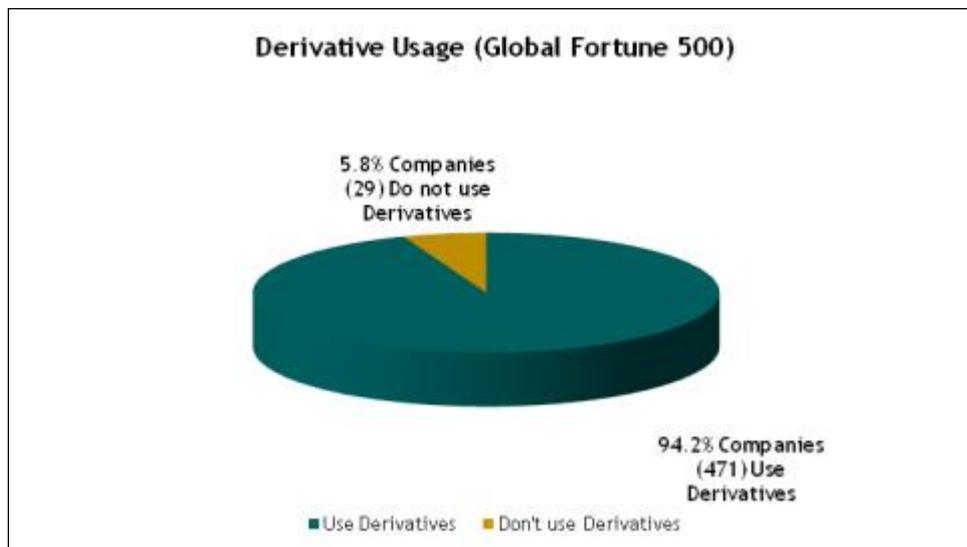
Source: ISDA, 2009

Figure 31: Percentage of derivatives usage by the joined countries

Top 10 Countries: Highest Reported Use of Derivatives

Country	Use Derivatives	Don't use Derivatives
Netherlands	13	0
Canada	14	0
Switzerland	14	0
South Korea	13	2
China	18	11
Britain	34	0
Germany	36	1
France	39	0
Japan	64	0
US	140	13

■ Use Derivatives ■ Don't use Derivatives
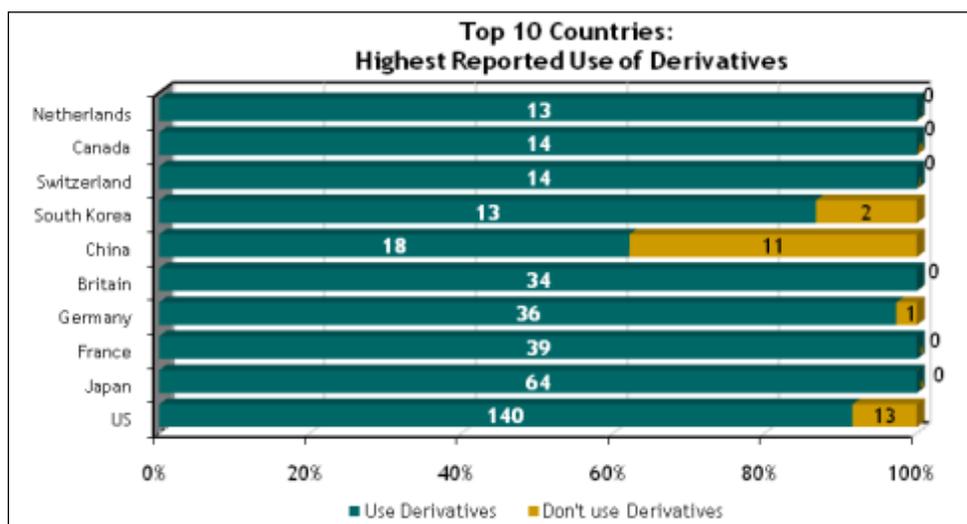
Source: ISDA, 2009

When we evaluate the survey results that ISDA made in 2003 and 2009 among the world's 500 biggest companies, usage of derivative products which are already high, increased from 92% to 94,2% after a period of 6 years.

When we check the types of derivative products used, usage of interest derivative products have fallen back from 85,1% to 83% and become number 2. foreign exchange derivative products increased from 78,2% to 88% and is the most commonly used derivative type. Commodity derivatives increased from 23,5% to 49%, equity derivatives increased from 11,1% to 29% and have the same ranking.

Figure 32: Percentage of derivatives types usage by the world's largest 500 companies in 2009
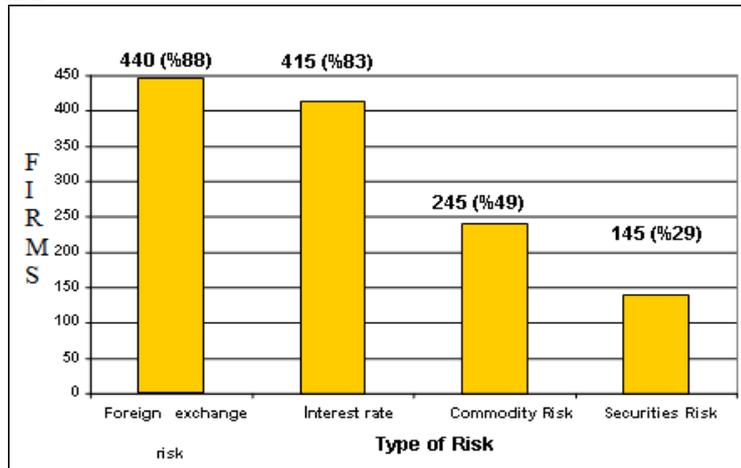
Resource: ISDA, 2009

Figure 33: Percentage of derivatives usage by the world's top 500 companies in 2003
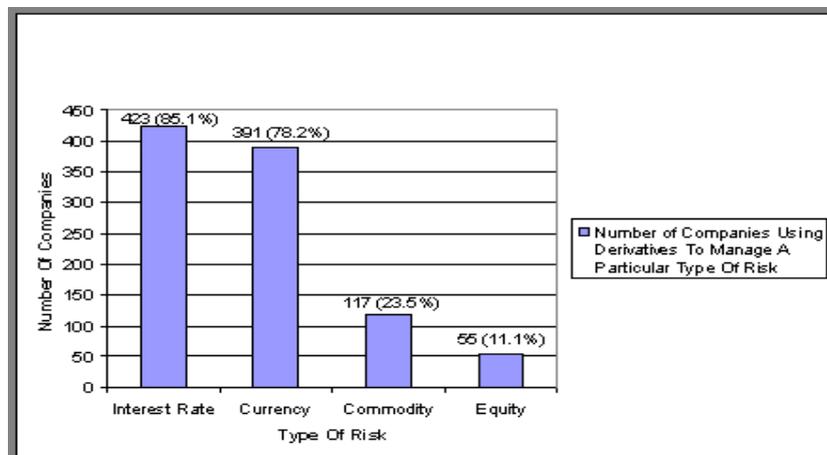
Resource: ISDA, 2003

Figure 34: Percentage of derivatives usage by sectors

Sector Name	Total	% Using Derivatives	% Using Interest Rate	% Using Forex	% Using Commodity	% Using Credit	% Using Equity
Basic materials	86	97%	70%	85%	79%	0%	6%
Consumer goods	88	91%	81%	84%	39%	1%	9%
Financial	123	98%	94%	96%	63%	76%	80%
Health care	25	92%	80%	72%	8%	4%	20%
Industrial goods	49	92%	86%	86%	37%	2%	20%
Services	40	88%	75%	85%	35%	3%	13%
Technology	65	95%	86%	92%	15%	6%	15%
Utilities	24	92%	92%	88%	83%	0%	8%
Total	500	94%	83%	88%	49%	20%	29%

Source: ISDA, April 2009

4. A HEDGING IMPLEMENTATION AND COMPARISON OF FX DERIVATIVES' PERFORMANCE

4.1. Data and methodology in parametric VAR

An export company is foreign exchange creditor in return for its exported products and borrows its stocks and basic goods as TRL therefore it is in open position in exchange. In case the rate of exchange decreases the price of assets in terms of TL will not change however due in will decrease. In practice, open position of export company between the periods 31.12.2008-31.12.2009 are given in table 7 on euro and usd basis.

Table 7: Open positon of company

DATE	USD	EURO
31.12.2008	389,946	9,672,671
31.03.2009	20,988	120,623,702
30.06.2009	133,804	222,028,748
30.09.2009	19,600,074	9,672,671
31.12.2009	19,600,074	9,672,671

The highest loss that can occur in a specific period and confidence level is expressed by Value at Risk. In the study, one of the Value at Risk methods ''Parametric Var'' has been used. In most cases Parametric VAR method is a suitable method to measure the market risk. It is the best method to recognize VAR in the fastest way. However when it is applied for complicated portfolios it may rise problems. In practice, since the export company has a simple portfolio composed of usd and euro, Parametric VAR has been preferred. In this method, from the volatility and corelations of prices and rates that have been obtained by using previous datas, risk estimations for future are made.

Steps of calculating the Parametric VAR is as follows:

1- TL value of exchange in terms of USD and EURO in company's portfolio is found

2- Premium differences between 31.12.2008-31.12.2009 are estimated.

3- Weight of USD and EURO in portfolio is calculated.

4- Covariance of yield change is calculated.

5- Volatility is found by taking the square root of multiplication of transpose of weight matrix, covariance matrix and weight matrix.

σ=√a*b*c

σ : Volatility

a : Weight Matrix Transpose

b : Covariance Matrix

c : Weight Matrix

6- From the point of view that the variables in normal distribution, VAR value is found.

$$Var = PV * \propto * \alpha * \sqrt{t}$$

PV : Present Value of Portfolio,

α   : Confidence Level,

σ   : Volatility

t   : Holding Period

The maximum exchange amount the company can have in long or short position is called ''Open FX Position Limit''. In a sense, it is the amount it can stand to lose. In practice, company has determined ''open fx position limit'' by risk management strategy. According to this, if PV (Portfolio value) is above 20.000.000 TL or VAR/PV rate is above 0.50% it has decided to hedge. (See in table 8)

Table 8: Parametric VAR results of company

DATE	PV	VaR	VaR/PV
31-12-2008	21,528,049.45	783,621	3.64%
31-03-2009	270,247,404.84	7,810,150	2.89%
30-06-2009	477,969,358.29	8,938,027	1.87%
30-09-2009	50,091,818.18	606,111	1.21%
31-12-2009	50,475,287.36	439,135	0.87%

4.2. Hedging with derivatives

4.2.1. Assumptions

Export company has signed a contract with the buyer to make shipments once in three months. It invoices the product amount on 31.12.2008, 31.03.2009, 30.06.2009, 30.09.2009 and 31.12.2009. Collection is performed on the first date of VOB futures contract following the invoice date. Company expects the Exchange rates to drop after the crisis. Therefore it has decided to hedge its open positions by taking short position with the assumption of keeping until the end of maturity. Buys contract at an amount that is equaled to its open positions with the limit bank has assigned to the company. In the study, to hedge the exchange rate risk futures, options and zero cost collar options are used. In futures, with the expectation that the exchanges would decrease, short position has been taken and assumed that it has been retained until maturity date. Active portfolio management is not performed on a day basis. Pricing has been done according to the theoretic forward price formula. Option pricing has been priced with Garman-Kohlhagen Currency Option Pricing Model. In this study, TRL/USD and TRL/EURO free market selling rate datas have been used during the aforementioned period. Foreign interest rate, domestic interest rate and volatility datas obtained from super derivatives have been used as you see in appendix 1.

4.2.2. Futures contracts and managing foreign exchange risk

In this part of the study, in order to hedge the open positions of export company between 31.12.2008 and 31.12.2009 arising from foreign exchange receivables, futures conract with maturity date 27.02.2009, 30.04.2009, 31.08.2009, 30.10.2009 and 26.02.2010 theoretically priced and their performances have been studied.

Since the income of the company is on foreign exchange basis, USD and EURO is in long position. Main goal is to limit the potential loss that may arise from exchange rate risk exposure by taking short position.

Futures pricing have been made with theorotical pricing formula.

$$F = S * exp^{[(r_d - r_f) * (t/365)]}$$

F : Future Price

S : Spot Price

r_d : Domestic Interest Rate

r_f : Foreign Interest Rate

T : Days to Maturity

In Table 9 details of profit and loss obtained from futures contracts, in table 13 a comparitive profit and loss analysis between strategies are shown.

Table 9: Between dates of 31.12.2008-31.12.2009 USD and EURO short futures profit and loss table

Billing Date	Settlement Date	On Expiry Date			On Expiry Date		
		USD Futures Price on Billing Date	USD Futures Price on Settlement Date	Futures USD P&L	EURO Futures Price on Billing Date	EURO Futures Price on Settlement Date	Futures EURO P&L
31.12.2008	27.02.2009	1.5703	1.6955	-48,821.24	2.1648	2.1465	177,009.88
31.03.2009	30.04.2009	1.6839	1.5860	2,054.73	2.2343	2.1135	14,571,343.20
30.06.2009	31.08.2009	1.5605	1.5030	7,693.73	2.1855	2.1460	8,770,135.55
30.09.2009	30.10.2009	1.4947	1.4900	92,120.35	2.1819	2.2085	-257,293.05
31.12.2009	26.02.2010	1.5141	1.5435	-576,242.18	2.1713	2.0960	728,352.13

4.2.3. Options and managing foreign exchange risk

In this part, in order for the loss/profit that are obtained from USD/TRL and EURO/TRL open positions to be comparable, for futures contract's maturity dates, an option pricising has been made. In option pricing, Garman-Kohlhagen pricing model has been used.

The Garman-Kohlhagen model is commonly used extension of the Black-Sholes option pricing model to pricing currency options.Mark Garman and Steven Kohlhagen showed that much the same arguments apply to pricing currency options as apply to pricing stock options with adaptations to allow for the two interest rates and the fact that a currency can trade at a premium or discount forward depending on the interest rate differential.

Garman - Kohlhagen; any interest rate difference between two currencies will affect the value of an option. Since an option holder does not provide a cash input through the underlying asset of the option; the constant cash cycle arising from this foreign exchange is subtracted from the price of the underlying asset. That means a lower call option price than the price in Black Scholes formulation and higher put option price.

Black-scholes model assumes that risk-free interest rate that is valid until the maturity of option does not change. In practice, interest rates of two countries are not the same.

The Black's 76 Model ;

$$C = e^{-r(T-t)}[SN(d_1) - XN(d_2)]$$

$$P = e^{-r(T-t)}[XN(-d_2) - XN(-d_1)]$$

$$d_1 = \frac{\left[\ln\left(\frac{S}{X}\right) + \left(\frac{\sigma^2}{2}\right)(T-t)\right]}{\sigma\sqrt{(T-t)}}$$

$$d_2 = d_1 - \sigma\sqrt{(T-t)}$$

In Black Scholes model, following formula is obtained with the changes made:

$$C = Se^{-R(T-t)}N(d_1) - Xe^{-r(T-t)}N(d_2)$$

$$P = Xe^{-r(T-t)}N(-d_2) - Se^{-R(T-t)}N(-d_1)$$

$$d_1 = \frac{\left[\ln\left(\frac{S}{X}\right) + \left(r - R + \frac{\sigma^2}{2}\right)(T - t)\right]}{\sigma\sqrt{(T - t)}}$$

$$d_2 = d_1 - \sigma\sqrt{(T - t)}$$

C : Call options premium

P : Put options premium

S : Underlying asset spot price

X : Options exercise price

r : Domestic interest rate

R : Foreign interest rate

σ : Underlying asset volatility

T : Option exercise date

t : Option initial date

N(X): Normal distribution function

d1: Cumulative distribution function

d2: Cumulative distribution function

In Table 10 details of profit and loss obtained from vanilla long put options, in table 13 a comparitive profit and loss analysis between strategies are shown.

Table 10: Between dates of 31.12.2008-31.12.2009 USD and EURO put options profit and loss table

Billing Date	Exercise Date	USD Options Strike Price	USD Spot Price on Exercise Date	Put Premium (USD/TRL)	Options USD/TRL P&L	EURO Options Strike Price	EURO Spot Price on Exercise Date	Put Premium EURO/TRL	Options EURO/TRL P&L
			On Expiry Date				On Expiry Date		
31.12.2008	27.02.2009	1.5345	1.6935	2.11%	- 12,606.50	2.1420	2.1520	2.88%	- 596,887.45
31.03.2009	30.04.2009	1.6695	1.5975	1.85%	863.77	2.2160	2.1100	1.67%	8,312,459.28
30.06.2009	31.08.2009	1.5355	1.4995	1.65%	1,434.86	2.1520	2.1490	1.39%	- 5,988,460.82
30.09.2009	30.10.2009	1.4855	1.4965	0.91%	- 265,621.79	2.1690	2.2020	0.67%	- 141,105.05
31.12.2009	26.02.2010	1.4975	1.5425	1.37%	- 402,885.07	2.1485	2.0995	1.07%	250,920.58

4.2.4 Zero cost collar and managing foreign exchange risk

Main goal in zero cost collar is not gaining profit but to prevent the potential losses and put a limit. It can be applied when the expectation of the company is that the exchange may go both ways or an expectation that a breakage may occur in the market. In addition to this companies generally do not have time to react in case of a crisis or sudden shocks. With zero cost collar companies are always prepared for sudden shocks. Company does not worry whether it will increase or decrease.

In this section, again for the same maturity dates zero cost collar option strategy has been used. In zero cost collar strategy, the institution expects a bearish market, so it sells 1 out of the money call option, buys 1 at the money put option. The cost of the position is the same since number of call and put and premiums are the zero.

In pricing of this option, again Garman-Kohlhagen method has been used. In Table no 11 and 12 details of zero cost collar option contracts of the enterprise, in table 13 a comparitive profit and loss analysis between strategies are shown.

Table 11: Between dates of 31.12.2008-31.12.2009 USD zero-cost-collar options profit and loss table

		On Expiry Date				On Expiry Date				
Billing Date	Exercise Date	USD Strike Price Call	USD Spot Price on Exercise Date	Call Price(USD/ TRL)	Call USD/TRL P&L	USD Strike Price Put	USD Spot Price	Put Price (USD/TRL)	Put USD/TRL P&L	Net Collar P&L(USD/TRL)
31.12.2008	27.02.2009	1.6077	1.6935	2.11%	- 33,451.28	1.5345	1.6935	2.11%	0.00	- 33,451.28
31.03.2009	30.04.2009	1.6992	1.5975	1.85%	0.00	1.6695	1.5975	1.85%	1,511.14	1,511.14
30.06.2009	31.08.2009	1.5854	1.4995	1.65%	0.00	1.5355	1.4995	1.65%	4,816.94	4,816.94
30.09.2009	30.10.2009	1.5041	1.4965	0.91%	0.00	1.4855	1.4965	0.91%	0.00	0.00
31.12.2009	26.02.2010	1.5309	1.5425	1.37%	- 227,865.30	1.4975	1.5425	1.37%	0.00	- 227,865.30

Table 12: Between dates of 31.12.2008-31.12.2009 EURO zero-cost-collar options profit and loss table

Billing Date	Exercise Date	On Expiry Date				On Expiry Date				Net Collar P&L (EURO/TRL)
		EURO Strike Price Call	EURO Spot Price on Exercise Date	Call Price (EURO/TRL)	Call EURO/TRL P&L	EURO Strike Price Put	EURO Spot Price	Put Price (EURO/TRL)	Put EURO/TRL P&L	
31.12.2008	27.02.2009	2.1885	2.1520	2.88%	0.00	2.1420	2.1520	2.88%	0.00	0.00
31.03.2009	30.04.2009	2.2534	2.1100	1.67%	0.00	2.2160	2.1100	1.67%	12,786,112.41	12,786,112.41
30.06.2009	31.08.2009	2.2186	2.1490	1.39%	0.00	2.1520	2.1490	1.39%	666,086.24	666,086.24
30.09.2009	30.10.2009	2.1950	2.2020	0.67%	- 67,284.43	2.1690	2.2020	0.67%	0.00	- 67,284.43
31.12.2009	26.02.2010	2.1941	2.0995	1.07%	0.00	2.1485	2.0995	1.07%	473,960.88	473,960.88

Table 13: A comparitive profit and loss analysis between strategies on contract and strike dates

Billing Date	Exercise Date	USD/TRL			EURO/TRL		
		Futures (Short)	Options (Long Put)	Zero Cost Collar	Futures (Short)	Options (Long Put)	Zero Cost Collar
31.12.2008	27.02.2009	-48,821.24	- 12,606.50	- 33,451.28	177,009.88	- 596,887.45	0.00
31.03.2009	30.04.2009	2,054.73	863.77	1,511.14	14,571,343.20	8,312,459.28	12,786,112.41
30.06.2009	31.08.2009	7,693.73	1,434.86	4,816.94	8,770,135.55	-5,988,460.82	666,086.24
30.09.2009	30.10.2009	92,120.35	- 265,621.79	0.00	- 257,293.05	-141,105.05	- 67,284.43
31.12.2009	26.02.2010	-576,242.18	- 402,885.07	-227,865.30	728,352.13	250,920.58	473,960.88

5. CONCLUSION

Although SMEs make up the 95% of the enterprises in Turkey, their share from bank loans is only 5%. SMEs trying to survive with limited opportunities need to be self-aware, organized under the roof of the unions that have been formed by government and private sector and become more powerful. SMEs in Turkey can only leave their competitors in global competition behind if they can be faster, more different and cheaper from other countries. Starting off from this purpose, studies are performed relating many subjects such as export, research and development, institutionalization, marketing and finance by means of institutions setting up in the frame of integrating in EU and new banking system.

In this study, risk management strategy and foreign exchange derivatives being an important financial subject that enables the increment of competitiveness and business volume of Turkish enterprises, contribute to the forming of institutional structure in the enterprises, and hedging methods with derivatives are explained.

Company at first should determine the risk management strategy it will apply. It should determine which and how much of the risks will be hedged or not. Then it should ask itself for which derivatives type it has chosen is used. It should observe how the derivatives it has chosen move when we compare with the volatility in the market. While an expectation is made about the risks that will be hedged their corelations with each other should be considered. Making expactations in the same direction for the risk that have low corelation may cause serious losses. It should be cautious in parallel with its determined strategies.

In this study, company is exposed to an exchange rate risk because its foreign exchange receivables are more than foreign exchange debts. It has decided to apply risk management strategy in order to be protected from exchange rate risk. For this purpose first it has determined an Open FX position limit for itself. For the next step by applying one of the value at risk methods Parametric VAR to the USD and EURO portfolio it holds, it has hedged the positions above the limit it has determined.

VAR enables companies to determine the minimum capital amount they should have against their risks. The transaction that is made is whether for hedging or

speculative, it should stop itself when the estimated VAR/PV value comes up above the risk level that the company has determined, it should resort to close or lower its positions. VAR is a decision maker mathematical indication rather than decide with assumptions. The goal here is bringing in an analytic perspective to the Sme's and private sector companies in risk management frame regardless of their size. Use of derivatives have nothing to do with the size of the company. If there are no legal proceedings or problem of reputation, a small sized enterprise can hedge itself in direct proportion to its trade volume.

In this study, financial instruments of Futures, Options, Zero Cost Collar as used in order to hedge against exchange rate risk in the period of 31.12.2008 – 31.12.2009. Hedging's main goal is to limit the potential loss.

Derivatives used in the practice have made profit and loss in different levels. Reasons of this are taking wrong position in the period it is applied, no corelation between the exchange rates, paying high premiums as a result of high volatility and the structure of derivatives that is applied.

5.1. Evaluation in terms of exchange rate

USD/TRY and EURO/TRY exchange rates have been through serious fluctuations after crisis period we study (See Appendix 2 and 3). This situation shows the importance of hedging. With this perspective, derivatives should not be the first tool that comes to mind only during crisis period. In order to benefit from hedging, one should be always sensitive to the crisis and shocks that may occur and it should be carried out within a discipline based on a specific strategy. Hedging should be considered as a long term strategy not a short term one. The benefits it provides can only be seen this way. Company has hedged since its receivables are on usd and euro basis by taking short position expecting that the exchange rates may decrease. It has made its expectation that the exchange rates would decrease in each period. Companies should take into consideration correlation with each other when creating expectation about risks to be hedged. Creating expectation in the same direction for risks have low correlation can lead to serious serious losses. Companies should analyse how exchanges act in relation with each other for an effective risk management and take position according to this. In line with these strategies, if there

is an expectation that any of the foreign exchange rates they have in their portfolios will decrease or increase in comparison to the other, they can act speculative by changing the weight of exchange rate positions. Or return can be achived by diversifying two Exchange rates from out of portfolio that have the highest correlation between each other. When we look at the first eight months (see appendix 4) in the period where the application takes place, correlation moves at zero and around. Howewer in the last three months of 2009, correlation between USD and EURO has increased gradually. If there is a negative correlation between two risk factors, these factors balance each other(hedging), if correlation between these two is zero; they diversify each other(diversity), if correlation between them is positive; they cause leverage effect between each other(leverage).

5.2. Evaluation in terms of product

It is known that regarding by derivatives SME's have less knowledge when compared to big companies and decisions are taken according to one person's opinions. By nature of futures changes occur in the market on a daily and weekly bases should be observed constantly. Therefore according to options and zero cost collar, they should renew their expectations for much shorter matureness. In order for futures to make contribution, it is inevitable for companies to employ one person. Howewer lack of labor force makes this problem worse. The biggest advantage of futures is that by stop-loss order without waiting its matureness the transaction can be closed howewer in sudden shocks it is usually late. In implementation, Futures contracts made a profit and loss more than other products in every period. The reason of this is there is no structure that limits the loss as in options. During crisis and after crisis the high volatility shows that futures market have higher profit and loss potential. In vanilla options you make loss at most as the premium, it provides limitless profit possibility. Zero cost collar strategy enables the company to take position by determining a suitable exchange rate level by the company. Therefore the risk level that is to be born is certain.

In order to make futures contract companies have to make a down payment. They can open a position approximately ten times big as the down payment they make. This is an advantage when compared to the other products. However when

they take wrong position the margin they make should drop below the level determined by the exchange market. In order for the position to be maintained an extra margin should be made. It calls "Margin Call". This situation creates disadvantage for the SME's who have limited ability against conditions that require emergent fund.

Futures are traded in organized exchange markets therefore transactions are made on standard contracts and standard maturity. In private sector maturities is varied so companies face base risk. As a result of the change in the elements that affect base, difference between spot price and forward price increases or decreases and this is called "base risk".

During and after crisis the premiums are high and this creates disadvantage for vanilla option.

In USD/TRY exchange in first, second and third periods when compared to other products, it becomes visible with its more limited profit and loss feature. In fourth and fifth period there has not been a change in USD/TRY exchange rate this causes loss due to a premium payment in option, it has obtained profit because the futures price on settlement date has been lower than the strike price. Zero cost collar has showed a better performance than option with its zero premium feature.

In EURO/TRY exchange in second and fifth periods when compared to other products, it becomes visible with its more limited profit and loss feature, in first and fourth period there has not been a change in euro exchange this causes loss due to a premium payment in option, it has obtained profit because the futures price on settlement date has been lower than the strike price. Zero cost collar has showed a better performance than option with its zero premium feature. In third period company that has taken the right position has made profit as a result of euro going down however made a loss because of the high premiums that have been paid.

As soon as a position is taken in zero cost collar, exchange rates that are to be sold or bought in the maturity of the option are fixed in a specific bandwidth. In practice, exporter is in long position. In order for the position to be hedged it sells one out of the money call option, buys one at the money put option. The cost of the position is the same since number of call and put and premiums are the zero.

Companies generally do not have time to react in crisis and sudden shocks. With zero cost collar companies are always prepared for sudden shocks. Company does not worry whether it will increase or decrease. Zero cost collar have made a limited profit and loss according to futures (See table 13). Futures has made a loss more than others when it has made a loss and a profit more than others when it made a loss (See table 13). When expectation in futures is made wrongly stop-loss order is usually given late. As soon as the position is opened in zero cost collar since the limits are determined this is advantageous with this feature. In addition to this if the company expects the exchange rate to go both direction or there might be a breakage up and down in the market zero cost collar is a trustworthy alternative.

5.3. Evaluation in terms of periods

Maintaining the same position for every period does not mean you make a profit every time. In implementation, short position that is taken maintained until the end of the year for each product. As a result there have been periods when the products made a profit and made loss. It means that for each period when we take a position conjuncture should be evaluated again, expectations should be updated.

5.4. Evaluation in terms of premium

Logic of hedging with derivatives is to insure the potential loss. Premium is paid in return for this insurance. However the premium that will be paid changes according to maturity, domestic and foreign exchange rate, volatility, spot price and strike price and structure of the product. In implementation, while options bring a limited profit when compared to futures because of the premium paid, when a wrong position is taken less loss has occurred. However in third period in the options based on euro although the position taken is right there has been a loss because the premium paid has been higher than the profit that has been made. High volatility is the indication of the uncertanty in the market. When the volatility increases, premiums paid increase as well. The period we study covers the pre and after crisis. In this kind of periods, if the expectation is made in the wrong direction, serious losses may occur. Futures prices in organized stock exchange markets are important indications that enable us to evaluate the future. In making an expectation ''implied

volatility'' is an another important indication that should be followed. Companies can benefit from created expectation strategies for themselves by following these prices. In order to decrease the premium costs it is advantageous to prefer conservative products with zero cost such as zero cost collar. From time to time even opportunity costs could not be used, losses were avoided. However in the process from crisis period to normal conditions, with the decrease of volatility, domestic and foreign interest rate, a decrease in premiums have been seen (see appendix 1). By evaluating new conditions, new products and strategies can be tried to benefit from opportunity costs. In table 13, as long as the expectation is made right futures and options make a profit (Except third term EUR/TRY options).

As seen during and after crisis, markets to be back to normal takes couple of years. As it can be understood from tables and graphics there is an environment where exchanges do not move in the same direction every time. There is lack of education in terms of derivatives in Turkey. Also unawareness of liabilities, managing exchange rate risk in a wrong way or being directed wrongly, people have prejudices against derivatives. For this reason Sme's should prefer products more trustworthy such as zero cost collar than vanilla options or futures.

In Turkey hedging logic has not been adopted yet. Exporters practice on expecting the devaluation or exchange rates to increase and importers practice expecting TL to gain value. Companies should adopt more dynamic hedging method based on the market reports they obtain from financial institution and they prepare themselves after adopting he hedging logic in line with what has been explained so far. With the call/put strategy they will make, they should not only decide contract trading but also they should decide whether the position should continue or be closed with hedge effectiveness tests by following their positions as of the day. By making the maturity strategy; it should base its expectations on an assumption model. By determining an exchange strategy; they should make diversifications between underlying assets. And by making a product strategy also the most important; they should manage the opportunities and threats with right type of derivatives.

6. REFERENCES

Alexander, C. (2009), *Pricing, Hedging and Trading Financial Instruments*, John Wiley & Sons, Ltd.

Alexander, C. (2009), *Value – At – Risk Models*, John Wiley & Sons, Ltd.

Allayannis, G. and Weston, J.P. (1999), *The Use of Foreign Currency Derivatives and Industry Structure*, University of Virginia

Alpan F., (1999), *Futures Contracts and Option with Examples*, Literatür Yayınları, İstanbul, s.3

Baker J. C. (1998), *International Finance*, Prentice-Hall Inc., p. 93.

Blake, M. and Mahady N.A. (1991), *How Mid-sized Companies Manage Risk*, Bank of America

Bolgün, E. (2002), *Ticari Bankalarda RMD Yöntemiyle Ölçülen Piyasa Riskinin Bankacılık Stratejilerine Etkisi, Doktora Tezi, Marmara Üniversitesi Bankacılık ve Sigortacılık Enstitüsü*, İstanbul, (Yayınlanmamış doktora tezi).

Bolgün, E. and Akçay, M.B. (2005), *Risk Yönetimi*, Scala Yayıncılık, p. 123.

Bolgün, E. and Akçay, M.B. (2005), *Risk Yönetimi*, Scala Yayıncılık, pp. 234-236.

Campbell, T. and Kracaw W., (1993), *Financial Risk Management*, p. 321.

Chambers, N. (2009), *Türev Piyasalar*, Beta Yayıncılık, p. 95.

Chan D., Gregorio C.,Marshall L.,Dobbs L., (2009), *Survey of Derivatives Usage by The World's 500 Largest Companies*, ISDA

Clifford, W.S. (1995), *Corporate Risk Management: Theory and Practice*, University of Rochester

Çepni, E. (2003), *Ekonomik Göstergeler ve İstatistikler Rehberi*, Beta Yayıncılık, pp. 137-140.

Çonkar K., H. Ata, (2002), Riskten Korunma Aracı Olarak Türev Ürünlerin Gelişmiş Ülkeler ve Türkiye'de Kullanımı, *Afyon Kocatepe Üniversitesi İ.İ.B.F Dergisi*, p. 6.

Doğukanlı, H. (2001), *Uluslararası Finans*, Nobel Kitabevi, p. 14.

Edwards F., Ma C., (1992), *Futures and Options*, McGraw-Hill, p. 558.

Garman, M.B. and Kohlhagen, S.W., (1983), "Foreign Currency Option Values", *Journal of International Money and Finance*, vol. 2.

Howcroft B., Storey C., (1989), *Management and Control of Currency and Interest Rate Risk*, Probus Pub. Co.

Kayahan, C., (2009), "Financial Derivatives:Their Myths and Perception Faults", *Yönetim ve Ekonomi Dergisi*, vol. 1, no. 16, p. 26.

Lawrance, D., (1996), *Measuring and Managing Derivative Market Risk*, International Thomson Business Press, p.108

Müslümov, A. (2002), *21. Yüzyılda Türkiye'de Kobiler*, Literatür yayınları

Nazlı, A.T. (2006), *Döviz Kuru Riski Yönetim Tekniklerinin Türkiye'de Uygulanabilirliği ve Uygulayıcıların Eğitiminin Önemi*, p:46

Officer, H. L., (1976), "*The Purchasing Power Parity Theory of Exchange Rates: A Review Article*", IMF Staff Papers, pp. 1-60.

Önalan, Ö. (2004*), Finans Mühendisliğinde Matematiksel Modelleme*, Avcıol Basım Yayın

Pringle, J.J. and Conolly, R.A. (1993), *The Nature and Causes of Foreign Currency Exposure*, University of North Carolina

Smithson, W.S. and Clifford, W.S. (1999), *Strategic Risk Management*, University of Rochester

Teker D.L., Akçay B., Akçay G., (2008), Reel Sektör Kur Riski Yönetiminde Forward ve Opsiyonların Performans Değerlemesi: Ampirik Bir Uygulama, *Electronic Journal of Social Sciences*, vol. 23, no. 7, pp.204-222

Vergil, Hasan and Özkan, Filiz, (1997), "Purchasing Power in Exchange Rate Prediction and Arima Models", *IMKB Dergisi*, vol. 35, no. 9, p. 42.

Yıldırak, K. and Çalışkan N. (2008), *Türev Ürün Fiyatlama Teknikleri*, Literatür Yayınları

http://www.tcmb.gov.tr/yeni/gen_sek/sozluk.htm#risktenkorunma

http://www.tcmb.gov.tr/yeni/iletisimgm/vadelidovizpiy.htm

http://www.tcmb.gov.tr/yeni/gen_sek/sozluk.htm#otc

http://www.bizterms.net/term/Organized-exchange.html

http://www.isda.org/press/press042309der.pdf

http://www.isda.org/statistics/surveynewsrelease030903v2.html

http://www.bis.org/publ/bcbs64.pdf

http://www.bis.org/publ/otc_hy9911.pdf

http://www.oecd.org/dataoecd/32/52/35645635.pdf

7. APPENDIX

Appendix 1 : Interest rates and volatilities between 31.12.2008 and 31.12.2009

	USD			EURO		
Date	Domestic (%)	Foreign (%)	volatility(%)	Domestic(%)	Foreign(%)	volatility(%)
31.12.2008	15,55	1,04	19,91	6,90	0,24	21,52
31.03.2009	11,23	0,74	19,78	11,23	1,25	18,07
30.06.2009	10,04	0,52	14,60	10,04	0,94	12,79
30.09.2009	7,70	0,22	10,47	7,70	0,50	8,23
31.12.2009	7,28	0,22	11,99	7,28	0,53	9,85

Source: Super Derivatives

Appendix 2 : EUR-TRY implied volatility graph
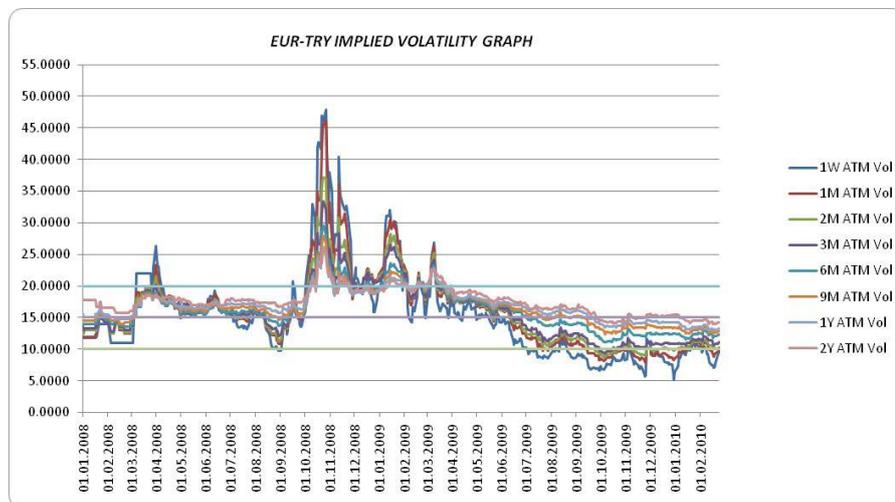
Appendix 3 : USD-TRY implied volatility graph
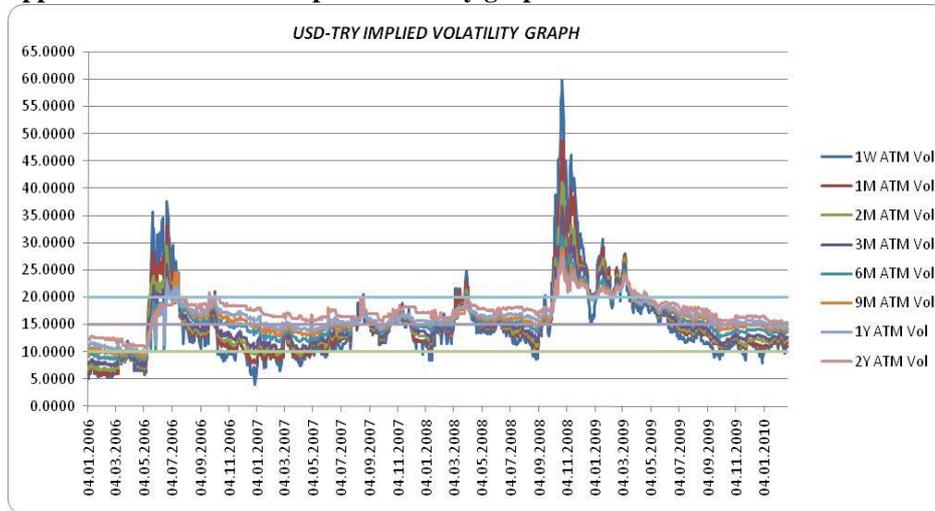
Appendix 4: EURO-TRY and USD-TRY correlation graph between 31.12.2008-31.12.2009