THE EFFECT OF FUTURES MARKETS ON UNDERLYING SPOT MARKETS: A CASE ANALYSIS FROM TURKEY

A THESIS SUBMITTED TO

THE GRADUATE SCHOOL OF SOCIAL SCIENCES

OF

IZMIR UNIVERSITY OF ECONOMICS

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR

THE DEGREE OF MASTER OF ART

IN

THE GRADUATE SCHOOL OF SOCIAL SCIENCES

MARCH 2007

Approval of the Graduate School of Social Sciences

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ABSTRACT

THE EFFECT OF FUTURES MARKETS ON UNDERLYING SPOT MARKETS: A CASE ANALYSIS FROM TURKEY

Keleş, Utku

MA in Financial Economics, Graduate School of Social Sciences

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March 2007, 80 pages

This thesis analyzes the effect of futures markets on underlying spot markets, from the perspective of Turkey. In order to make the analyses an expanded form of the GARCH model, which is called EGARCH have been used. With the application of the EGARCH model, the volatilities of ISE-30 index and TRY/DOLLAR currency spot returns have been examined. The results of ISE-30 index analyses showed that the futures trading has a reducing effect on the underlying spot market volatility, whereas the results of TRY/DOLLAR analysis showed that futures trading has no effect on the underlying spot market volatility. Accordingly, it can be said that there is no destabilizing effect of futures markets in Turkey.

Keywords: *futures markets, volatility, garch, egarch*

ÖZET

VADELİ İŞLEM PİYASALARININ SPOT PİYASALAR ÜZERİNE ETKİSİ: TÜRKİYE ÜZERİNE BİR ÖRNEK ÇALIŞMA

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Mart 2007, 80 sayfa

Bu tezde, vadeli işlem piyasalarının, spot piyasalar üzerine etkisi, Türkiye perspektifinden analiz edilmiştir. Analizi yapmak için, EGARCH olarak bilinen, GARCH modelinin genişletilmiş bir biçimi kullanılmıştır. EGARCH modeli uygulamaları ile, IMKB-30 endeksinin ve YTL/DOLAR kurunun spot getirileri üzerinden, fiyat hareketleri incelenmiştir. İMKB-30 endeks analizi sonuçlarında, vadeli işlemlerin, spot piyasa fiyat hareketi üzerinde azaltıcı etkisi olduğu görülürken, YTL/DOLAR kuru analizi sonuçlarında vadeli işlemlerin spot piyasa fiyat hareketi üzerinde bir etkisi olmadığı görülmüştür. Elde edilen bu sonuçlara göre, Türkiye'de vadeli işlem piyasalarının spot piyasa üzerinde destabilize edici bir etkisi olmadığı söylenebilir.

Anahtar Kelimeler: *vadeli işlem piyasaları, fiyat hareketi, garch, egarch*

ACKNOWLEDGMENTS

I express sincere appreciation to Asst. Prof. Dr. Hasan Fehmi Baklacı for his guidance and insight throughout the research. Thanks go to the other faculty members, Asst. Prof. Dr. Ayla Oğuş and Assoc. Prof. Dr. Adnan Kasman, for their suggestions and comments. The technical assistance of Assoc. Prof. Dr. Adnan Kasman is also gratefully acknowledged. Special thanks go to Prof. Dr. Asım Yücel for his great support. To my family, I offer sincere thanks for their unshakable faith in me and their willingness to endure with me the vicissitudes of my endeavors. To my friends, I thank them for understanding my frequent absences.

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INTRODUCTION

Traditionally, risk has been defined as uncertainity in finance literature. In case of uncertainity, financial markets become very sensitive and volatile, because of the relative instability in markets. Thus, dealing with uncertainity, in other words risk management, has always been the most essential issue for professional fund managers. Being the most essential issue, since the inauguration of financial markets, specialists have never stopped looking for different ways to deal with risk.

Following the enhanced globalization in international financial markets, the speed and the amount of capital flows increased, owing to expansion in financial markets. This, in turn, caused financial markets to become deeper. On the other hand, managing risk has become a more complex and harder issue, along with the financial markets development. At this point financial actors needed more effective and complex risk management

instruments. Accordingly, following their introduction, the use of derivative instruments have accelerated.

In a brief definition, a derivative is a financial instrument or security whose payoffs depend on a more primitive or fundamental good. For instance, a wheat futures contract is a derivative instrument, because the value of the futures contract depends on the value of the wheat that underlies the futures contact. The value of a wheat futures contract is derived from the value of the wheat in underlying spot market.

There are mainly four types of financial derivatives namely; forwards, futures, options and swaps. Due to the fact that the majority of the derivative contracts include futures contracts, this study intends to address the impact of futures trading on the underlying spot market.

Historically, many people considered derivatives as recently invented instruments but in reality Thales had been the first person who had implicitly used derivatives in the 5th century BC. He had made a call option in order to get the first call on a wine press. If the harvest is bad, he

would not use his call option but if the harvest is good he would make profit. Eventually, he had made lots of profit. Thus, from this example it is understood that options had been the first used derivative instrument in the finance literature.

Initially, derivatives were used in non-profit agricultural exchange for trading butter and eggs. Then in 1972, CME (Chicago Mercantile Exchange) created the world's first financial futures contract by introducing futures on seven foreign currencies. Financial derivatives have reached a huge popularity and growth following their introduction.

There are several reasons for this improvement :

1) The financial derivatives help to move the market closer to equilibrium and thus, are considered to improve efficiency. If two financial markets are considered which are almost the same, with the exception that one includes financial derivatives, the market including financial derivatives will allow traders more choices for both managing the risk and making investment.

2) In many cases traders find financial derivatives to be a more attractive instrument than the underlying cash security. The transaction costs associated with trading a financial derivative are substantially lower than the costs of trading the underlying cash instrument. Moreover, the return potential for derivatives are higher than the associated spot market instruments. Thus, higher profit potential with lower cost (leverage effect) is one of the major reasons why derivative instruments stand as one of the most attractive financial instruments.

3) One of the most important reason for the popularity of derivative instruments, is the potential for effective risk management. Financial derivatives provide a powerful tool for limiting risks, however, successful risk management with derivatives requires a full understanding of the principles that govern the pricing of financial derivatives.

Despite all of these improvements and benefits, there are also many contradictory opinions about derivative markets. The main theme of these opinions is about its effect on spot markets. It is claimed that derivative markets cause destability and inefficiency on the spot markets and the

economy. The underlying rationale behind this is that the derivatives encourage speculation and thus, has a destabilizing impact on the underlying spot market. Financial experts, governments and academicians started to make analyses to clarify these two distinct opinions. In their analyses, they have used mostly the futures and options markets, either individually or combined to reach any justifiable result. However, they have hardly been able to find clear-cut results. While some of them observed that derivative markets cause inefficiency, the others have claimed the opposite suggesting that derivative markets improve the efficiency on the spot market. In addition, some researches showed that derivative markets have no significant effect on the spot markets.

The analyses of prior studies are based on mainly two subject areas:

1) The lead-lag relationship between these two markets:

The lead-lag relation between price movements of derivatives and the underlying cash market illustrates how fast one market disseminates new information relative to the other one, and how well the two markets are

linked. If one market reacts faster to information, and the other market is slow to react, lead-lag relation is observed which means that the market that reacts faster to information leads the other one and the new information is impounded into prices faster in these markets.

2) The second type of analyses are based on the volatility impact of derivative markets on the underlying spot market following the introduction of derivative markets. In fact, volatility impact analyses have been the dominant analyses to observe if derivative markets are causing any instability on the spot markets. Accordingly, an increase in the underlying spot market volatility, stemming from the transactions of same instruments in derivative markets, indicates that derivative markets are causing instability on spot market.

In this study, the destabilizing effect of the index and foreign exchange futures transactions on underlying spot market instruments in Turkey will be analyzed. The impact of future transactions on underlying spot market will be analyzed by examining how the volatility in underlying spot market has changed following the commencement of future transactions.

In the analysis, an expanded form of the GARCH model called EGARCH (Exponential GARCH) model will be used which is regarded as the most trusted model to examine volatility.

In the second part of the paper, a detailed information about futures markets will be provided. In this part, the basic characteristics of futures markets, their purposes and types of futures contracts will be discussed. In addition, the futures markets in Turkey will also be discussed.

The third part of this study consists of the relevant literature review, which includes the discussion of past studies about this subject and their findings.

The fourth part includes the analysis, which is composed of a brief description of data and model for to be used to examine the impact of both index and foreign exchange futures trading on the volatility of underlying spot markets in Turkey. The results from the analyses will also be conferred.

The fifth and final part is the conclusion, which includes a brief review of the study and discussion of the implication of the findings for further study.

CHAPTER 2

A GENERAL REVIEW OF FUTURES MARKETS

2.1.General Characteristics of Futures

In this chapter, a brief information about the functions and types of futures will be provided. As mentioned before, futures markets have started with the introduction of a non-profit agricultural exchange for trading butter and eggs. Financial futures have become a part of financial markets officially, following the creation of the world's first financial futures contract by CME. The first futures contracts were written on seven foreign currencies in 1972.

A futures contract is an agreement between two counterparties that fixes the terms of an exchange that will take place between these two counterparties at a certain future date on predetermined conditions. It is a derivative security, as its value is derived from the value of the underlying security subject to the futures contract.

Futures contracts are standardized agreements to exchange specific types of good in specific amounts and at specific future delivery or maturity dates. Conventionally, there are only four contract periods per year (March, June, September and December). On the other hand, in Turkish Derivatives Exchange (TurkDEX), contract maturity periods are; February, April, June, August, October and December. However, only the three nearest by maturity of these contracts are being transacted concurrently. These standardized contracts can be exchanged between counterparties very easily through the exchange.

Chicago Board of Trade (CBOT) is the oldest and largest futures exchange in the world. Thus, CBOT's organizational features have been used to illustrate the features of other derivative exchanges.

In CBOT, futures contracts are traded on a central regulated exchange by open outcry, whereby traders congregate periodically in a pit on the floor of the exchange to buy and sell contracts, with every negotiated price being heard by other traders[1]. When an order is executed, the two traders fill out

[1] Kolb, Robert W. 1999. Futures, Options, and Swaps

clearing slips and they are later matched by the exchange. As soon as the order is confirmed by the customers ,the futures contract is settled.

The buyer of a futures contract is said to be in long position and will make profits if the futures price rises. Conversely, the seller of a futures contract is said to be short position and will make profits if the futures price falls.

The number of contracts outstanding at any time is refered as the ''open interest'' at that time.

In futures markets, the functions of the clearing house is very important. The clearing house guarantees fulfilment of all contracts by intervening in all transactions and becoming the formal counterparty to every transaction. Therefore, clearing house bears all the credit risk in futures transactions.

It is also possible to close a position at any time by performing a reverse trade, so it can be said that futures contracts are in most cases extremely liquid.

The clearing house stands against all the credit risk by being the counterparty to every transaction and by using the daily marking-to-market system. At the end of every day's trading, as a result of that day's change in the futures price, the profits or losses of the counterparties have to be settled. Failure to pay the daily loss results in default and the closure of the contract against the default party. Hence, the credit risk of the clearing house is minimized because accumulated losses are not allowed.

In order to establish a futures contract, each counter party must deposit a certain amount of the contract value, this deposit is called ''initial margin''. The initial margin is determined by the clearing house and it is generally equal to approximately 5% - 10% of the contract value. Investors can use cash, T-bills, bonds or stocks for the margin requirement. Even a single day's loss is covered by this deposit. As the margin account falls below a particular threshold which is called the maintenance margin level, it has to be brought back to the initial margin level with additional payments known as variation margin.

The clearing house is also protected from excessive credit risk through the operation of a system called ''daily price limits''. During any trading day, the futures prices can lie within a band centered on the settlement price at the close of business on the previous trading day. If the futures price rises above the upper limit of the band, the market will close ''limit-up''. If the futures price falls below the lower limit of the band, the market will close ''limit-down''. The purpose is to ensure an orderly market by giving market participants a cooling-off period with a chance to reassess their positions[2].

2.2.Functions of Futures Markets

Most people consider futures instruments as the tools that provide speculative gains as in stock exchanges. In reality futures markets are designed for hedging and risk management purposes, that is, to prevent investors from speculation. However, as the derivative markets evolved, the speculators and arbitrageurs have also been involved in futures transactions.

[2] Blake, David. 1990. Financial Market Analysis

Nowadays, futures markets are generally used for these three purposes. Thus, there are mainly three kinds of investors namely; speculators, hedgers and arbitrageurs. Speculators consist of investors willing to make profits by speculative trading. Hedgers consist of investors willing to protect their asset values from fluctuations in price levels. Arbitrageurs consist of investors willing to make sure profits without any risk by seizing the price disparities between futures and spot markets. In addition to these three kinds of investors, there is one more group of investors who wish to discover information about the future course of prices in commodities.

On the other hand, when the social function of futures markets are examined it can be argued that, the speculation and the arbitrage are not regarded as socially constructive. Thus, the futures markets have mainly two social functions, namely the price discovery and hedging.

2.2.1.Price Discovery

Price discovery is the revealing of information about future cash market prices through the futures market. As mentioned above, in buying or

selling a futures contract, a trader agrees to receive or deliver a given commodity at a certain time in the future for a price that is determined now. Due to this circumstance, by using the information contained in futures prices today, market observers can estimate the future price of the commodity. Futures markets serve a social purpose by helping people make better estimations of future cash prices. Accordingly, they can make their consumption and investment decisions more wisely.

Farmers, lumber producers and other economic agents can use futures markets to make production decisions. They all use futures market estimates of future cash prices to plan their production decisions.

2.2.2.Hedging

Hedging is a risk management strategy. The objective of hedging is to transfer risk between individuals or corporation.

Hedging in futures markets involves taking a position in a futures market opposite to a position held in the cash market to minimize the risk of financial loss, which may be caused by price fluctuations.

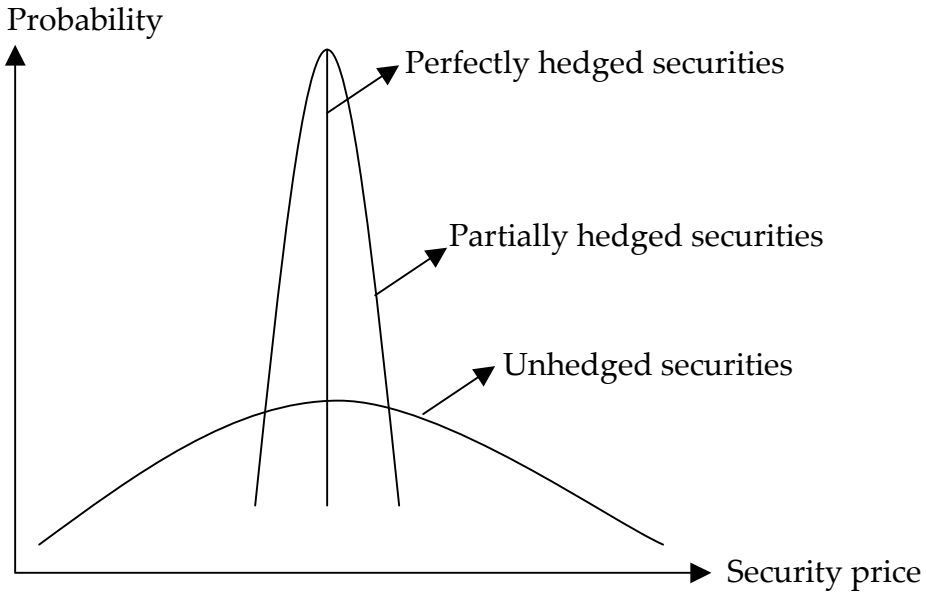
The person who tries to eliminate the risk is called the hedger. Hedgers are concerned with adverse movements in security prices or with increases in volatility which increase the overall riskiness of his position. Thus, they use the futures market as a buffer for a cash market transaction. Every hedger has a preexisting risk associated with the commodity that is being sold and they use the futures market transaction to reduce that risk.

For example, if an individual has a long position in spot (cash) market securities, that individual may incur loss if the prices go down and may want to protect himself against this risky position. Alternatively, if an individual has a short position in spot (cash) market securities, that individual may incur loss if the prices go up and may want to protect himself against this risky position.

In order to hedge successfully and to transfer the risk, the hedgers will have to make the right decision. Hence, the individual with the long position in the spot market should take a short position in futures market. On the other hand, the individual with the short position in the spot

market should take a long position in futures market. Figure-1 shows the effect of hedging on the distribution of security prices.

Figure-1
The Effect of Hedging on The Distribution of Security Prices[3]



A perfect hedge is one in which the hedging instrument is established in such a way that its price movements are perfectly negatively correlated with those of the underlying cash security. In many cases, however, it is not possible to create a perfect hedge because a perfectly correlated hedging instrument is not available. In such cases, only a partial hedge can be established, but this is better than not to hedge at all.

[3] Blake, David. 1990. Financial Market Analysis

2.2.3.Speculation

Literally, speculation can be defined as the trading on anticipated fluctuations in price. Speculation, involves the buying, holding, selling, and short-selling of any valuable financial instrument to profit from fluctuations in its price.

Moving on from this definition, a speculator is a trader, who enters the futures market with the objective of profit and consistent with this objective, is willing to accept magnified risk. Speculators are basically interested in taking either a short or a long position in a particular security in hope of making a quick short-term profit[4].

Most individuals have no heavy risk exposure in most commodities. If we consider an individual who does not use futures markets for hedging purposes, such as farmers, has an interest in the wheat market and trades wheat futures contract, then it can be argued that he is most likely to speculate on the wheat prices. He enters the futures market to make some profit with increased risk.

[4] Eun, Cheol S. and Resnick, Bruce G. 2004. International Financial Management

Mostly, there are three types of speculators; day traders, scalpers, and position traders.

Speculators who will not hold overnight positions are known as day traders. Day traders attempt to profit from the price movements that may take place over the course of one trading day. The day traders close their position before the end of trading each day so that they have no position in the futures market overnight.

The traders that take positions for only a few minutes are known as scalpers. Scalpers aim to foresee the movement of the market over a very short interval, ranging from the next few seonds to the next few minutes.

Finally, the traders that hold positions for more than one day are known as position traders. On occasion they may hold their positions for weeks or even months.

Compared to the spot markets, speculation in futures markets has greater advantages. First of all, it is generally difficult or even impossible to short

cash market securities in sufficient volume to make the speculation worthwhile (Indices for instance). In addition, cash markets may actually be less liquid than the corresponding derivatives market which is important for opening and closing positions rapidly. The major advantage of speculating in futures markets is that only a small amount of capital has to be put upfront to take on large long or short positions.This is known as the leverage effect.

2.2.4.Arbitrage

Arbitrage involves the simultaneous purchase of a security in one market and the sale of it or a derivative product in another market to profit from price differentials between the two markets. Arbitrage means making sure profit without any risk and an arbitrageur is a person who engages in arbitrage actions.

As mentioned above, arbitrage is the simultaneous buying and selling of a security at two different prices in two different markets. The arbitrageur makes profit by taking advantage of the price disparity by selling in one market, while simultaneously buying in the other. Since the disparity is

usually very small, a large volume is required to lock in a significant profit for the arbitrageur. An important factor for arbitrage trade is the transaction costs. Therefore, arbitrageurs have to construct arbitrage bands, to see that if the arbitrage trade is profitable even after transaction costs are taken into account.

Perfectly efficient markets present no arbitrage opportunities, since in a well-functioning market, such opportunities can not exist or disappear very rapidly. If they did exist, there would be many fabulously wealthy people.

2.3.Types of Futures Contracts

There are mainly four types of futures contracts. These are commodity futures, foreign currency futures, interest rate futures and index (generally stock index) futures. In addition, there are more than 50 different subcontracts that are currently avaliable in CBOT. In this section, the characteristics of these four contracts are going to be discussed.

2.3.1.Commodity Futures Contracts

Commodity futures contracts were first used in the agricultural area to protect farmers from the seasonal fluctuations, and to hedge their income. Nowadays it is being used for hedging, speculation and arbitrage purposes.

Parallel to the growth of commodity future markets, the variety of products traded have also expanded. As such, trading of the precious metals as well as the energy derivatives have commenced besides agricultural products.

The primary agricultural products traded include, grains, oil products and cotton. The highest trading volume among precious metals belong to gold, silver and copper. Energy derivatives are mainly comprised of crude oil, heating oil and gasoline.

For many of these commodities, several different contracts are available for different types of the commodity. For the majority of the comodities, there are various delivery months.

2.3.2.Interest Rate Futures Contracts

Interest rate futures contact is a type of contract whose underlying security is a debt obligation. These type of contracts are traded on Treasury bills, notes, and bonds, as well as Eurodollar deposits, and municipal bonds. There are two contracts with three-month maturities being traded on CME, namely T-bills and Eurodollar time deposits. In Turkish Derivatives Exchange (TurkDEX), T-Benchmark interest rate futures contract was introduced on April 24 2006. On the other hand, 91 day T-Bill and 365 day T-Bill are the interest rate futures contracts that are in transition stage to be introduced in near future.

Interest rate futures contracts can be used by hedgers, speculators and arbitrageurs. Trader having T-bills, notes and bonds on their portfolios may use interest rate futures for hedging purposes. Likewise, investors who are willing to make profits due to seize the interest rate fluctuations can also use the interest rate futures to seize arbitrage opportunities.

2.3.3.Foreign Exchange Futures Contracts

Active trading of foreign exchange futures have started with the establishment of the floating exchange rate regimes in the early 1970s.

Firstly, foreign exchange futures were designed to protect both exporters and importers from the currency fluctuations. As the market developed, it has become an attractive instrument for speculators and arbitrageurs, as well. Foreign exchange futures contracts are mostly denominated on the British pound, U.S. dollar, Canadian dollar, Euro, the japanese yen, and the Swiss francs.

2.3.4.Index Futures Contracts

Most of the future contracts include stock indices. One of the most remarkable characteristic about stock index futures contracts is that there is no possibility of actual delivery. A trader's obligation must be fulfilled by a reversing trade or a cash settlement at the end of trading. These contracts mosty used for making profits with speculative actions. To some extent hedgers are also using these contracts but not as much as speculators do.

2.4.Futures Markets in Turkey

In Turkey, the first futures contracts were introduced by Istanbul Stock Exchange (ISE) in 2001. However, the first futures trading trial ended in a very short time because of the insufficient substructure. Afterwards, on February 4 2005, Turkish Derivatives Exchange (TurkDEX) has commenced. By the commencement of TurkDEX, futures trading officially started in Turkey.

Initially, only ISE-30 index, TRY/DOLLAR and TRY/EURO currency futures contracts were introduced. Afterwards, on November 1 2005, the ISE-100 index, on March 1 2006, Gold and on April 24 2006, T-Benchmark interest rate futures contracts were introduced.

According to the regulations in TurkDEX, the contract size of ISE-30 contract is; (ISE-30 index/1,000)*100 TRY and the initial margin is 600 TRY. On the other hand, the contract size of ISE-100 contract is; (ISE-100 index/1,000)*100 TRY and the initial margin is 500 TRY.

In addition, the contract size of Euro contract is 1000 euro and the initial margin is 200 TRY, whereas the contract size of Dollar contract is 1,000 dollar and the initial margin is 150 TRY.

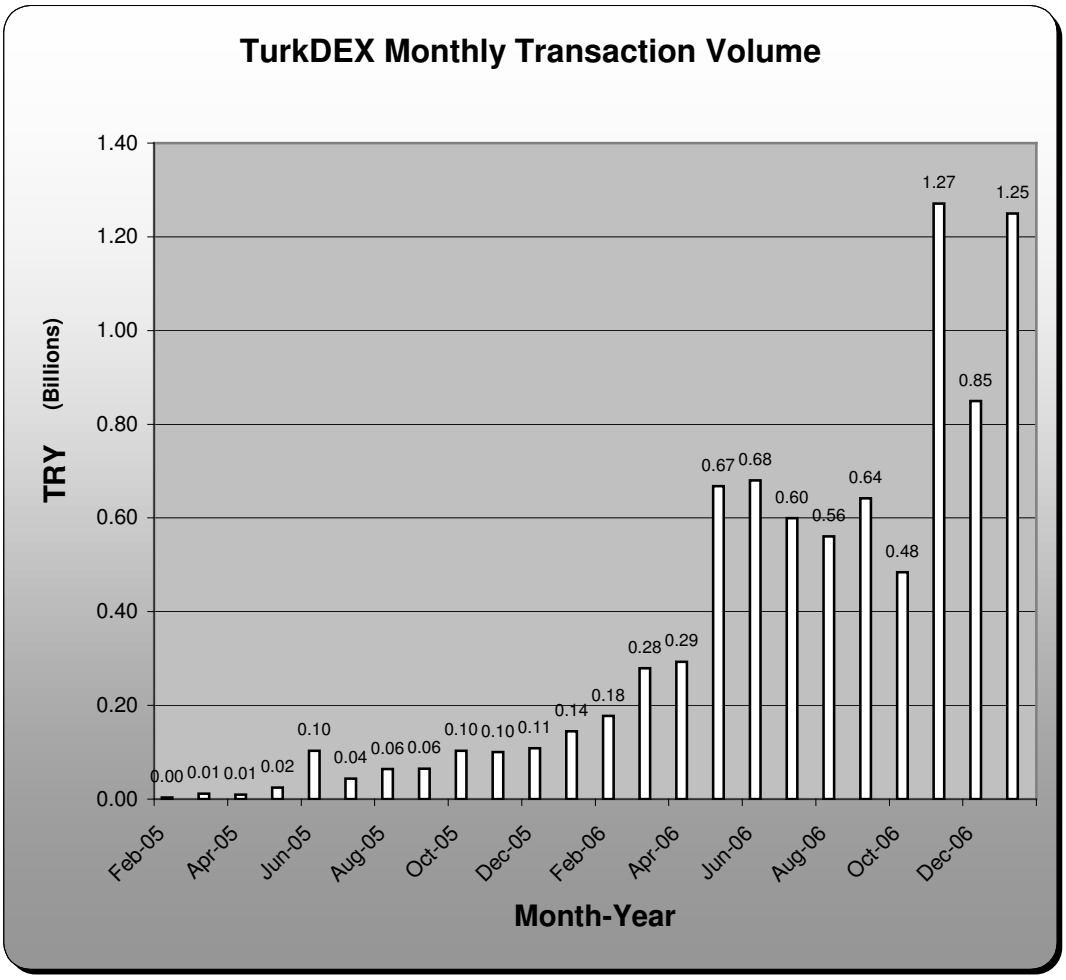
Furthermore, while the contract size of the Gold contract is 100 gr. and the initial margin is 250 TRY, the contract size of T-Benchmark interest rate contract is 10,000 TRY and the initial margin is 300 TRY.

As it is seen, in TurkDEX only futures contracts are traded. Although it is a derivatives exchange market, the other derivative instruments are not planned to be introduced in the short term. Besides, the 91 day T-Bill and 365 day T-Bill interest rate futures contracts are still in line to be introduced.

Figure-2 shows the monthly transaction volume in TurkDEX and it can be observed that the interest in futures trading is increasing on a daily basis. If Figure-2 is examined deeply, it can be observed that there were two big jumps, one on June-2006 and the other one on November 2006. It is can be seen that on June 2006, the transaction volume became 0.67 billion TRY

and on November 2006 the transaction volume became 1.27 billion TRY which is marked as the highest transaction volume to date.

Figure-2



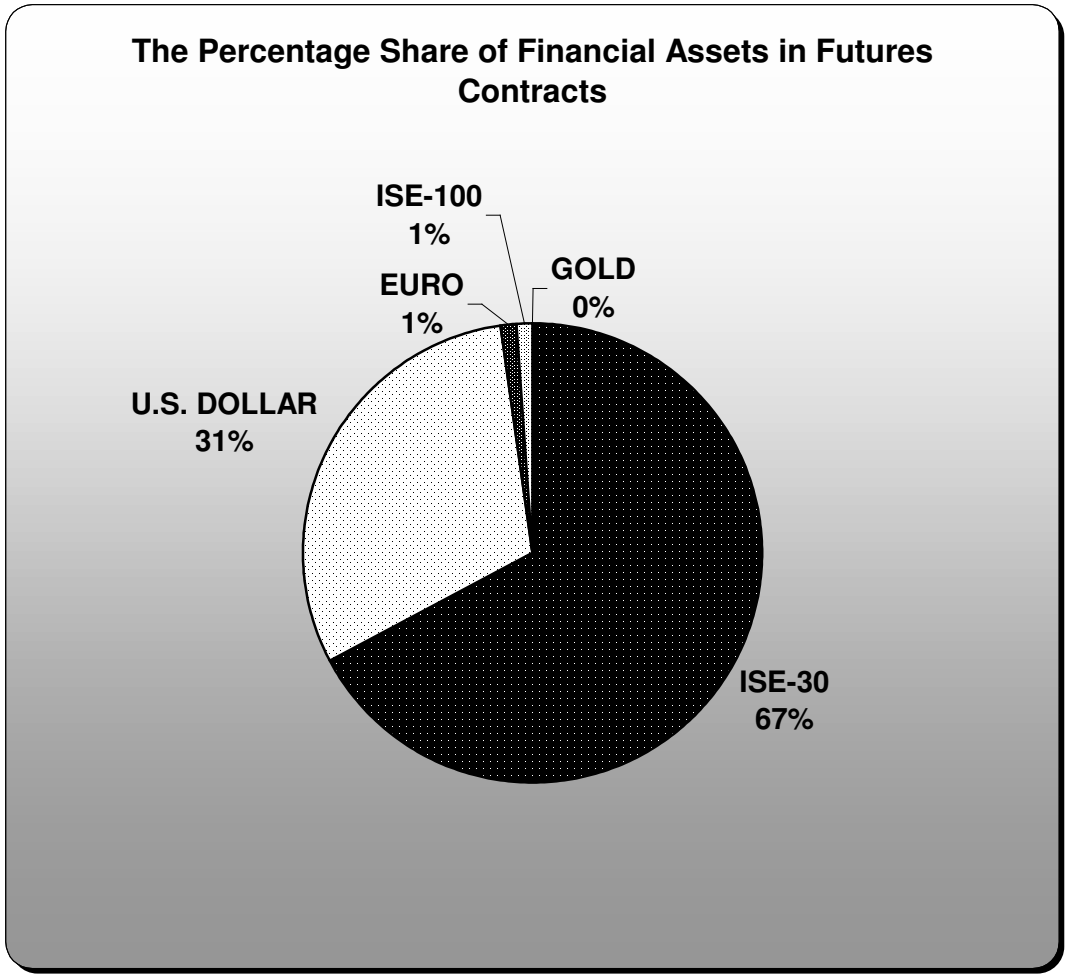
It can also be seen that even though, on December 2006 the transaction volume declined to 0.85 billion TRY, next month it has risen again and became 1.25 billion TRY. The decline on December 2006 can be explained

with cash requirements for the new year celebrations. Considering the Figure-2, it can be said that since it is a very new and developing market TurkDEX is still operating in a very small scale.

On the other hand, in Figure-3, it can be seen that 67 % of all futures transactions contained the ISE-30 index futures contracts transactions. As discussed previously, most of the index futures trading consist of speculative activities. Thus, it can be said that in TurkDEX, speculative activies dominate hedging activities.

It is also seen in Figure-3 that U.S Dollar contracts have been the second highest volumed futures contracts with 36 % share among all futures transactions. However, Figure-3 shows that only 1 % of all futures transactions contained Euro futures contracts transactions, in addition same as Euro futures contracts, the share of transaction volume for ISE-100 futures contracts is also 1 % among all futures transactions. Furthermore, with 0 % share it can be said that there is no considerable demand on Gold futures contracts.

Figure-3



The commencement of Turkdex took approximately 2 years and until the commencement, there were many conflicting thoughts claiming that it was very soon and risky to start a derivatives market in a developing country like Turkey. Nevertheless, it was a very remarkable attempt and it can be monitored that the derivatives markets in Turkey has been improving since its commencement.

Consequently, it can be said that in a very short term, TurkDEX will be an indispensable part of the Turkish financial markets.

CHAPTER 3

LITERATURE REVIEW

After the introduction of futures contracts in CME, futures contracts has become one of the most popular financial instruments because of their positive effects not only on the financial markets but also on the economy. As it is mentioned in the introduction part, their positive effects are basically; altering the risk management schemes of institutional investors, making asset management strategy more active and providing diversification for both the investors and financial institutions which is important for financial markets to come close to the completeness.

As futures contracts became popular in U.S.A. other countries started to introduce futures contracts in their financial markets. Accordingly, futures transactions reached huge volumes all over the world. Albeit the positive sides, there has been always questions and doubts about its effects on the underlying spot market. The main subject of these questions has been the low cost of futures contracts which in turn causes more speculative activity

and thus, destablizes the underlying spot markets by increasing the volatility in the underlying spot markets. However, there were not enough studies to answer these questions until the stock market crash of U.S.A. in 1987 and in 1989. During these stock market crashes, futures markets were blamed as the scapegoats by some financial specialists. Moreover, questions about futures markets became so intense, such that there have been many studies to examine and reveal the effect of futures markets on spot markets. In these studies, various methodologies including simple analysis of variances, linear regression analysis, GARCH models and causality analysis have been used and distinct results have been obtained.

After the stock market crash, Franklin R. Edwards (1989) employed a close-to-close variance model and examined whether the introduction of futures contracts have caused the market crash. He examined both S&P 500 index, Value Line Index, 90-day Eurodollars and 90-day T-Bills. He found that the introduction of financial futures did not destabilize the cash markets and volatility did not increase because of the futures trading. No evidence was found in favor of linking futures trading to an increase in underlying spot

market volatility. In contrast, he found that futures transactions induced short-run volatility.

Smilarly, Benjamin H. Cohen (1999) observed ratios of the variances of multi-day and daily price movements for both bond prices (In U.S.A. and Germany) and stock indices (In U.S.A, Japan and U.K.). As a result he found no evidence that futures increased volatility of the underlying spot markets .

A. Hogson and D. Nicholls (1991) studied the impact of All Ordinaries Shares Index futures on the All Ordinaries Share Index in spot market. He estimated a standard deviation of daily and weekly returns to measure the change in the volatilities of underlying index. The results indicated that the introduction of futures trading has not affected the volatility of underlying index.

Hendrik Bessembinder and Paul J. Seguin (1992) also examined U.S. S&P 500 spot index to see the relations between spot and futures trading activity and volatility in equity markets. They made a variance analysis

and they could not find any evidence supporting the fact that futures trading caused any increase on spot market volatility.

Andreas Pericli and Gregory Koutmos (1994) conducted a smilar analysis to examine the impact of U.S. S&P 500 index futures and options contracts on the volatility of underlying spot market by using an EGARCH model. Their evidence reported that both index futures and options contracts had no escalating effect on the spot market volatility.

An EGARCH model was also used by Ali F. Darrat, Shafiqur Rahman and Maosen Zhong (2000) in examining the effect of U.S. S&P 500 index futures on the spot market volatility. Emprical results of the study suggested that index futures trading did not increase the volatility of spot market. Moreover, they found that volatility in the futures market was an outgrowth of a turbulent cash market.

An extended study on this subject was performed by Christos Floros and Dimitrios V. Vougas (2006) for FTSE/ASE-20 and FTSE/ASE Mid 40 indices in Greece. They investigated the relationship between information and the

volatility by using GARCH, TGARCH and EGARCH models. The results for the FTSE/ASE-20 index suggested that futures trading has led to decreased stock market volatility, whereas, the results for the FTSE/ASE Mid-40 index indicated that the introduction of stock index futures has led to increased volatility. In addition, the results showed that good news had a faster impact on FTSE/ASE-20 stock returns volatility. For the FTSE/ASE Mid-40 index, the results suggested that news is reflected in prices more slowly.

Mario G. Reyes (1996) used an EGARCH model to examine the impact of stock index futures trading on the volatility of the stock indices in Denmark and France. The emprical results suggested that, while index futures trading in Denmark has not destabilized its underlying stock market, futures trading on the CAC 40 index reduced stock price fluctuations in the underlying French stock market. Morever, sub-period analysis indicated that index futures trading changed the returns distribution in both Denmark and France

A different type of GARCH model which is called the GJR model, was used by Corredor Pilar and Santamaria Rafael in order to examine the IDEX-35 index in Spain. The results indicated that since the derivatives markets have introduced, the volatility of the underlying IDEX-35 spot index reduced.

In a further study, John Board, Gelb Sandmann and Charles Sutcliffe (2001) examined the validity of the hypothesis suggesting that futures trading destablises the underlying spot market and leads to an increase in price volatility by using U.K.'s FTSE 100 index. As a result of their analysis in which they have used GARCH and Schwert models; they found no evidence to support the hypothesis. However, in the analysis where they have used SV model, they found a small increase in the spot market volatility. This small difference resulted from estimating the effect of a declining lag structure on futures volume, in the SV model.

As another study scrutinizing the positive effects futures markets on spot markets, P. Bologna and L. Cavallo (2002) observed the Italian Stock Exchange using a GARCH model. Consequently, their evidence reported

that in Italy, futures markets were increasing the spot market efficiency by reducing the underlying spot market volatility.

The Indian stock markets also have been examined by M. Thenmozhi (2002) to see if there has been any change in the volatility of Nifty index due to the introduction of Nifty futures. A GARCH model was used and the results showed that inception of futures trading has reduced the volatility of spot index returns.

Another Indian stock market analysis was conducted by O.P. Gupta (2002) using a different analysis. He examined both the BSE Sensex and S&P CNX Nifty Index from June 1998 to June 2002 to find the impact of index futures introduction on stock market volatility. In his study he has used Parkinson's Extreme Value Estimator, Garman-Klass measure volatility (GKV) as well close-to-close and open-to-open prices. The emprical results of the study reported that the overall volatility of the underlying stock market has declined after the introduction of index futures, when all four measures employed are taken into consideration.

A similar study has been made by Golaka C Nath (2003) in India using static and conditional variance. He modeled conditional volatility using 4 different methods; GARCH(1,1), IGARCH, one year rolling window of standard deviation and a six month rolling standard deviation. His models consisted of randomly selected 20 stocks from the NIFTY and Junior NIFTY basket. In their results, these methods showed that the volatility of the spot market have fallen after the introduction of derivatives market.

M. Illueca and J. A. Lafuente (2003) analyzed the intraday relationships between trading activity in Spanish stock index futures market and spot volatility. A bivariate error correction GARCH model was used to estimate spot volatility. Their emprical findings revealed that there was no destablizing effect of futures trading on spot market.

An extended study was conducted by Shang-Wu Yu (2001) to examin U.S. S&P 500, U.K. FT-SE 100, France General Share, Japan Nikkei 225, Australia All Ordinaries Share and Hong kong Hong Seng Indices. He used a modifed levene statistic and a switching GARCH model to find out the impact of index futures contracts on the volatility of the spot market.

His results suggested that stock market volatility increased after the introduction of stock index futures with the exception of the London and the Hong Kong stock markets; in these two markets it was observed that stock market volatility decreased.

Conversely, some analyse findings supported the hypothesis that futures markets trading leads to an increase in the underlying spot market volatility and destabilize the market. As such, Darren Butterworth (2000) examined FTSE Mid 250 contract to find out the impact of futures trading on underlying stock index volatility by using both symetric and asymmetric GARCH techniques. The results showed that the Mid 250 index futures trading has increased the volatility of spot market.

In another study, Arjun Chatrath, Sanjay Ramchander and Frank Song (1996) analyzed the relationship between futures trading activity and the volatility of five spot exchange rates (British Pound, Deutsche Mark, Swiss Frank, Canadian dollar and Japanese Yen) in U.S.A. They used a GARCH model and the evidence which they found indicated that an increase in the

level of futures trading activity was followed by greater volatility increase in the underlying exchange rates.

Smilarly, Vivek Bhargava and D. K. Malhotra (2000) examined the effect of futures trading activity on the underlying exchange rate volatility in U.S. markets. They used a GARCH(1,1) model to measure the intra-day, historical and conditional volatility of all British Pound, Deutche Mark, Japanese Yen and Canadian Dollar, from 1982 to 2000. Their analysis reported that futures trading increased the spot market volatility in all of the currencies examined.

Hyun-Jung Ryoo and Graham Smith (2004) investigated the impact of stock index futures on the Korean stock market by using a GARCH model. Their results showed that introduction of KOSPI 200 futures contracts have increased the volatiltiy of underlying spot market.

Sung C. Bae, Taek Ho Kwon and Jong Won Park (2004) have also examined the effect of the introduction of index futures trading in Korean markets on spot price volatility with an ARMA variance analysis model.

Like as Ryoo and Smith they have also found that KOSPI 200 futures contracts had an increasing effect on the spot market volatility.

Minho Kim, Gyeong Rok Kim and Mincheol Kim (2004) examined the relationship between the trading activities of KOSPI 200 derivatives contracts and underlying stock market volatility. In their analyses an EGARCH(1,1) model was used. The emprical results suggested that there was a positive (negative) contemporaneous relationship between the stock market volatility and the volume (open interest) for both futures and options contracts. In addition, for the spot market volatility and derivatives volume two-way causality was found for both futures and options contracts, however, for the spot market volatility and open interest two-way causality was found only in options markets.

In a different study , Wee Ching Pok and Sunil Poshakwale (2004) analyzed Malaysian Kuala Lumpur Stock Exchange to see the impact of the introduction of stock index futures trading on the spot market volatility. They developed a GARCH model using data for both the underlying and non-underlying stocks. Their results showed that the

futures trading seemed to increase the spot market volatility of both the underlying and non-underlying stocks. In their study they also examined the lead-lag and causal relationship between futures trading activity and spot market volatility. Their value at risk (VAR) results suggested that the impact of the previous day's futures trading activity on volatility was positive but short (1 day) and this result was also confirmed by Granger's causality test.

The analysis carried out by Min-Hsien Chiang and Cheng –Yu Wang (2002) for Taiwan index futures showed that the initiation of TAIEX futures trading altered the spot price volatility while the initiation of MSCI Taiwan futures trading had no effects on spot price volatility. In their analysis they used the daily volatility measure of Garman and Klass model. They have related their findings to the fact that majority of the investors in TSE were non-instutional investors that were uninformed.

A GARCH model that captures the heteroscedasticity in returns that characterize stock market returns developed by Premalato Shenbagaraman (2002), have examined the effects of Nifty futures contracts on the

underlying spot market volatility in India. The results revealed little evidence that the introduction of new stock index futures in India has destabilized the stock markets.

Against all these studies whose results were mostly one sided, a trivariate simultaneous equations model has been developed by Kyriacos Kyriacou and Lucio Sarno (1999) to examine the dynamic relationship between spot market volatility and derivatives trading (Futures and options) of U.K. FTSE 100 index. Their results suggested that volatility of spot market follows a time-dependent path. In some periods they observed increase in volatility followed by a relative decline in the consequent periods.

Some studies have also examined the volatility patterns and linkages using frequency data. As such; Kalok Chin, K. C. Chan and G. Andrew Karolyi (1991) examined the intraday relationship between price changes and price change volatility in the S&P 500 stock index and S&P 500 stock index futures markets from 1984 to 1989. They found a strong intermarket dependence in the volatility of the cash and futures returns, using a bivariate GARCH model.

In a similar type of volatility analysis, Juan A. Lafuente (2002) examined the intraday lead-lag relationships between returns and volatilities in Ibex 35 spot and futures markets. Using hourly data, the interactions between markets were analyzed with a GARCH model and findings showed a bidirectional causal relationship between market volatilities, with a positive feedback.

Marine D. Racine and Lucy F. Ackert (1998) have examined the interaction between NYSE Composite, S&P 500 and Toronto 35 indexes and their associated futures prices, using a M-GARCH model. Even though, they found that the volatilities were highly correlated, they have also illustrated that the correlation between these markets declined over time.

As a summary, from all these past studies it can be stated that there is not a single answer for the effect of futures trading on the underlying spot market volatility. While some of the results support the idea that futures markets have an increasing effect on the spot market volatility, the other results support the controversial idea that futures markets have no effect on the spot market and even in some cases, they have a reducing effect.

Therefore, it can be said that the effect of futures trading on spot market generally depends on various factors including microstructure of financial markets as well as the economical and social condition of the country.

CHAPTER 4

ANALYSIS

4.1.Methodology

In the financial market analysis, volatility has always been one of the most important research issues. Thus, numerous econometric models have been developed to estimate and examine the volatilities of financial time series. However, until the introduction of the ARCH model, the variance of the errors were assumed to be constant by all the previous models, which is also known as homoscedasticity. Because of the homoscedasticity assumption, the results of the volatility analysis were not considerable enough to make clear decisions

The non-linear ARCH (autoregressive conditionally heteroscedastic) model was developed by Engle (1982). With the introduction of the ARCH model, including the homoscedasticity assumption, most of the imperfections that belonged to the previous models were eliminated.

Before defining the ARCH model, it is important to discuss its differences with the other models. The main features of the ARCH model are basically:

1) In contrast to the other models, ARCH is a heteroscedastic model, which means that the variance of the errors are assumed to be not constant. Assuming the variance of the errors constant in the context of financial time series, was an important flow in the previous models. However, it is also possible to describe the evolution of the variances over time with a heteroscedastic model.

2) The ARCH model imposes an autoregressive structure on the conditional variance, which allows volatility shocks to persist over time and therefore allows for volatility clustering

3) Since, ordinary least-squares (OLS) regression assumes that the variance of errors are constant, the OLS estimations are inefficient in heteroscedastic models. Thus, in order to estimate heteroscedastic models the method called maximum likelihood is being used. Essentially, the method works

by finding the most likely values of the parameters that is given by the actual data.

Accordingly, the ARCH model can be expressed as follows:

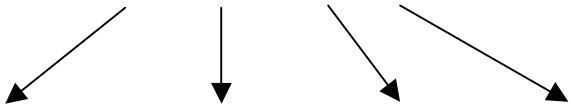
Mean Equation

$$R_t = \alpha + \sum \delta_i R_{t-i} + u_t \quad (1)$$

Return — The constant term — Autoregressive term — Error term

Variance Equation

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 \quad (2)$$



The conditional Variance of u_t — The constant term — News Coefficient — One lagged squarred error

As it is seen from the above model, the conditional variance (σ_t^2) depends on only one lagged squared error (u_{t-1}^2) therefore, this model is known as ARCH(1) model.

If the model includes q lagged squared errors, then it is called ARCH(q), which is the general form of the ARCH model. The ARCH(q) model can be shown as follows:

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \alpha_2 u_{t-2}^2 + \ldots + \alpha_q u_{t-q}^2 \quad (3)$$

In this study an expanded form of the ARCH model which is known as the GARCH (Generalised autoregressive conditionally heteroscedastic) model is applied to estimate the volatilities in order to find the impact of futures trading on the spot market. The reason for selecting the GARCH model over the ARCH model is that the GARCH is a more parsimonious model which avoids overfitting. Therefore, the GARCH model is more eligible on conforming the non-negativity constraints.

The GARCH model was developed by Bollerslev and Taylor (1986). The essential difference between the ARCH and the GARCH model is that the GARCH model also includes the previous own lags of the conditional variance (σ_t^2). Accordingly, the GARCH model can be written as follows:

$$R_t = \alpha + \sum \delta_i R_{t-i} + u_t \tag{4}$$

$$\sigma_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta \sigma_{t-1}^2 \tag{5}$$

Generally, in the finance literature conditional variance (σ_t^2) is represented with h_t, thus, the model can be rewritten as follows:

$$h_t = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 h_{t-1} \tag{6}$$

Since the conditional variance h_t depends on both the last period's squarred error and its conditional variance, the above model is called GARCH(1,1) model. On the other hand the GARCH(p,q) model (The general form of the GARCH model) can be expressed as follows:

$$h_t = \alpha_0 + \sum_{i=1}^{q} \alpha_i u_{t-i}^2 + \sum_{i=1}^{p} \beta_i h_{t-i} \qquad (7)$$

In the GARCH(1,1) model (Equation (6)) the ARCH parameter α_1 represents the news coefficient and the GARCH parameter β_1 represents the persistence coefficient, which can be also defined as the old news.

According to the model if α_1 increases (decreases) it means that the news is reflected into prices more rapidly (slowly) and if β_1 increases (decreases) the model suggests that the old news has a greater (lower) persistent effect on price changes.[5]

Moreover, the increase and decrease in the volatility persistence can be examined by calculating the sum of α_1 and β_1. The GARCH model assumes that if the sum approaches unity, then the persistence of shock to volatility is considered to be permanent.

[5] Brooks, Chris. 2002. Introductory Econometrics for Finance.

However, the standard GARCH model is not enough to examine the impact of futures trading on the underlying spot market volatility. Following the previous studies on this issue, an additional dummy variable is needed in order to carry out the analysis. Thus, the standard GARCH(1,1) model with a dummy variable can be specified as follows:

$$R_t = \alpha + \sum \delta_i R_{t-i} + u_t \tag{8}$$

$$h_t = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 h_{t-1} + cD_f + u \tag{9}$$

Where D_f is the dummy variable, which takes zero value for the pre-futures period and one for the post-futures period.

If the coefficient on the dummy is found statistically significant it means that the introduction of futures has an impact on the spot market volatility. If the coefficient of the dummy variable is positive(negative), the effect of futures trading on volatility is positive(negative).

As it is known, the standard GARCH model with a dummy variable is a symmetric model. In other words, the model assumes that both negative and positive innovations have the same impact on the volatility. However, it is argued that the negative shocks have a deeper effect on the volatility than the positive shocks. Therefore, in order to test asymmetric effect there are two specialized GARCH models which are called TGARCH ('treshold' GARCH) and EGARCH (exponential GARCH).

The TGARCH model, which is also known as GJR, was developed by Glosten, Jagannathan and Runkle (1993). The model is similar to the classic GARCH model with the exception of an additional term ($vu_{t-1}^2 I_{t-1}$).

The additional term is added into the model with the aim of calculating the possible asymmetries. Therefore, the TGARCH(1,1) model with a dummy variable can be defined as follows:

$$R_t = \alpha + \sum \delta_i R_{t-i} + u_t \tag{10}$$

$$h_t = \alpha_0 + \alpha_1 u_{t-1}^2 + \beta_1 h_{t-1} + v u_{t-1}^2 I_{t-1} + cD_f \tag{11}$$

According to the TGARCH model, if **v>0**, then there is an asymmetric effect in other words, the leverage effect exists. In addition, the condition for non-negativity in TGARCH model will be $\alpha_0 \geq 0, \alpha_1 \geq 0, \beta_1 \geq 0$, and $\alpha_1 + v \geq 0$

On the other hand, the logarithm of the TGARCH model is called the EGARCH model which is developed by Nelson (1991). Since it is a logarithmic model, there is no restriction for the non-negativity condition. The EGARCH(1,1) model is specified as follows:

$$R_t = \alpha + \sum \delta_i R_{t-i} + u_t \tag{12}$$

$$\log h_t = w + \alpha_1 \left| \frac{u_{t-1}}{\sqrt{h_{t-1}}} \right| + v \frac{u_{t-1}}{\sqrt{h_{t-1}}} + \beta_1 \log h_{t-1} + cD_f \tag{13}$$

In contrast to the TGARCH model, the EGARCH captures asymmetries differently. In the EGARCH model if the coefficient v is statistically significant it means that the asymmetric effect exists. On the other hand, while the parameters α_1 and $\alpha_1 + v$ represent the effect of positive and negative shocks on the volatility in TGARCH(1,1), α_1 and v in

EGARCH(1,1) represent the magnitude and sign effects, respectively. In addition, the EGARCH model assumes that, if the relation between volatility and returns is negative, the coefficient of additional term (ν) will be negative.

In this study, EGARCH(1,1) model is used in order to investigate the impact of futures trading on the volatility of the underlying asset in the spot market. To do this, ISE-30 index and TRY/DOLLAR currency returns are used.

4.2.Data

Trading of futures contracts in Turkey began on 04 February 2005. Starting from the openning day the ISE-30 index and TRY/DOLLAR currency futures contracts have been the most transacted contracts in TurkDex. Accordingly, the effect of the introduction of both futures contracts is examined in this study.

The ISE-30 index is a capitalization of weighted index comprising the top 30 selected Turkish stocks that are traded in the Istanbul Stock Exchange market. Daily closing prices for the ISE-30 index are used over the period 05 February 2003 to 23 January 2007. The period from 05 February 2003 to 04 February 2005 represents the pre-futures period and the period from 04 February 2005 to 23 January 2007 represents the post-futures period.

On the other hand, daily closing prices for the TRY/DOLLAR currency are used over the period 18 February 2003 to 23 January 2007. The period from 18 February 2003 to 04 February 2005 represents the pre-futures period and the period from 04 February 2005 to 23 January 2007 represents the post-futures period.

Closing prices for ISE-30 index were obtained from the data base of www.analiz.com and www.ise.org. On the other hand, for TRY/DOLLAR currency, closing prices were obtained from the data base of www.tcmb.gov.tr

The data set of ISE-30 index consists of 984 observations and for the TRY/DOLLAR currency there are 990 observations. The reason for the difference between the data sets is, on 28 October 2005, 02 November 2005 and 09 January 2006 there were no transactions in ISE market because of the unfavorable wheather conditions.

Furthermore, the closing prices for 31 August 2006 and 27 October 2006 omitted from the data set of both ISE-30 index and TRY/DOLLAR currency, following the non-existence of any transaction in TurkDEX on those days.

In the data section, it is also important to investigate the descriptive statistic results of the daily returns (Table-1 and Table-2). The reason for investigating the descriptive statistics, is to see if the data set is normally distributed or not. If the data set is normally distributed, it means that the data set is not feasible for applying a non-lienar EGARCH model. In contrast, if the data set is not normally distributed, it can be said that an EGARCH model can be applied.

The descriptive statistics of daily ISE-30 index and TRY/DOLLAR currency spot returns are provided for the full sample period (pre and post futures period).

Daily returns are calculated by using the following expression:

$$R_t = \log(P_t / P_{t-1}) \tag{14}$$

Daily return — Price

Table-1 presents the descriptive statistics of daily ISE-30 index spot returns. In the descriptive statistics table; mean, median, maximum, minimum, standard deviation, skewness, kurtosis, jarque-bera values and number of observations can be seen.

Table -1 shows that the number of observations is 983. In addition, it can be seen in Table-1 that standard deviation value of the daily returns is very low (0.020607), therefore, it might be said that the daily return values of ISE-30 index are close to the mean value (0.001383). It is also observed that

while the maximum value is 0.110999, the minimum value of ISE-30 index returns is –0.135893.

Table-1
Descriptive Statistics for Daily ISE-30 Index Spot Returns

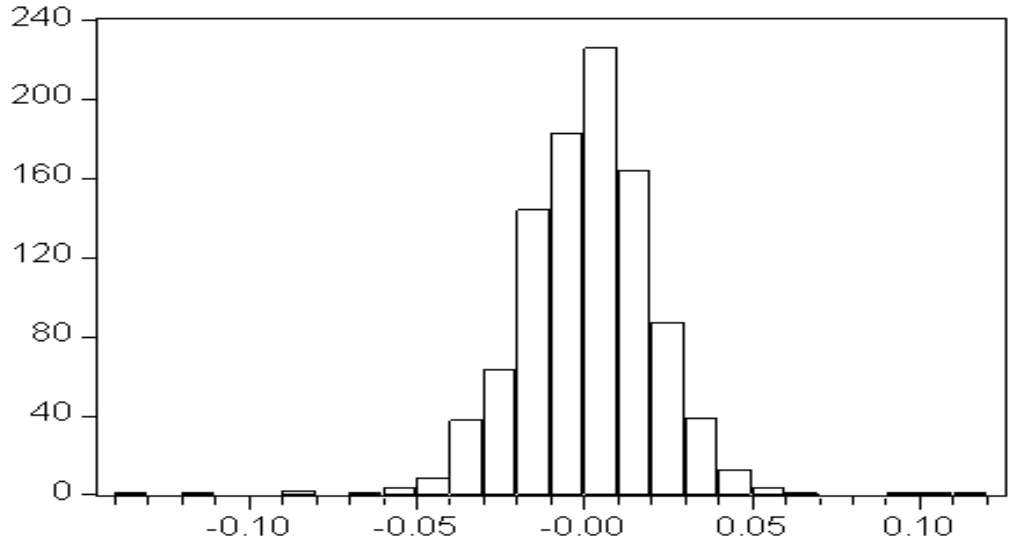
Number of observations	983
Mean	0.001383
Median	0.001868
Maximum	0.110999
Minimum	-0.135893
Standart Deviation	0.020607
Skewness	-0.252035
Kurtosis	7.733341
Jarque-Bera	928.0585
Probability	0.000000

Furthermore, it is seen in Table-1 that the skewness value of data set is negative (-0.252035) thus, in terms of skewness measurement it can be said that the data set is skewed to the left, this can be observed more clearly in Figure-4. Besides, the time series graph of ISE-30 index returns is presented in Appendix 1. The dashed line represents the opening day of

TurkDEX. As it is seen in Appendix 1, before the opening day there are four jump points between February 2003 and January 2004. The reason for these jumps might be ongoing impact of 2001 deep economical crisis in Turkey. In addition, it is seen in Appendix 1 that there is a particular jump point after the opening day of TurkDEX, between May 2006 and June 2006. This particular jump observed might be ascribed to fluctuation observed in the global financial markets on May 2006.

Figure-4

Distribution of Return Series for ISE-30 Index



On the other hand, Table-1 shows that in terms of kurtosis measurement the kurtosis value is quite higher (7.733341) than the standart normal

distribution value (3). Therefore, the data set is said to be not normally distributed and the positive value of kurtosis indicates a peaked distribution, this can be also observed in Figure-4.

In addition, from Table-1 it can be seen that the Jarque-Bera value is very high (928.0585). In terms of Jarque-Bera measurement the high value proves that the data set is not normally distributed.

Finally, The descriptive statistic results clearly show that the data set of ISE-30 index is not normally distributed. According to the results it can be also said that the data set is confirming presence of volatility clustering. Moreover, the results confirms that variance of the data set is heteroscedastic. Thus, it can be directly suggested that the data set is available for applying an EGARCH model.

Table-2 presents the descriptive statistic results of daily TRY/DOLLAR currency spot returns. Table -2 shows that the number of observations is 989. It is also observed that while the maximum value is 0.110999, the minimum value of ISE-30 index returns is –0.135893.

Table-2
Descriptive Statistics for Daily TRY/DOLLAR Currency Spot Returns

Number of observations	989
Mean	-0.000154
Median	-0.000969
Maximum	0.047721
Minimum	-0.027757
Standart Deviation	0.008016
Skewness	0.949767
Kurtosis	7.084826
Jarque-Bera	836.2835
Probability	0.000000

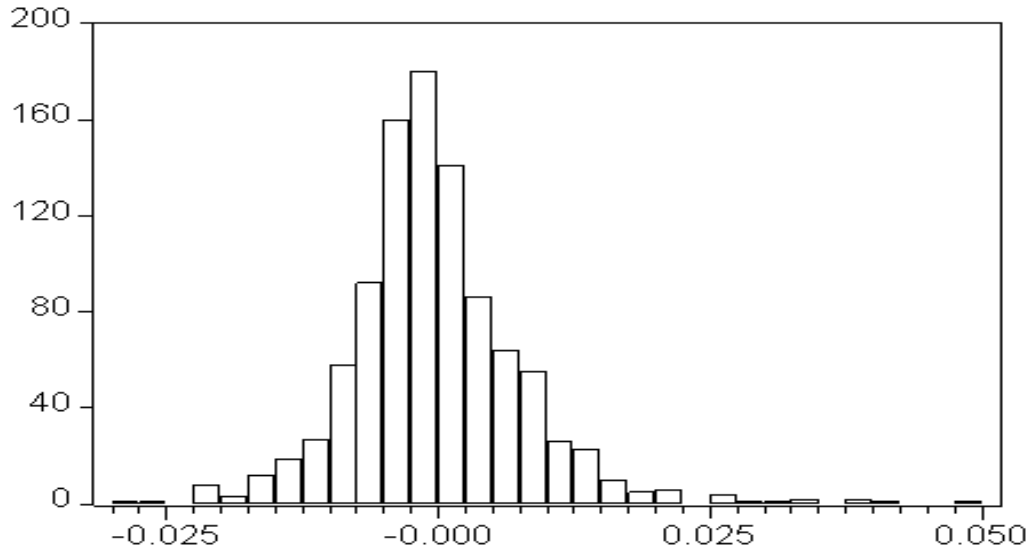
Descriptive statistics in Table-2 show that the standard deviation value of daily returns is very low (0.008016). Thus, it is understood that the daily return values of TRY/Dollar currency are close to the mean value (–0.000154). On the other hand, as the skewness value of the data set (0.949767) is observed in Table-2, the positive value suggests that the data set is skewed to the right. This can be also seen in Figure-5. On the other

hand, the time series graph of TRY/DOLLAR currency returns is presented in Appendix 2. The dashed line represents the opening day of TurkDEX

As it is seen in Appendix 2, there are two big jump points after the opening day of TurkDEX. The first one, which is between May 2006 and June 2006, might be caused by the fluctuation observed in international as well as Turkish financial markets in May 2006. The second one, which is between September 2006 and November 2006, might have stemmed from the rising conflict with European Union in the negotiation process.

Figure-5

Distribution of Return Series for TRY/DOLLAR Currency



Moreover, the high kurtosis value (7.084826) in Table-2 proves that, the data set of daily returns is not normally distributed and the positive value indicates a peaked distribution. In Figure-5 the peaked distribution of data set can be seen. In addition, the Jarque-Bera value (836.2835), which is shown in Table-2, is very high. Hence, it can be said that the data set is not normally distributed.

Consequently, the descriptive statistic results of TRY/DOLLAR currency suggest that, the data set of daily returns is not normally distributed. Furthermore, the results confirm the presence of volatility and the heteroscedasticity. Thus, the data set of TRY/DOLLAR currency is available for an EGARCH model application.

4.3.Empirical Results

In this section, first the empirical results of ISE-30 index analysis then the empirical results of TRY/DOLLAR currency analysis will be investigated. The econometric Eviews software program is used in order to make the analysis.

4.3.1.Empirical Results of the ISE-30 Index Analysis

For the ISE-30 index analysis, the results of EGARCH model specified in Equations (12) and (13) are reported in Table-3 and Table-4.

The Table-3 shows the constant term (α) value of the mean equation. The results show that the constant term (0.001069) is significant at the 10 % level. The residual graph and standardized residual graph of ISE-30 Index analysis can be seen in Appendix 3 and Appendix 4

Table-3
Mean Equation for ISE-30 Analysis

α	$\sum \delta_i R_{t-i}$*
0.001069	-
(1.848986**)**	**(-)**

*The autoregressive terms were insignificant

Table-4 represents the results of variance equation for ISE-30 analysis. The results indicate that all coefficients are statistically significant at the 5 % level. The hypothesis tests are made according to the Z statistics and the values that are in parenthesis shows the Z-statistic values of the coefficients.

Table-4
Variance Equation for ISE-30 Analysis[6]

w	α_1	v	β_1	c
-0.532733	0.146195	-0.063492	0.944799	-0.030320
(-3.764448)	(6.421444)	(-3.699233)	(51.91194)	(2.163886)

The EGARCH model expression says that if the coefficient v is statistically significant then the asymmetric effect exists. Since the coefficient v is significant, then it can be said that there is an asymmetric effect for ISE-30 index. In other words the positive and the negative innovations have a different effect on the volatility. Furthermore, the negative value of coefficient v defines that the negative innovations have a greater effect on the volatility.

To examine the impact of futures trading on the volatility of underlying spot market, the statistical significance of the dummy coefficient is checked. It is observed that the coefficient is negative and significant at the 5 % level. Since, the coefficient **c** is statistically significant, it can be said

[6]In the sample period, when the volume series for ISE-30 transactions were visually inspected, two distinct periods consisting of a low volume followed by a sudden jump in ISE-30 Index volume (beginning February 2006) were observed. In order to test the possible impact of sudden volume changes on volatility, the sample period for ISE-30 Index transactions are further divided into two sub-sample periods representing low and high volume periods. Specifically, an additional dummy variable is utilized to separate high and low volume periods. However, the results indicated that the coefficient of additional dummy variable is insignificant. Accordingly, it can be said that there is no impact of volume on the volatility.

that there is a decrease in volatility associated with the introduction of futures.

Consequently, the results presented in Table-4 show that the introduction of ISE 30 stock index futures has a negative effect on the volatility of the underlying spot market.

4.3.2.Empirical Results of the TRY/DOLLAR Currency Analysis

Table-5 and Table-6 presents the results of EGARCH model analysis for TRY/DOLLAR currency. In Table-5, α represents the constant term of the mean equation and the results show that the constant term is significant at the 10 % level. The residual graph and standardized residual graph of TRY/DOLLAR analysis can be seen in Appendix 5 and Appendix 6.

Table-5
Mean Equation for TRY/DOLLAR Analysis

α	$\sum\delta_i R_{t-i}$*
-0.000341	-
(-1.720808**)**	**(** - **)**

*The autoregressive terms were insignificant

The variance equation table (Table-6) presents the results of the analysis. According to the results, although the coefficient (v), that represents the asymmetric effect, is significant at the 5 % level, the positive value (0.056401) indicates that there is no asymmetric effect for TRY/DOLLAR currency.

Table-6
Variance Equation for TRY/DOLLAR Analysis

w	α_1	v	β_1	c
-0.842896	0.324226	0.056401	0.939646	-0.001355
(-7.726858)	(8.510657)	(2.571252)	(95.23656)	(-0.089670)

On the other hand, the coefficient (c) that represents the futures trading impact on the underlying spot market volatility, is statistically non-significant. Thus, futures trading has no impact on the underlying spot market volatility.

Consequently, the results presented in Table-6 show that the introduction of TRY/DOLLAR currency futures has neither negative nor positive effect on the volatility of the underlying spot market.

CHAPTER 5

CONCLUSION

In this study, the impact of the futures markets on the spot markets is examined. It is a well-known fact that the aim of the futures markets is to hedge the expected risk. However, in order to make higher profits, the speculative trading activities have been generally more than the hedging activities. Thus, the arguments about the impact of futures trading are mostly based on its negative effects on the underlying spot market, following the intense speculative trading activities.

It is mentioned in the previous chapters that in order to examine the impact of futures trading on the underlying spot market, the most feasible method is to examine the volatility of the underlying spot market. As it is presented in the literature review chapter, the previous studies on this issue show that in different markets the futures trading has either positive or negative effects on the underlying spot market.

This study examined the impact of futures market on the underlying spot market from the perspective of Turkey. In order to make the analyses, ISE-30 index and TRY/DOLLAR currency are selected. The reason for selecting the ISE-30 index and TRY/DOLLAR currency is that the futures contracts of those two instruments cover the 98 % of the transactions in Turkish Derivatives Market (67 % ISE-30 index and 31 % TRY/DOLLAR currency).

The empirical results of the analysis show that the introduction of ISE-30 index futures contracts reduced the volatility of the underlying spot market. This result suggests that the ISE-30 index futures trading has a positive impact on the underlying spot market in terms of volatility.

If the implications for this positive impact of ISE-30 index futures trading are examined, it might be argued that majority of the transactions in ISE-30 index futures contracts seem to be for hedging purposes rather than the speculative activities and thus has a stabilizing effect on underlying spot market.

In addition, after the 2001 economical crisis, Turkish economy showed a constant stability including the analysis period of this study. As it is known, after the deep 2001 economical crisis in Turkey the government started to apply tight economical policies. The policies consist of; leaving the fixed currency regime and subsequently starting the flexible currency regime, regulations about the privacy of central bank and regulations about the banking system.

Following the applications, the economic indicators showed that the Turkish economy started to stabilize and these improvements made foreign capital investments flow into Turkish capital markets and increased the liquidity. Accordingly, it might be also suggested that the increase in liquidity might contribute to the reduction in volatility of ISE-30 spot index. Indeed, as more data becomes available in the Turkish market, further studies would be beneficial in order to make more clear decisions

On the other hand, the empirical results of TRY/DOLLAR currency analysis suggest that the futures trading of TRY/DOLLAR currency has

neither negative nor positive impact on the underlying spot market. In fact, this is not an unexpected result, according to the circumstances of Turkish economy.

It is known that the Central Bank of Turkey aims to control the volatility of currencies and tries not to allow volatilities to fluctuate more than expected. Thus, it might not be possible to examine the volatility fluctuations for currencies. In addition, when compared to the spot market, the transaction volume is very low in futures market for TRY/DOLLAR currency. Because of these reasons, there might not be any observable effect of futures markets on underlying spot markets for TRY/DOLLAR currency.

Consequently, this study shows that the introduction of futures market in Turkey has not increased the volatility of underlying spot market. Moreover, the results suggest that the ISE-30 index futures trading contributes to the underlying spot market efficiency by reducing the volatility of underlying spot market. Thus, it can be said that there is no destabilizing effect of futures markets in Turkey.

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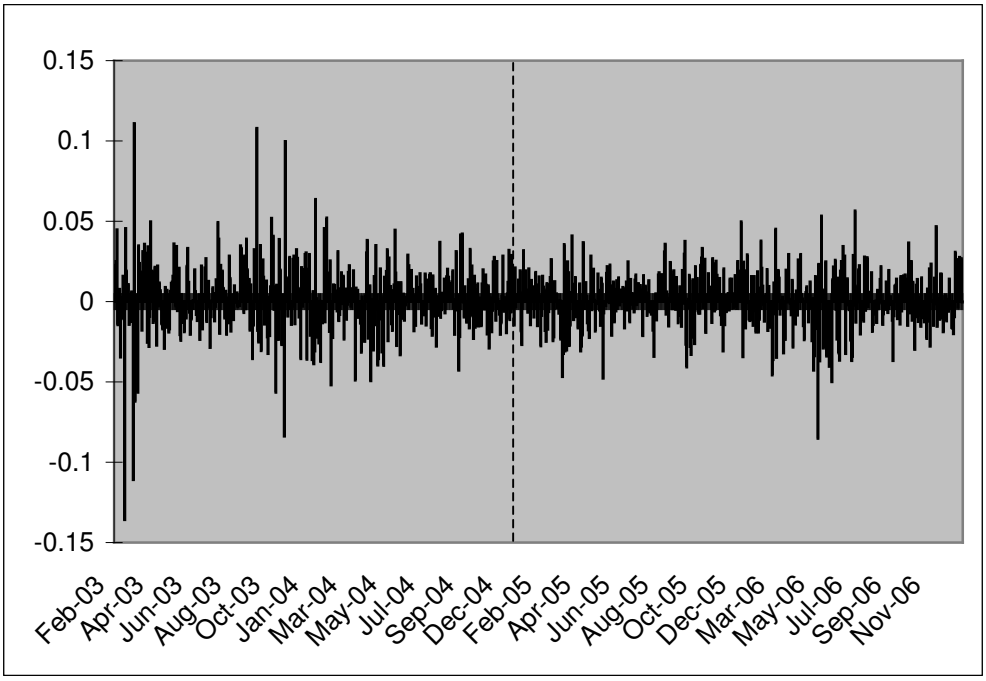
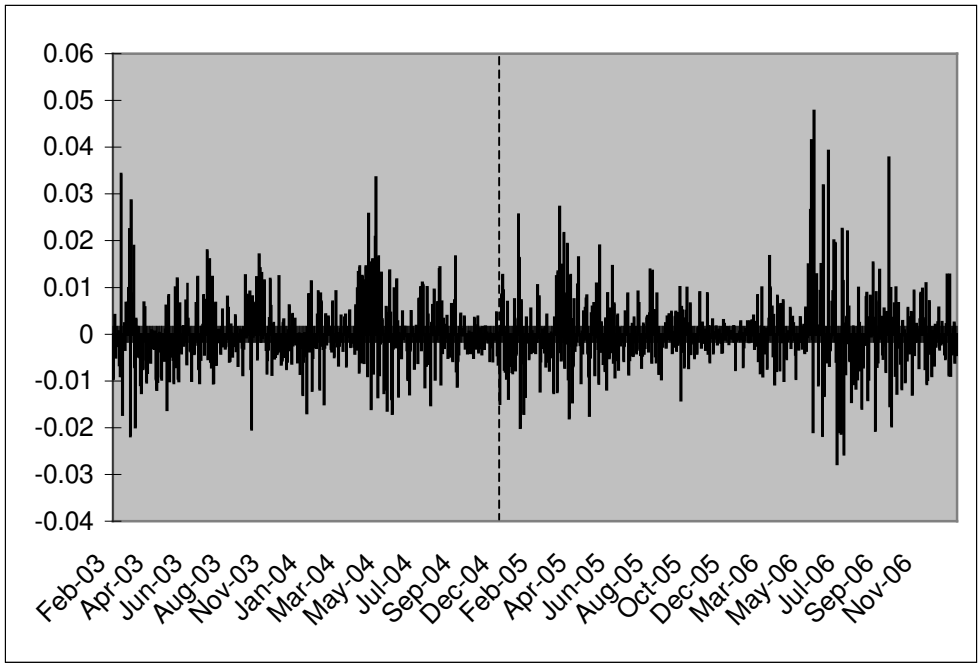
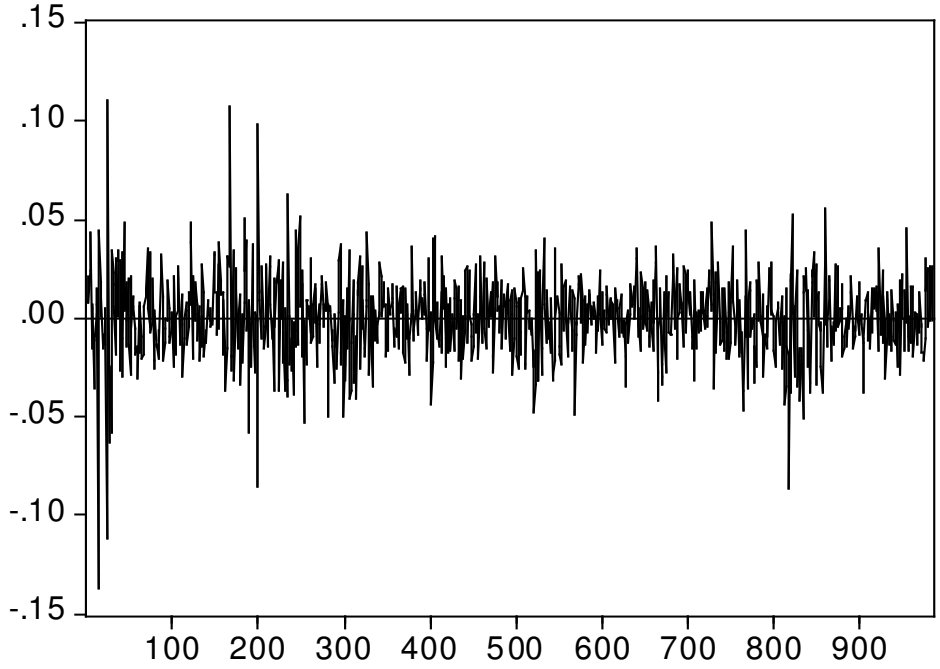
APPENDIX 1:
Graph of Time Series for ISE-30 Index Returns



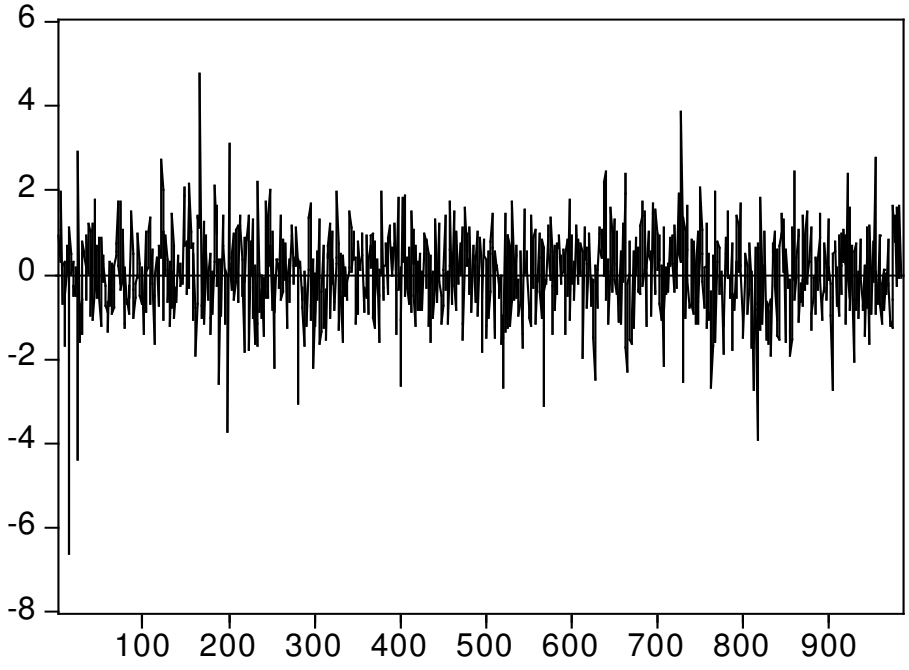
APPENDIX 2:
Graph of Time Series for TRY/DOLLAR Currency Returns



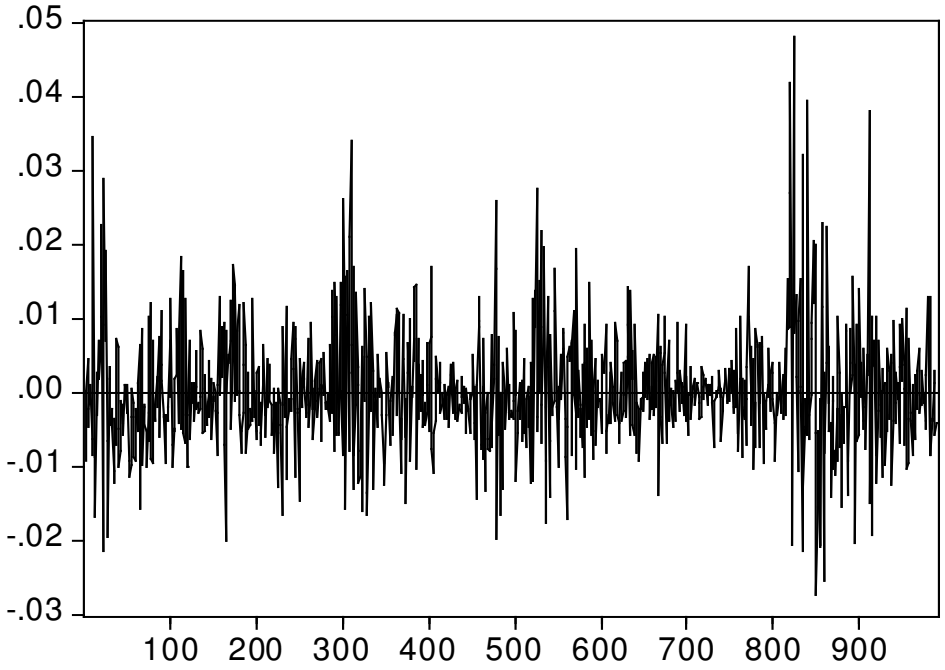
APPENDIX 3:
Graph of Residuals for ISE-30 Index Analysis



APPENDIX 4:
Graph of Standardized Residuals for ISE-30 Index Analysis



APPENDIX 5:
Graph of Residuals for TRY/DOLLAR Currency Analysis



APPENDIX 6:
Graph of Standardized Residuals for TRY/DOLLAR Currency Analysis