

T. C.
DOKUZ EYLÜL ÜNİVERSİTESİ
SOSYAL BİLİMLER ENSTİTÜSÜ
İNGİLİZCE İŞLETME YÖNETİMİ ANABİLİM DALI
YÜKSEK LİSANS TEZİ

**THE INTEGRATION OF ISTANBUL STOCK
EXCHANGE (ISE) TO THE EUROPEAN UNION STOCK
MARKETS**

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Danışman
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2006

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FOREWORD

I would like to thank my advisor, Associate Professor Pınar Evrim Mandacı, for her help in my writing the thesis. I am very grateful for her patience and kind attitude to me, for her support while I am abroad. I am thankful for her contribution to my personal and academic development. Working with her has been really a pleasure for me.

I would also like to thank Professor Banu Durukan and Associate Professors Tülay Yücel, and Adnan Kasman for their kindness and contribution to my knowledge in the field of finance and econometrics.

Last, I would like to thank my parents, my sister and her husband for their belief in me, for their trust and support while I am in Turkey, for their belief and support in my writing the thesis, for their efforts and help they provide throughout my whole life. I am thankful.

ÖZET

Tezli Yüksek Lisans Projesi

İMKB'nin Avrupa Birliđi Hisse Senedi Piyasalarına Entegrasyonu

Dejid Vantchikova

Dokuz Eylül Üniversitesi

Sosyal Bilimler Enstitüsü

İşletme Ana Bilim Dalı

İngilizce İşletme Programı

Uluslararası piyasaların entegrasyonu finans literatüründe çok popüler bir konudur. Bu çalışmanın amacı Avrupa Birliđi'ne aday olma potansiyeli taşıyan ülke olarak Türkiye'nin hisse senedi piyasasının, AB hisse senedi piyasalarına entegre olup olmadığını belirlemektir.

Çalışmada Türk hisse senedi piyasası ve AB hisse senedi piyasaları arasındaki uzun dönemli eşbütünleşmeyi ölçmede Engle-Granger eşbütünleşme testi kullanılmıştır. Çalışmada ele alınan örneklem grubu gelişmiş ve gelişmekte olan ülkeler olmak üzere iki gruba ayrılmıştır. Burada amaç, Türk Hisse Senedi Piyasasının AB'deki gelişmiş ülkelerle mi ya da gelişmekte olan ülkelerle mi daha fazla entegre olduğunu saptayabilmektir. Çalışmada kullanılan veriler AB'deki gelişmiş ülkelerin ve İMKB'nin 1988-2006 ve gelişmekte olan piyasaların 1994-2006 dönemine ait aylık hisse senedi fiyat endeksleridir.

Çalışmadan İMKB ile AB'nin hem gelişmiş hem de gelişmekte olan piyasaları arasında uzun dönemde eşbütünleşme olduğu sonucuna varılmıştır. Türk Hisse Senedi piyasası ile çalışmada ele alınan ülkeler arasındaki eşbütünleşmenin varlığı, AB yatırımcılarının Türk hisse senetlerini portföylerine katmaları ile yapacakları uluslararası çeşitlendirmeden sağlayacağı faydayı kısıtlamaktadır. Aynı zamanda, çalışmada kukla değişken kullanılarak eşbütünleşmenin Gümrük Birliđi sürecinden sonra artıp

artmadığı test edilmeye çalışılmıştır. Sonuçlar, bize Gümrük Birliği'nden sonra AB'nin gelişmiş piyasaları arasında yer alan Avusturya piyasası ve Macaristan haricindeki Doğu Avrupa gelişmekte olan piyasaları ile eşbütünleşmenin arttığını göstermektedir. Piyasalar arasındaki kısa dönemli ilişkileri analiz etmede kullanılan Hata Düzeltme Modeli sonucunda gelişmiş piyasalarında her ay %7, gelişmekte olan piyasalarında %8 oranında dengesizlik durumu düzeltildiği görülmektedir.

Anahtar Kelimeler: 1) Eşbütünleşme, 2) Uluslararası Çeşitlendirme,
3) Hisse Senedi Piyasaları

ABSTRACT

Master Degree Thesis

**The Integration of the Istanbul Stock Exchange (ISE) to the European Union
Stock Markets**

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The issue of international market integration has been very popular in the finance literature. The aim of this study is to investigate whether the Turkish stock market is integrated or not with the European Union stock markets as a potential candidate for entering the EU.

I use Engle-Granger co-integration test to investigate long-run co-integration relations between the Turkish stock market and the European Union stock markets. I divide the sample into developed and emerging markets in order to assess whether the Turkish stock market is integrated more with the developed or with the emerging markets of the European Union, or both. The data used are monthly stock price indices from 1988 through 2006 for developed markets of the EU and from 1994 through 2006 for emerging markets of the EU.

The results indicate the presence of long-run co-movements for all the markets, both the developed and emerging, i.e., there is co-integration between the Turkish stock market and the EU stock markets indicating limited benefits for portfolio diversification for the European Union investors in the Turkish stock market. Also, using a dummy variable I examine whether integration between the ISE and the EU markets increased

or decreased during the post-Customs Union period. The results show increasing co-integration only with the Austrian market among the developed markets of the EU and with the Eastern European markets except Hungary, integration with all the other markets decreased after the passage to the CU. The analysis of short-run relations between the markets using Error Correction Model shows that in average 7 percent of disequilibrium is corrected each month in the developed markets and 8 percent of disequilibrium is corrected each month in the emerging markets.

Key Words: 1) Co-integration, 2) International Diversification, 3) Stock Markets

THE INTEGRATION OF ISTANBUL STOCK EXCHANGE (ISE) TO THE EUROPEAN UNION STOCK MARKETS

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ABBREVIATIONS

ADF	Augmented Dickey and Fuller
AIC	Akaike Information Criterion
ASEAN	Association of Southeast Asian Nations
CAPM	Capital Asset Pricing Model
CU	Customs Union
ECM	Error Correction Model
EE	Eastern European
EM	Emerging markets
EME	Emerging market economies
EMU	European Monetary Union
EU	European Union
IFC	International Finance Corporation
IMF	International Monetary Fund
IPO	Initial Public Offerings
ISE	Istanbul Stock Exchange
FDI	Foreign Direct Investment
MENA	Middle East and North Africa
NAFTA	North American Free Trade Association
PP	Phillips and Perron

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INTRODUCTION

The degree of international equity market integration has received increasing attention in recent years. Changing economic policies, especially the liberalizing of capital market constraints, developing of emerging markets have increased both the level of interest in international money and capital markets and the ability to invest in markets worldwide. The global scale October 1987 stock market crash and the subsequent Asian and Russian crises of 1997-1998, the formation of different economic alliances as European Community, later on, European Union (EU), North American Free Trade Association (NAFTA), Association of Southeast Asian Nations (ASEAN) motivated many researchers to examine the various aspects of international equity market relations (Atteberry and Swanson, 1997; 24).

For example, Bracker and Koch (1999) analyze the correlation structure across international equity markets of Australia, Canada, Germany, Hong-Kong, Japan, Mexico, Singapore, Switzerland, the UK, and the US using daily returns from 1972 through 1993. They hypothesize that the correlation matrix does not change over time but the results reveal substantive changes over both short and long time horizons throughout the 22-year sample period. Aggarwal and Kyaw (2004) basing on daily, weekly, and monthly data for the period 1988-2001 examine by means of Johansen cointegration test equity market integration in the NAFTA region (including Canada, the USA, Mexico) before and after the passage of NAFTA in November 1993. Their results indicate that the three NAFTA countries are co-integrated only for the post-NAFTA period. Also, there is stronger cointegration for the US-Canada and the US-Mexico pairs of markets in the post-NAFTA period. Click and Plummer (2005) using the times series techniques of cointegration examine whether the ASEAN-5 (Association of Southeast Asian Nations) countries: Indonesia, Malaysia, the Philippines, Singapore, and Thailand are integrated or segmented. Their results of the cointegration test based on daily and weekly data over the period July 1, 1998-December 31, 2002 reveal that the ASEAN-5 stock markets are co-integrated. Jun

et al. (2003) using daily return data for twenty seven emerging markets measure liquidity and stock returns in emerging equity markets. They find that stock returns in emerging countries are positively correlated with aggregate market liquidity as measured by turnover-ratio, trading value and the turnover volatility multiple. Ng (2000) basing on weekly returns from March 1975 to December 1996 examine how and to what extent volatility in a Pacific-Basin market (including Hong-Kong, Korea, Malaysia, Singapore, Taiwan, Thailand) is influenced by foreign shocks from other national markets, namely, the US and Japan. Ng, by considering innovations from the Japanese and the US markets as regional and world shocks respectively, analyze how much of the return volatility of any particular market in the Pacific-Basin is driven by a world factor and how much is left to be explained by a regional force. The results of the analysis show that both regional and world factors are important for market volatility in the Pacific-Basin region, although the world market influence tends to be greater. Kearny (2000) using monthly returns of Britain, France, Germany, Japan, and the US over the period from July 1973 to December 1994 study volatility across the countries. The results of the multivariate cointegration test indicate that world equity market volatility is predominantly caused by volatility in the Japanese/US markets rather than the European markets and world equity market volatility is transmitted more to the European than to the Japanese/US markets.

In addition to these studies, the cointegration methodology developed by Engle and Granger (1987) and Johansen has given rise to numerous studies of long run relationships between stock markets, which have important implications for portfolio theory and diversification issues. Investigations on the existence of long-run stock market relations have traditionally focused on developed markets of Western Europe, the US and Japan, recently, there has been a shift in attention to the emerging markets. For example, DeSantis and Imrohoroglu (1997) analyze stock returns and volatility in emerging financial markets and find strong evidence of time-varying volatility. They also find that volatility is considerably higher in emerging markets, both at the conditional and unconditional level.

Among the emerging markets the most investigated have been emerging markets of Asia and Latin America, as well as Central and Eastern European markets. Works devoted to investigations of the Turkish stock market on its financial linkages with the European Union (EU) stock markets are few.

The purpose of this study is to examine stock market linkages between Turkish and European Union markets as well as diversification opportunities for EU investors in the Turkish market. In particular, I examine the extent to which index prices are integrated to one another. The study uses Engle and Granger (1987) cointegration test and Error Correction Model (ECM) to investigate long and short run relationships of the stock markets. In order to examine the degree of integration at the post-Customs Union period I introduce a dummy variable. I choose Turkey and the EU countries because Turkey is a candidate for entering the European Union. Since the EU aims at the economic, commercial and political integration of the European countries (Bayar and Onder, 2000; 83), it is interesting to examine, as a part of this integration, whether the Turkish equity market is integrated with the European Union equity markets. I divide the EU markets into two: developed and developing. I do this in order to find out whether, if it is, the Turkish stock market is integrated more with developed countries, or, whether it is integrated with developing economies, as Turkey represents a developing economy, or both. The study contributes to the literature in the aspect that it will have important implications for investors, portfolio managers, and financial managers in corporations.

The paper is organized as follows. Part I is devoted to emerging and developed markets and international integration literature, as well as international diversification and benefits. Part II gives market characteristics of the markets of the study and compares the Istanbul Stock Exchange with the European Union markets according to market capitalization, trade value, and number of listed companies. Part III introduces methodology, data, and hypotheses of the study and represents the results of the analysis. Finally, I give conclusion to the study.

CHAPTER 1

THE WORLD EQUITY MARKET INTEGRATION AND INTERNATIONAL DIVERSIFICATION

1.1 World Equity Markets

The financial industry makes a distinction between two main categories of international markets: developed and emerging. The two typically differ in size, liquidity, risk, volatility, accessibility, and the impact they have on the global economy — though there are no strict rules that differentiate the categories (Path to Investing, 2006).

1.1.1 Developed Markets

According to the Wikipedia encyclopedia, developed markets are those countries that are thought to be the most developed and therefore less risky. As Wikipedia states, according to Morgan Stanley Capital International, developed markets as of May 2005 are the following: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, United Kingdom, United States (Wikipedia, 2006).

The developed markets account for more than 80% of the market capitalization in the global equity market. The nations of Asia (except Japan), the Indian subcontinent, Eastern Europe, the Middle East, Africa, and South America are generally considered emerging markets (Path to Investing, 2006)

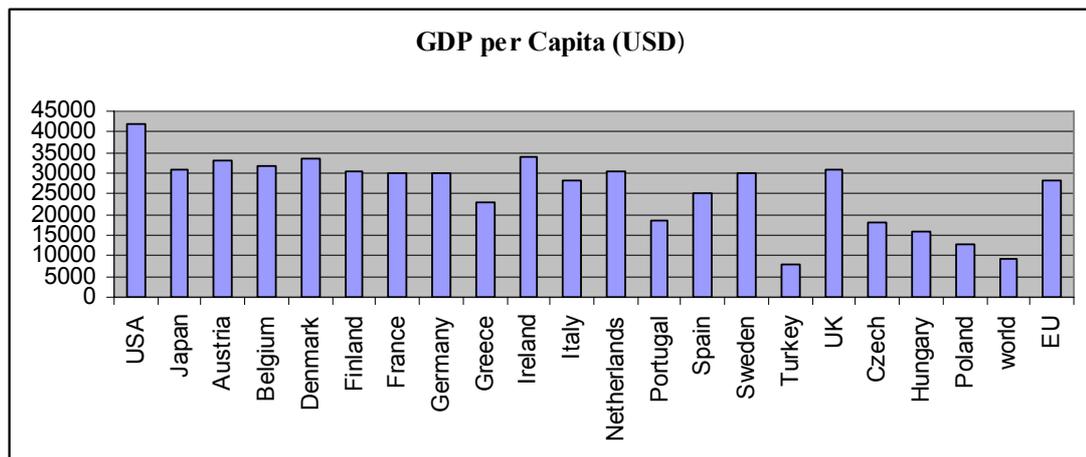
Developed markets are large, both in market value and volume of trading, and they generally have a well-established infrastructure of financial services companies. This makes developed markets more liquid, i.e., there is an efficient system in place to match buyers and sellers, and there are enough buyers to make it easy to liquidate an investment at a fair market price (Path to Investing, 2006).

In developed markets trading is transparent and ups and downs in these markets are fairly easy to follow. Plus, the financial press and financial Web sites report regularly on what's happening. And because the governments are stable in developed markets, political risk to which investors can be exposed to in the developed markets is as it is, for example, in the United States (Path to Investing, 2006).

The traditional criterion for ranking the state of a development of a country is its level of income, measured by the gross domestic product (GDP) per capita. Developed nations are high income countries (Solnik, 1996; 252), their broad stock indexes are generally less risky than those of emerging markets (Bodie, Kane, and Marcus, 2005; 906); developing countries are low income countries (Solnik, 1996; 252).

Graph 1.1 indicates the highest GDPs per capita for developed countries for the year 2005. As for Turkey, GDP per capita of Turkey is the lowest.

Graph 1.1. GDP per Capita of Some Selected Countries (2005)



GDP per capita and other economic indicators of the countries of the analysis are given for comparison in Table 1.1.

Table 1.1 Economic Indicators of Some Selected Countries (2005)

Economy	GDP (\$ bill).	GDP per capita	Real growth rate (%)	Inflation rate (%)
USA	12,410	42,000	3.5	3.2
Japan	3,914	30,700	2.4	-0.2
Austria	269.6	32,900	1.8	2.3
Belgium	330.6	31,900	1.5	2.7
Denmark	181.6	33,400	2.8	1.9
Finland	159.7	30,600	2.2	1.2
France	1,822	30,000	1.6	1.9
Germany	2,454	29,800	0.9	2
Greece	243.3	22,800	3.3	3.8
Ireland	136.9	34,100	4.7	2.7
Italy	1,651	28,400	0.2	1.9
Netherlands	501.6	30,600	0.7	1.7
Portugal	196.3	18,600	0.8	2.4
Spain	1,017	25,200	3.4	3.4
Sweden	268.3	29,800	2.6	0.5
Turkey	552.7	7,900	5.1	7.7
UK	1,869	30,900	1.7	2.2
Czech Republic	185.7	18,100	4.8	2
Hungary	161	16,100	3.9	3.7
Poland	489.8	12,700	3.5	2.1
World	59,590	9,300	4.4	1-4 (developed) 5-20 (developing)
European Union	12,180	28,100	1.7	2.2

Source: CIA, The World Factbook, April 2006.

Developed markets received a lot of attention in the finance literature of the past years. Researchers investigated different aspects of the stock markets of the developed countries.

Concerning early works on the issue of financial linkages and co-movement of developed markets, examples may be the following. Jorion and Schwartz (1986) applying the Capital Asset Pricing Model (CAPM) on monthly returns from January 1963 to December 1982 examine the issue of integration versus segmentation of the Canadian stock market relative to a global North American market and find the Canadian market to be segmented. Kasa (1992) using co-integration methods on monthly and quarterly data from January 1974 through August 1990 examines the existence of long-run relations between the US, Japan, England, and Germany and finds the presence of a single common trend driving these countries' stock markets. Arshanapalli and Doukas (1993) using daily stock price index data over the period beginning January 1980 and ending May 1990 analyze by means of Engle-Granger cointegration test the linkages and dynamic interactions among stock price indices of French, German, and the UK stock markets. They find that France, Germany and the UK stock markets are not related to the US stock market for the pre-October 1987 crash period, but for the post-crash period the three markets are strongly co-integrated with the US stock market.

Other examples for the developed markets are some recent works. Pascual (2003) basing on quarterly data beginning from 1960 till 1986 assesses long-run comovements in the UK, French, and German stock markets using cointegration techniques and reveals that the UK and German stock markets do not show evidence of changes in the degree of financial integration, as for the French market, it does show the evidence of increasing financial integration. Rangvid (2001) investigates the convergence of German, French, and the UK markets applying a recursive common stochastic trend analysis. Using share price indices spanning the period from 1960 to 1999 Rangvid proves the European stock markets were being increasingly integrated throughout the 1980s and 1990s,

indicating by this that the European stock markets are to an increasingly extent being driven by the same growth factors. Francis and Leachman (1998) study share price co-movements in the US, UK, Japanese and German stock markets using monthly data covering the period from January 1974 to August 1990. Conducting Johansen and Johansen-Juselius cointegration tests they establish the presence of a cointegrating relationship between these markets. Vo and Daly (2005) performing cointegration tests on daily stock market indices of the French, German, Greek, Irish, Dutch, Spanish, the UK, and the US markets for the period from 16 February, 1988 to 15 December, 2003 analyze co-integration between the US and the European Union equity markets. Their results indicate that between 1993 and 1998 when the European equity markets were in a process of financial and economic convergence in preparation for the EMU and a single currency there was mixed evidence of cointegration ties with the US equity market, but over the period covering introduction of the euro (1998-2003) five of the seven markets (the exceptions are Spain and the UK) do not show any evidence of cointegration with the US market.

1.1.2 Emerging Markets

In contrast with developed markets, emerging markets are usually significantly smaller, often newer, and may be considerably less liquid, which results in greater volatility. Also, there is much political instability as well. As for number of stocks, in some well-established emerging markets, for example, fewer than 300 stocks are listed on the country's exchange (Path to Investing, 2006).

There are many various definitions of an emerging market in the financial literature. I will give here two definitions that, to my mind, most precisely define an emerging market.

According to the definition of an emerging market that uses Choudry (1997) referring to the International Financial Corporation, an emerging market is any market in a developing economy with the implication that it has all the potential for development. The basic idea behind the term is that emerging market countries "emerge" from less developed status and join the group of developed countries. In development economics, this is known as convergence (Bekaert and Harvey, 2002; 2).

According to Investopedia (Investopedia, 2006), an emerging, or developing, market economy (EME) is defined as an economy with low-to-middle per capita income. As Investopedia states, such countries constitute approximately 80% of the global population, representing about 20% of the world's economies. While developing countries make up over 80% of the world's population, they make up less than 10% of the world stock market capitalization (Investorhome, 1999).

As I have already mentioned, the nations of Asia, except Japan, the Indian subcontinent, Eastern and Central Europe, the Middle East, Africa, and South America are considered emerging markets. According to the World Bank, the

five biggest emerging markets are China, India, Indonesia, Brazil and Russia (The World Bank, 2006).

Emerging market economies (EME) are characterized as transitional, meaning they are in the process of moving from a closed to an open market economy while building accountability within the system. Examples include the former Soviet Union and Eastern bloc countries. As an emerging market, a country is embarking on an economic reform program that will lead it to stronger and more responsible economic performance levels, as well as transparency and efficiency in the capital market (Investopedia, 2006).

The emerging equity markets in a number of developing countries in Asia, Eastern Europe, Latin America, and the Middle East grew rapidly during the second half of the 1980s and throughout most of the 1990s (Barari, 2004; 649). According to Barari, this growth was made possible to a significant degree by market-oriented, financial liberalization policies.

By financial liberalization, according to Bekaert and Harvey (2003), is meant allowing inward and outward foreign equity investment. In a liberalized foreign equity market, foreign investors can, without restriction, purchase or sell domestic securities. In addition, domestic investors can purchase or sell foreign securities.

Referring to Parametric White Paper, for some time emerging markets have achieved higher long-term economic growth rate than the developed world, and this trend is set to continue. The World Bank estimates that developing countries will see real annual GDP growth per capita of around 3.5% between 2006 and 2016 compared to 2.4% for high income countries. Growth in the Asian region and in countries of Central and Eastern Europe is likely to be even most pronounced (Parametric White Paper, 2006).

The emerging markets have become the focus of numerical researches as they have become to present a good arena for portfolio diversification. According to Neaime (2005), this new focus stems from the fact that these markets present portfolio and fund managers a new possibility to enhance and optimize their portfolios.

Emerging capital markets are quite different from their counterparts in developed countries. They differ in the degree of volatility, in the information-based features that make emerging markets not fully efficient, in the institutional infrastructure, which includes market entry and exit regulations, and in the investment tax structure (Papaioannou and Tsetsekos, 1997; 4).

The international interest in emerging stock markets has come in several stages. In the 1980s the Asian “tigers” (Hong Kong, Korea, Singapore, and Taiwan) attracted much attention because of their rapid economic growth rates. The entry of Greece and Portugal into the European Common market provoked a financial boom in those countries in the mid-1980s. Latin American countries regained international honorability when Brady plans (a US strategy that emphasized debt-forgiveness for highly indebted developing countries (Cato.org, 2006)) brought a solution to the rescheduling of their nonperforming debts, and their stock markets offered attractive returns in the early 1990s. The disintegration of communism in Eastern Europe led to the development of market economies and the hope for investment opportunities for foreigners. However, according to Solnik, successful stock markets have so far developed only in the Czech Republic, Hungary, and Poland. China has started to industrialize and open up to foreign investment. Some African markets, such as Zimbabwe or South Africa, are envisaged as part of a global diversification strategy (Solnik, 1996; 251).

According to Papaioannou and Tsetsekos (1997), the implementation of financial liberalization measures has varied widely across emerging market economies. Some markets followed a fast pace of financial reforms as, for

example, Singapore, and the overwhelming majority as Turkey, Korea, and Mexico, etc., followed a more gradual reform process.

In addition to macroeconomic policies and financial liberalization measures, many emerging market governments have also paid close attention to institutional factors that inhibit portfolio investment. The risks associated with institutional factors involve the tax/accounting and legal systems, the financial infrastructure, and cumbersome bureaucratic procedures. Accounting practices are particularly important. Many emerging markets have instituted accounting systems that are perceived as fair and accurate and have thus gained investors' confidence (Papaioannou and Tsetsekos, 1997; 27). The Far Eastern countries, most notably Korea, are examples of countries that have adapted swift and quick policy measures in the early 90s. Turkey and other countries such as Mexico, Portugal, and Spain, also have instituted policy adjustments and institutional changes at a reasonably fast pace and thus have also experienced an influx of foreign capital flows (Papaioannou and Tsetsekos, 1997; 28).

Generally, as state Papaioannou and Tsetsekos (1997), in today's world of globalization and financial liberalization, governments of emerging market economies are strongly bounded and to a large degree have followed the general policy of relaxing excessive controls and regulations of their financial systems. In the 1980s, most of the liberalization programs of the domestic financial system were accompanied by the relaxation of restrictions on international capital flows and a shift toward more flexible exchange rate arrangements. Such developments encouraged international investors to actively invest their funds in the most liberalized emerging equity markets.

The growth and globalization of emerging stock markets today are impressive. In 1994, emerging market capitalization was 1.9\$ trillion, compared to 0.2\$ trillion in 1985 (Demirguc-Kunt and Levine, 1996; 291). The market capitalization of emerging market countries has more than doubled over the past decade, growing from less than 2\$ trillion in 1995, it is set to exceed 7\$ trillion in

2006. As a percentage of world market capitalization, emerging markets are now more than 12% and steadily growing (International Finance Corporation, 2006).

1.1.3 Financial Markets Integration

The increasing integration of national stock markets is already well documented (Ayuso and Blanco, 2001; 266). In financially integrated markets, domestic investors are able to invest in foreign assets and foreign investors in domestic assets; hence, assets of identical risk have identical expected return, regardless of trading location. Moving from a segmented regime to an integrated regime affects expected returns, volatilities, and correlation with world factors, all of which are important for both risk analysis and portfolio construction. Consequently, the concept of market integration is central to the international finance literature (Bekaert, Harvey and Lumsdaine, 2002; 204).

A good survey on international equity market integration made Kearney and Lucey (2004) in their article “International Equity Market Integration: Theory, Evidence, and Implications”. They research the literature on international equity market integration and give overall summary of definition and measures of international financial integration. As Kearney and Lucey state, international financial markets have developed rapidly throughout the last four decades. According to them, this development is documented in terms of internationalization, securitization, and liberalization. In terms of internationalization, the pace of activity has grown faster than real output in the major industrial countries, but this has been accompanied by even faster growth in offshore financial market activity. Concerning securitization, there has been a move away from indirect finance to direct finance through international bond markets. Liberalization has resulted in the removal of domestic quantity and price restrictions, greater international participation in domestic financial markets, more cross-border capital flows, and new financial instruments.

Further on, they give three basic approaches to defining the extent to which international financial markets are integrated. These approaches fall into two broad categories: direct and indirect measures. The first approach, a direct measure, is based on the logic that unrestricted international capital flows through searching the best available return would lead to an equalization of the rates of return across countries. This approach is called a direct measure because it invokes the law of one price. The second and third approaches are indirect ones. The second approach invokes the concept of international capital market completeness. This definition asserts that financial integration is perfect when there exists a complete set of international financial market participants to insure against the full set of anticipated states of nature. The third approach concerns sourcing domestic investment. This definition requires that for a country that is small in world financial markets, exogenous changes in national savings can be financed from abroad, with no change in real interest rates.

As for the measures of international equity market integration, Kearney and Lucey cite three measures. They are: testing the segmentation of equity markets via the international CAPM, testing the extent and determinants of changes in the correlation or cointegration structure of markets, and time-varying measures of integration that recognizes weaknesses of these tests. Also in their article Kearney and Lucey give some examples of studies on international market integration.

In recent years the quantity of research on interdependence of stock markets of both developed and developing countries has been high and extensive. As I have mentioned, early works on market integration were mostly devoted to developed markets, later on, there have been a shift in attention to emerging markets.

Among emerging markets the most investigated have been emerging markets of Asia and Latin America. Early studies on capital market integration in the Pacific Basin region concentrated on integration between Japan and the US

(Phylaktis, 1999; 269). Recently there has been a lot of interest in other Pacific Basin countries. The Asian markets mostly received attention after the Asian crisis in 1997. For example, Chelley-Steeley (2004) based on daily stock market index data over the period January 3, 1990 to January 30, 2002 measures speed of integration of four Asian-Pacific markets of Korea, Singapore, Thailand, and Taiwan, namely, the extent to which the four Asia-Pacific countries have become less segmented in recent years. She performs the smooth transition model that assumes that the move from one regime to another is not instantaneous but a gradual process. Her results indicate Korea, Singapore, Thailand becoming less segmented at a relatively fast pace both locally and globally, in contrast, the market of Taiwan not showing evidence either local or global integration. Manning (2002) basing on weekly and quarterly information over the period January 1988 to February 1999 and using cointegration techniques examines the South East Asia markets of Hong-Kong, Indonesia, Japan, Korea, Malaysia, Philippines, Singapore, Thailand, Taiwan, as well as the US, and finds that they show signs of convergence during the 1990s. Phylaktis and Ravazzolo (2002) investigate financial links simultaneously at the regional and global level for a group of Pacific-Basin countries by analyzing covariance of monthly excess returns over the period 1980-1998. They find that there is substantial integration between domestic and international financial markets in Hong-Kong, Singapore, Malaysia, the Philippines and Indonesia, while views are divided for Korea and Thailand. Leong and Felmingham (2003) using cointegration techniques on daily data from July 8, 1990 to July 6, 2000 explore five East Asian stock price indices (those of Japan, Singapore, Hong Kong, South Korea and Taiwan) and conclude that these markets are interrelated, thereby limiting the opportunities for the diversification of risk in these markets.

Choudhry (1997), Chen et al. (2002), Barari (2004) have examined the Latin American markets. For example, Choudhry (1997) using cointegration techniques for weekly data from January 1989 to December 1993 investigates the long-run relationship between stock indices from six Latin American markets of Argentina, Brazil, Chile, Colombia, Mexico, and Venezuela and the United States and

indicates the presence of it. Chen et al. (2002) using Johansen multivariate cointegration test for daily stock price index data ranging from 1 February 1995 to 30 June 2000 analyze stock price linkages of the same six emerging markets: Brazil, Mexico, Argentina, Venezuela, Chile, and Colombia, and find that until 1999 there was cointegration among these countries and, accordingly, risk diversification opportunities were limited, but between 1999 and 2000 there was no evidence of cointegration implying that investors could diversify their portfolio by buying stocks in the six countries. Barari (2004) using the Akdogan test of measuring the degree of cointegration on the basis of integration or segmentation according to the regional or global integration finds for the sample of the six Latin American markets between January 1988 and December 2001 be a trend of increased regional integration relative to the global one until the mid-1990s, but during the second half of the 1990s there is noted a change in trend with global integration proceeding faster than regional integration.

The Central and Eastern European markets have also attracted much attention in recent years. Following the collapse of communism, the countries of Central and Eastern Europe rapidly adopted the institutions associated with market economies (Hanousek and Filer, 200; 624). Formal stock markets were created; gradually the markets of the Czech Republic, Hungary, and Poland have become the principal emerging markets in Europe and, accordingly, global investors as well as many researchers became interested in these markets (Scheischer, 2001; 27). Gilmore and MacManus (2002) applying Johansen cointegration procedure on weekly data over the 1995-2001 period examine cointegration between the Czech Republic, Hungary, and Poland and the US stock markets and find no long-term relationships of the three markets, either individually or as a group, with the US stock market, suggesting that there are benefits of international diversification for long-term US investors. In contrast to this, Voronkova (2004) using daily data over a period September 7, 1993 and April 30, 2002 investigates the existence of long-run relationships between the three most advanced emerging Central European stock markets and the developed markets of Europe (Britain, France, Germany) and the USA and concludes that

the Central European markets have become more integrated with the world markets. Chelley-Steeley (2005) applying smooth transition analysis on daily data for the period July 1994 – December 1999 investigates the Eastern European countries: the Czech Republic, Hungary, Poland, and Russia on the degree of their integration (or segmentation) with the world equity markets. She finds that Hungary and Poland have made a rapid progress towards becoming an integrated market, the Czech Republic is integrating at a slower pace, and Russia appeared to be the most heavily segmented market out of the four studied in the analysis. In line with these, there are few studies analyzing the Turkish stock market on its financial linkages with the EU stock markets.

Many researchers have proposed different methods of analyzing long run relationships between equity markets. For example, Akdogan (1996) proposed an alternative approach to international risk diversification based on a measure of market segmentation which means that an international fund manager, before taking any risky investment position in emerging markets or even developed markets, should select the most segmented countries from a benchmark. Segmentation, in its turn, is measured as the fraction of systematic risk in a given country against a global benchmark portfolio. Country selection then entails the selection of segmentation measured as the contribution of a local market to world systematic risk, implying that higher degrees of segmentation would offer higher risk-adjusted returns, and hence make a market more attractive for international investors. Kwiatkowski et al. (1996) stemming from the fact that standard unit root tests fail to reject the null hypothesis of a unit root for many economic times series, propose an alternative test of the null hypothesis of stationarity against the alternative of a unit root. Gregory and Hansen (1996) propose a model that concerns with the possibility of a more general type of cointegration, where the cointegrating vector is allowed to change at a single unknown time during the sample period. Simply, it is a test of cointegration which allows for the possibility of regime shifts.

Gregory and Hansen made a remarkable contribution to the existing literature of co-integration analysis. They proved structural shifts in the long-run relationships of national markets to influence the degree of co-integration of those markets. There can be no co-integration before some structural break, a crisis, for example, but there can definitely be a co-integration after the structural break, or, vice versa. Motivated by the theory numerous researchers analyzed different markets using a structural break in their study. A good example can be the study of Shamsuddin and Kim (2003) that examines the integration of the Australian stock market with its two leading trading partners, the US and Japan. Shamsuddin and Kim using cointegration techniques based on weekly stock price indices for the period January 1991 – May 2001 indicate that there was a stable long-run relationship among the Australian, US, and Japanese markets prior to the Asian crisis (1997) but their relationship disappeared in the post-Asian crisis period. Also an example can be Fernandez-Serrano and Sosvilla-Rivero (2001). Fernandez-Serrano and Sosvilla-Rivero (2001) using daily data covering the 1977-1999 period examine the linkages between Asian stock markets of Hong-Kong, Japan, Singapore, South Korea, and Taiwan. Their results suggest that if cointegration tests without structural breaks are applied, the evidence of cointegration between the Asian stock markets and the Japanese index is not found. In contrast, if the possibility of structural breaks is introduced, a strong evidence in favor of such relationships is found.

It should be noted that past attempts to empirically investigate the structure of world capital markets have not always produced the same results, they sometimes have been inconsistent (Errunza and Losq, 1992; 950).

In an integrated world equity market, individual stock prices are expected to have long-run relationships, i.e. share common stochastic trends (Choudry, 1997; 285). There are several reasons why different countries' stock prices may have significant long-run relationships. The presence of strong economic ties and policy coordination between the relevant countries can indirectly link their stock prices over time. Technological and financial

innovation, the advancement of international finance and trade and deliberate regional and global cooperation, the geographical divide among various national stock markets contribute too, as well as deregulation and market liberalization measures, rapid developments in communication technology and computerized trading system, and increasing activities by multinational corporations. The formation of common trading blocs (ASEAN, EU, NAFTA) and the development of economic systems (EU and EMU) also foster closer linkages of stock markets within the constituent countries (Chen et al., 2002; 1114).

In general, the key issue behind the integration is that if stock price indices of two or more countries are found to be co-integrated then it means that equity markets of these countries are interdependent (Bekaert and Harvey, 2002; 12).

1.2 International Diversification

Diversification is an investment strategy in which you spread your investment money among different markets, sectors, industries, and securities. The goal of the strategy is to protect the value of your overall portfolio in case a single security or market sector takes a serious downturn and drops in price (Path to Investing Dictionary of Financial Terms, 2005).

A well-diversified stock portfolio, for example, might include small-, medium-, and large-cap domestic stocks, stocks in six or more sectors or industries, and international stocks (Path to Investing Dictionary of Financial Terms, 2005). The benefits of diversification, in this case, is the marginal contribution of any given asset to the total risk of an investor's diversified portfolio (Agmon, 1999; 840).

As for the international diversification, international diversification is the attempt to reduce risk by investing in more than one nation. By diversifying across nations whose economic cycles are not perfectly correlated, investors can typically reduce the variability of their returns (The Free Dictionary, 2006).

1.2.1 International Investing

International portfolio investment has long been a tradition in many European countries. However, there is now a strong trend toward international diversification in all countries (Solnik, 1996; 89).

The case for international portfolio diversification was established in the 1960s and 1970s. Accordingly, investors have become increasingly active in foreign securities markets. However, in recent years, global markets have tended to become more integrated as a result of a broad tendency toward liberalization and deregulation in the money and capital markets of developed as well as developing countries. These changes raise the possibility that greater correlations may now exist between national stock markets, which would imply reduced

benefits from international diversification. This issue has led to a renewed attention to the potential benefits from international diversification, mostly in the emerging markets of Asia and Latin America (Gilmore and McManus, 2002; 70).

According to Securities and Exchange Commission (SEC), two of the chief reasons why people invest internationally are:

- Diversification – spreading investment risk among foreign companies and markets that are different from a domestic market, and
- Growth – taking advantage of the potential for growth in some foreign economies, particularly in emerging markets (Securities and Exchange Commission, 1999).

So, the basic arguments in favor of international diversification are that foreign investments offer additional profit potentials while reducing the total risk of the portfolio.

Domestic securities tend to move up and down together because they are similarly affected by domestic conditions, such as money supply announcement, movements in interest rates, budget deficit, and national growth. This creates a strong positive correlation among all national securities traded in the same market. Investors have searched for methods to spread their risks and diversify away the national market risk. In line with this, foreign capital markets, in their variety, have proved to provide good potential for diversification beyond domestic instruments and markets (Solnik, 1996; 90).

As I have mentioned above, the argument often heard in favor of international investment is that it lowers risk without sacrificing expected return. The argument for this is that the various capital markets of the world have somewhat independent price behavior. If the Paris Bourse and the London Stock

Exchange moved in parallel with the U.S. market, diversification opportunities would not exist (Solnik, 1996; 91). As Cheung and Ho (1991) argue, as long as stock returns in different national markets are less than perfectly correlated, it pays to diversify internationally. According to Campbell et al. (2002), low correlation is desirable from an investment perspective; diversification benefits materialize when a fall in one market is offset by a rise in another market.

The degree of independence of a stock market is directly linked to the independence of a nation's economy and government policies. To some extent, common world factors affect stock prices of all firms. However, purely national or regional factors play an important role in asset prices, leading to sizable differences in the degrees of independence between markets. It is clear that constraints and regulations imposed by national governments, technological specialization, independent fiscal and monetary policies, and cultural and sociological differences all contribute to the degree of a capital market's independence. On the other hand, when there are closer economic and government policies, as among the Benelux countries or the members of the European Union, more commonality in capital market behavior can be observed. In any case, all capital markets move together to some extent, but their relatively high degree of independence leaves ample opportunities for risk diversification on foreign stocks (Solnik, 1996; 93).

1.2.2 Risk Factors in International Investing

Opportunities in international investments do not come free of risk or of the cost of specialized analysis (Bodie, Kane and Marcus, 2005; 910). As with any investment, international investing carries some risks. These risks are political risk, currency risk, information risk, liquidity risks, volatility, costs, access, repatriation of capital, fiduciary constraints.

Political Risk

Political risk is the risk of loss when investing in a given country caused by changes in a country's political structure or policies, such as tax laws, tariffs, expropriation of assets, or restriction in repatriation of profits. For example, a company may suffer from such loss in the case of expropriation or tightened foreign exchange repatriation rules, or from increased credit risk if the government changes policies to make it difficult for the company to pay creditors (Investorwords.com, 2006).

In emerging markets, political stability and economic policy often rest in the hands of a government leader (Papaioannou and Tsetsekos, 1997; 41).

Political risk also includes the risk of adverse government actions. Although this risk also exists in developed markets, the consequences of adverse policies are often more dramatic in emerging markets. Another form of political risk in emerging-markets governments is corruption (Papaioannou and Tsetsekos, 1997; 41).

Currency Risk

Currency risk is the risk that a business' operations or an investment's value will be affected by changes in exchange rates. For example, if money must be converted into a different currency to make a certain investment, changes in

the value of the currency relative to the American dollar will affect the total loss or gain on the investment when the money is converted back. This risk usually affects businesses, but it can also affect individual investors who make international investments. Another name is exchange rate risk (Investowords.com, 2006).

Currency risk exists on all foreign-denominated investments, whether in developed or developing markets (Papaioannou and Tsetsekos, 1997; 43). Moreover, currency risk is one of the most significant concerns for an international portfolio (Papaioannou and Tsetsekos, 1997; 21).

According to Papaioannou and Tsetsekos (1997), three features heighten the currency risk on emerging markets compared to developed markets. First, political risk and currency risk are connected, which means that an investor can suffer from falling stock prices and a falling currency. Second, extreme inflation can produce extreme currency risk. Third, unlike investments in developed markets as Japan and Germany, a foreign investor can seldom hedge the currency risk in an emerging market.

Information Risk

Information risk encompasses a range of problems. The quality of data and information in emerging markets in general is often inconsistent by developed country standards (Parametric White Paper, 2006). Financial statements in emerging markets seldom follow generally accepted accounting standards. Moreover, disclosure requirements may be lacking (Papaioannou and Tsetsekos, 1997; 42).

Other forms of information risk include the prevalence of insider trading, which is legal in some emerging markets, and the perception of price manipulations. Moreover, the high inflation rates in some developing countries

render financial statements meaningless. Finally, there may be language and culture barriers for an investor (Papaioannou and Tsetsekos, 1997; 42).

Liquidity

Liquidity risk is the risk that arises from the difficulty of selling an asset. Since liquidity allows investors to alter their portfolios quickly and cheaply it makes investment less risky and facilitates longer-term, more profitable investments (Investorwords.com, 2006). Liquidity is an important attribute of stock market development because theoretically liquid stock markets improve the allocation of capital and enhance prospects of long-term economic growth (Demirguc-Kunt and Levine, 1996; 295).

As Papaioannou and Tsetsekos (1997) state, trading in emerging markets lacks the depth and breadth of trading in developed markets.

Volatility

Volatility indicates how much and how quickly the value of an investment, market, or market sector changes. For example, stocks of small, newer companies are usually more volatile than those of established, blue chip companies because their values tend to rise and fall very sharply over short periods of time (Path to Investing Dictionary of Financial Terms, 2006).

Emerging stock markets are more volatile than developed stock markets. For example, the Mexican market lost a cumulative 94 percent from 1980 to 1982. Stock prices on the Shanghai and Shenzhen exchanges in China lost 78 percent and 44 percent, respectively, from May to November 1992, before rising to new peak levels in February 1993 (Papaioannou and Tsetsekos, 1997; 40). The Istanbul Stock Exchange lost almost half of its entire value in 1994, after rising by more than 200% in dollar terms in 1993 (Darrat and Benkato, 2003; 1090).

Costs

Costs on international investments tend to be higher than those of domestic investments. This effect is more pronounced for investors in countries where all costs tend to be very low (e.g., the United States, France) (Solnik, 1996; 119). As for the costs on emerging market investments, they exceed costs on domestic investments as well. Brokerage fees are larger in emerging markets, as are the bid-ask spreads and the price impacts of trades (Papaioannou and Tsetsekos, 1997; 42).

Custodial fees are naturally larger since laws and regulations do not provide the level of safety taken for granted in developed economies. Costs of obtaining information are also higher. Finally, management expenses in emerging markets are very high, since they must reflect the costs of obtaining information and a reward for the specialized knowledge of the emerging markets. (Papaioannou and Tsetsekos, 1997; 42).

Access

Emerging markets differ in their willingness to allow foreign funds to enter and leave their markets. Some countries limit a foreign investor's stake to a small percent of selected stocks, or a government may limit foreign ownership of a firm's share (Papaioannou and Tsetsekos, 1997; 44).

Repatriation of Capital

Access refers to getting capital into a country. Repatriation refers to getting capital out of a country. Governments may restrict repatriation of funds either until foreign currency is available, by requiring a lengthy registration process, or until after funds have remained in the country for a minimum number of years. More generally, there always exists the threat that a government will

impose future restrictions to the free flow of funds (Papaioannou and Tsetsekos, 1997; 44).

Fiduciary Constraints

Some investment committees of plan sponsors prohibit investments in emerging markets. Others allow only a small exposure. Another fiduciary constraint on emerging markets is the need to choose a benchmark (Papaioannou and Tsetsekos, 1997; 45).

In general it can be said that developed markets do not pose much risk to a foreign investor as their economies more or less stable than emerging markets economies. Developing stock markets do pose risks and problems to a foreign investor (Path to Investing, 2006).

1.2.2 Benefits of International Diversification

The benefits of investing in emerging markets include high returns and greater diversification, while the risks are greater than investing in developed countries (Investorhome, 1997).

According to Solnik (1996), the expected benefits of international investing in terms of risk and return of a portfolio are different. Because of the low (less than one) correlation across different national assets, the volatility of a portfolio is less than the average volatility of its components. Risks get diversified away. This international risk reduction appears from any currency viewpoint. However, the return on a diversified portfolio is exactly equal to the average return of its components. By definition, the return on the world index is the average return of all national markets. In other words, some countries will outperform the world index, whereas others will underperform the world index.

In spite of the fact that emerging markets are quite volatile and risky, however, the case for diversifying into emerging stock markets stems from the high growth potential of emerging markets, together with their low correlation with developed markets (Solnik, 1996; 256).

Emerging markets have some special risk and return characteristics (Solnik, 1996; 261):

- emerging markets have high volatility,
- emerging markets offer high return,
- emerging markets have low correlation with the world developed index.

Thus, although emerging market equity returns are highly volatile, they are large and they are relatively less correlated with the equity returns in the developed markets, making it possible to construct low-risk portfolios (Bekaert

and Harvey, 2003; 12). Concerning the case, Bekaert and Harvey (1997) focusing on world major developed and twelve emerging markets of Chile, Colombia, Greece, India, Jordan, Korea, Malaysia, Mexico, Nigeria, Taiwan, Thailand, Zimbabwe proved that the range of average returns is greater for the emerging than the developed markets and emerging markets' returns are characterized by high volatility.

In general, emerging markets provide good diversification benefits to a portfolio invested only in developed markets. The contribution to the long-term return can be excellent, and the risk of the overall portfolio can be reduced. However, the correlation is still generally positive. It should not be surprising to find that in some periods when developed markets drop, emerging markets also drop and by a large amount, because of their high volatility. In other periods an appreciation of emerging markets can offset a loss in developed markets (Solnik, 1996; 263).

As you might guess, traditionally investors have considered only developed markets in their international diversification strategy. However, investors began to realize the stock market development and economic growth potential of many emerging countries. The World Bank decided to promote their stock markets. The International Finance Corporation (IFC), a member of the World Bank Group, started to publish monthly Emerging Stock Market Indexes, which allowed money managers to measure the performance of their portfolios invested in developing countries. Since 1990, the amount of foreign investment in these emerging markets has grown dramatically. The net foreign capital flow to emerging equity markets in 1993 was around 37\$ billion (Solnik, 1996; 251-252).

According to International Monetary Fund (IMF) total Foreign Direct Investment (FDI) flows to emerging markets increased substantially in 2004 and 2005. The inflows in 2004 amounted to \$180 billion, 41 percent higher than in 2003 and above the 2001 peak. Foreign direct investment in emerging markets is

estimated to have increased by more than 10 percent in 2005. Equity financing represented the bulk of FDI flows to EMs: 87 percent in 2002-2004 (Global Financial Stability Report, 2006; 26).

Almost all regions experienced expansions in FDI in 2004. The largest increases were in emerging Europe, Central Asia, and Latin America. Flows to Asia also increased. In 2005, flows to emerging Europe, Central Asia, and Asia continued to increase strongly, but declined somewhat to Latin America. Flows to South Africa increased dramatically because of a large bank acquisition (Global Financial Stability Report, 2006; 26).

New issuance in emerging markets was unprecedentedly high both in gross and in net terms in 2005. Gross annual issuance of bonds, loans, and equities was \$ 406.4 billion in 2005, far surpassing the level of 2004 (\$286.9 billion), which was itself a record (Global Financial Markets Stability, 2006; 42).

Equity issuance grew the most out of all primary capital flows to emerging markets, rising 73 percent to \$78.2 billion in 2005 over that of 2004 (\$45.2 billions). As in past years, equity issuance was dominated by Asian countries, and in particular China, where initial public offerings raised over \$21 billion. European equity issuance followed a distinct second, dominated by Russian Initial Public Offerings (IPOs). In Latin America, IPOs have been relatively more active in Brazil and Mexico (Global Financial Stability Report, 2006; 45).

Table 1.2 shows the amounts of external financing of Emerging Markets in several regions.

Table 1.2. Emerging Market External Financing By Regions (in USD billion)

	2000	2001	2002	2003	2004	2005
Gross issuance of equities	41.8	11.2	16.4	27.7	45.2	78.2
Gross issuance by region:	216.4	162.1	135.6	199.7	286.9	406.4
Asia	85.9	67.5	53.9	88.8	123.7	150.4
Latin America	69.1	53.9	33.4	43.3	54.3	86.2
Europe, Middle East, Africa	61.4	40.8	48.3	67.7	109	169.8

Source: Global Financial Stability Report, April 2006.

Turkey along with Thailand, Korea, the Philippines, Sri Lanka, China, India, Chile, Peru, Hungary, and many other countries in Asia, Latin America, and Central Europe are among the fast-growing economies with emerging stock markets which portfolio investors should seriously consider (Global Financial Stability Report, 2006; 26).

In line with this, it is now well documented the decreasing opportunities in the potential benefits that arise from international diversification because of the increasing degree of co-movement among national equity markets (Campbell and Hamao, 1992; 60). However, Bekaert and Harvey (2002) and Korajczyk (1996) argue that emerging markets appear to exhibit relatively low correlations with developed markets and can therefore provide diversification opportunities which may be unavailable in developed markets.

CHAPTER 2

MARKET CHARACTERISTICS OF ISE AND MAJOR EU EQUITY MARKETS

2.1 Istanbul Stock Exchange

The Istanbul Stock Exchange (ISE) was established in early 1986. The ISE is the only securities exchange in Turkey established to provide trading in equities, bonds and bills, revenue-sharing certificates, private sector bonds, foreign securities and real estate certificates as well as international securities. The ISE is a dynamic and growing emerging market with an increasing number of publicly traded companies, state-of-the-art technology and strong foreign participation. The ISE provides a transparent and fair trading environment not only for domestic participants, but also for foreign issuers and investors. (Istanbul Stock Exchange, 2006).

Turkey is an associate member of the EU since 1963 and an official candidate since 1999. It has close ties with the EU: both geographically and economically. In 1995 Turkey signed an agreement with EU according to which Turkey benefited from elimination of all tariffs on Turkish imports of mining and industrial products from the EU, adoption of the European common external tariff rates on mining and industrial products and elimination of the existing export quotas on Turkey's textile and clothing exports to the EU under the "Voluntary Export Restraint Scheme". As such, Turkey remains the single country outside the EU, with complete integration of its commodity markets under the Customs Union (CU) (Kasman and Kasman, 2005; 2).

Turkey, until 1980, had a mixed-economy model, mainly targeting the growth of the economy. The basic features of this model were industrial development, structural improvements in agriculture, restriction of foreign competition, establishment of public economic enterprises in industry, and protection of private enterprises (Özdemir, 2002; 20).

In 1980, the Turkish government made serious reforms targeted at developing a free market economy in Turkey minimizing state intervention, and integrating the economy with the global economic system (Tatoğlu and Glaister, 1998; 2). One key progress was in the field of foreign direct investments, which has expanded rapidly following the realization program. The import substitution strategy of development adopted before the 1980s, according to Erdal and Tatoğlu (2002), was one of the primary reasons of the low level of FDI in Turkey. The cumulative FDI until 1980 was only \$228 million. Together with the government policies of the early 1980s, there was a shift from the import strategy strategy towards a more outward-oriented export-led development strategy that has attracted the interest of foreign investors in Turkey. Since the mid-1980s, foreign investors have been taking an increasingly prominent role in the economy of Turkey.

Turkey has one of the most liberal foreign exchange regimes in the world, with a fully convertible currency as well as a policy that allows foreign institutional and individual investments in securities listed on the ISE since 1989. In August 1989, the Turkish government issued a decree that began the process of allowing foreign institutional and individual investors to purchase and sell all types of securities in the ISE and repatriate the proceeds (Istanbul Stock Exchange, 2006). Since then foreign investors have been actively taking part in the Turkish market.

The Turkish stock market is, by far, the largest and most liquid market in the Middle East and North Africa region (MENA) (Darrat and Benkato, 2003; 1090). Besides its regional dominance, the ISE is also quite volatile. For example, after rising by more than 200% in dollar terms in 1993, the ISE lost almost half of its entire value in 1994. As Darrat and Benkato (2003) argue, similar volatile behavior generally characterizes stock prices (returns) in the Turkish market since it began trading in 1986.

Tables 2.1, 2.2 represent the figures of equity investments by foreign

investors in the ISE and stock market transactions realized on behalf and account of foreign banks, brokerage houses or individuals.

Table 2.1. Equity Investments by Foreign Investors (Million USD)

1996	2000	2004
33,659	137,285	127,124

Source: www. imkb.gov.tr, 2006

*data for the years 1997, 2005 are not available

Table 2.2. Foreign Banks/Brokerage Houses Transactions (USD)

1997	2000	2004	2005
4,302,410,973	15,116,228,238	19,395,070,276	42,840,490,338

Source: www. imkb.gov.tr, 2006

We see from Table 2.1 that equity investments by foreign investors had increased by 2000 reaching 137,285 million USD, by 2004 it dropped to 127,124 million USD. Analyzing stock market transactions realized on behalf and account of foreign banks, brokerage houses or individuals, we see that transactions increased gradually year by year reaching 42,840,490,338 USD in 2005.

2.2 Major European Union Equity Market Characteristics

In this section I give short market characteristics of the European Union equity markets I study and compare the Turkish equity market with these markets according to market capitalization, trade value, and number of listed companies.

Table 2.3 presents a list of the countries and their stock exchanges that I study. There are 18 countries representing 15 stock markets together with Turkey.

Table 2.3 Countries and Stock Exchanges

Country	Stock Exchange
Turkey	ISE
Austria	Wiener Borse
Belgium, Netherlands, Portugal, France	Euronext: Brussels, Amsterdam, Lisbon, Paris
Czech Republic	Prague
Denmark	Copenhagen
Finland	Helsinki
Germany	Deutsche Borse
Greece	Athens
Hungary	Budapest
Ireland	Irish
Italy	Borsa Italiana
Poland	Warsaw
Spain	Spanish Exchanges (BME)
Sweden	Stockholm
UK	London

Austrian Stock Market

Wiener Borse was founded in 1771. It is a modern customer and a market oriented financial service company that plays a pivotal role in the Austrian capital market. The core business of Wiener Borse is to operate cash market trading (equity market, bond market), and a futures market as well as trading in warrants. The equity market comprises the prime market, the standard market

continuous and the standard market auction. The leading index of Wiener Borse is Austrian Traded Index (ATX). It reflects price trades of the most liquid stocks in continuous trading (Wiener Borse, 2006).

Euronext

Euronext was formed on September 22, 2000. It consists of the Brussels, Paris, Amsterdam, and Lisbon equity markets. Euronext is the first genuinely cross-border exchange organization in Europe providing services for regulated stocks and derivatives market in Belgium, France, the Netherlands and Portugal, as well as in the UK (derivatives only). Euronext is Europe's leading stock exchange based on trading volumes on the central order book.

Euronext 100 is the largest stock market covering 100 biggest companies (Euronext, 2006).

Prague Stock Exchange

The Prague Stock Exchange is the main securities market organizer in the Czech Republic. The first exchange operated in Prague already in 1861, but the present day Prague Stock Exchange was formed on November 24, 1992 and trading started on April 6, 1993. The Prague Stock Exchange publishes values of three cross-section indices PX 50, PX-D and PX-GLOB and sector indices of sectors in which number of constituents has not dropped below three. Historically the oldest and most famous one is the official index PX 50 introduced in April 1994 (Prague Stock Exchange, 2006).

Copenhagen Stock Exchange

In 2005, the Copenhagen Stock Exchange became part of the Swedish, listed company OMX when it bought all the shares in the Copenhagen Stock Exchange. The new organisation was established on April 1, 2005. The

Copenhagen Stock Exchange is still a company domiciled in Copenhagen and regulated by Danish laws and authorities.

The stock market in Denmark is divided into four sub-markets each covering one of the four main types of securities: shares, investment certificates, bonds and derivatives. Some 200 companies are listed on the equity market, and the vast majority are Danish. OMXC20 is a stock market index for the Copenhagen Stock Exchange (Copenhagen Stock Exchange, 2006).

Helsinki Stock Exchange

The Helsinki Stock Exchange began its transaction on October 7, 1912. In 2003 Hex (Helsinki Exchange) merged with OM AB, owner of the Stockholm Stock Exchange, to become OM HEX. A year later, the company was renamed to OMX.

The Finnish index family is made up of 22 indexes. OMX Helsinki 25 (OMXH25) is a stock market index for the Helsinki Stock Exchange. It is a market value weighted index that consists of the 25 most-traded stock classes. OMXH25 is more commonly known by its old name, HEX25 (Helsinki Stock Exchange, 2006).

German Stock Market

Deutsche Borse is a marketplace organizer for the trading in shares and other securities. It is a transaction services provider. With advanced technology it affords companies and investors access to global capital markets.

The Frankfurt Stock Exchange operated by Deutsche Borse is one of the world's largest trading centers for securities. The origins of the Frankfurt Stock Exchange go back to the ninth century. It was only in 1949 after World War II that

the Frankfurt Stock Exchange finally established as the leading stock exchange in Germany with consequently incoming national and international investments (Wikipedia, 2006).

With a share in turnover of around 90%, the Frankfurt Stock Exchange is the largest of the eight German stock exchanges. Today, Deutsche Borse is a full-service provider for securities, offering its clients one-stop access to a full range of services from trading to the provision of technical infrastructure. The leading index of the Deutsche Borse is DAX 30 (Deutsche Borse, 2006).

Athens Stock Exchange

The Athens Stock Exchange (ASE) was established in 1876. It began operating as an independent statutory public body. The Athens Exchange organizes and supports the markets related to securities, derivatives as well as other financial means, both inland and abroad. The ASE consists of primary and secondary markets. The issue of securities by companies constitutes a primary capital market while securities trading constitute the secondary market, which in essence represented by ATHEX. The leading index of the ASE is FTSE/ASE 20 index which is a large capitalization index including the 20 largest companies listed on ASE (blue chips) (Athens Stock Exchange, 2006).

Hungarian Stock Exchange

The Commodity and Stock Exchange was established in Pest in 1864 upon a decree of Franz Josef I, Emperor of Austria. The economic crisis of the early 1930s affected Hungary as well as many other countries, and from the summer of 1931 to the autumn of 1932, the stock exchange was closed. It was reopened only in 1994.

The Budapest Stock Exchange is the key actor on the Hungarian stock market, being the official trading platform for publicly emitted securities. The

continuously widening range of products available at the Budapest Stock Exchange can be divided into three clearly separable categories: equities section, debt securities, and derivatives section. The equities section has been operating since the very beginning of the BSE.

A stock market index for the Budapest Stock Exchange is the Budapest Stock Index (BUX) (Budapest Stock Exchange, 2006).

Irish Stock Exchange

The Irish Stock Exchange (“the Exchange”) is a key element of the financial infrastructure of Ireland. Its roots go back to 1793 when the Exchange first opened for trading in Dublin.

The markets of the Exchange include equities and corporate bonds of companies, covered warrants, government bonds, investment funds, exchange traded funds and specialist securities. Equities constitute the main trading market of the Exchange. Trading in corporate securities is facilitated on ISE Xetra, the Exchange's electronic trading platform.

The ISEQ 20 Index represents the 20 most liquid and largest capped equities quoted on the Irish Stock Exchange (Irish Stock Exchange, 2006).

Italian Stock Market

The Borsa Italiana, based in Milan, is Italy’s main stock exchange. It was founded in 1997 following the privatization of the exchange and has been operational since January 2, 1998. The Borsa Italiana’s primary objective is the development of managed markets, maximizing their liquidity, transparency and competitiveness and at the same time pursuing high levels of efficiency and profitability.

Borsa Italiana regulates, develops and manages the Italian equities markets, (MTA/MTAX and Expandi Market), the Italian Derivatives market (IDEM), the Securitized Derivatives market (SeDeX), the electronic Fixed Income market (MOT), and the Electronic Share Market (MTF).

The leading indices are the blue chip indices S&P/Mib and new Midex (Borsa Italiana, 2006).

Polish Stock Market

Capital market traditions in Poland go back to 1817, when the Warsaw Mercantile Exchange was established. Due to the change of political and economic systems, capital markets could not be re-created after the World War II was over. The Warsaw Stock Exchange (WSE) began activity in its present form on April 16, 1991. The WSE is a joint-stock company created by the State Treasury.

WIG-20 is the leading index in the Warsaw Stock Exchange (Warsaw Stock Exchange, 2006).

Spanish Stock Market

Bolsas y Mercados Espanoles (BME) encompasses the companies that direct and manage the securities markets and systems in Spain. It brings together, under a single activity, decision-taking and coordination unit, the Spanish equity, fixed-income and derivatives markets and their clearing and settlement systems. The BME Group is formed by the Barcelona, Bilbao, Madrid and Valencia stock exchanges, MF Mercados Financieros and Iberclear.

Bolsa de Madrid (Madrid Stock Exchange) is the largest and most international of Spain's four regional stock exchanges located in Barcelona, Bilbao, and Valencia that trade shares and convertible bonds and fixed income

securities, both government and private-sector debts. The Bolsa de Madrid was officially founded in 1831 (Wikipedia, 2006).

The biggest index in the BME is Ibx 35. The Ibx 35 Index is a capitalization-weighted index comprising the 35 most liquid Spanish stocks traded in the continuous market, and is Bolsa de Madrid's benchmark (Bolsas y Mercados Espanoles).

Swedish Stock Market

The Stockholm Stock Exchange is a stock exchange located in Stockholm, Sweden. It is the primary securities exchange of the Nordic Countries. It was acquired by OMX in 1998, and in 2003 the operations were merged with those of the Helsinki Stock Exchange. The main index of the Stockholm Stock Exchange is OMX Stockholm 30 index (Swedish Stock Exchange, 2006).

London Stock Exchange

The London Stock Exchange is one of the world's oldest stock exchanges and traces its history back more than 300 years. It started its life in the coffee houses of 17th century London and quickly grew to become the City's most important financial institution.

The London Stock Exchange enables companies from around the world to raise the capital they need to grow, by listing securities on its highly-efficient, transparent and well-regulated markets. There are two primary markets in the London Stock Exchange: the Main Market and AIM, through which it gives companies access to one of the world's deepest and most liquid pools of investment capital.

The Main Market is Europe's most prestigious and effective listings venue for established companies, a proven way to raise capital and gain profile. The Main Market has around 1,800 companies with a total market capitalisation of more than £3,500bn.

As for the AIM, it is the world's leading small-cap growth market - in 2004 AIM alone accounted for 65% of all IPOs in Western Europe. Currently there are more than 1,060 issuers listed on AIM with a combined market capitalisation of £37bn (London Stock Exchange, 2006).

The FTSE (Financial Times Stock Exchange) 100 Index is the biggest index in the London Stock Exchange. The FTSE 100 Index is a share index of the 100 largest companies listed on the London Stock Exchange. The index is seen as a barometer of success of the British economy and is the leading share index in Europe. It is maintained by the FTSE Group, a now independent company which originated as a joint venture between the Financial Times and the London Stock Exchange. According to the FTSE Group's website, the FTSE 100 companies represent about 80% of the UK share market (FTSE, 2006).

These were market characteristics of the major European Union stock markets. Below are given for comparison tables of market capitalization, trade value, and number of listed companies of the corresponding stock markets. Table 2.4 and Graph 2.1 represent market capitalizations of ISE and some selected European Stock Markets.

Table 2.4. Market Capitalizations of ISE and Some Selected European Stock Markets during 2003-2005 (USD Millions)

Stock market	2003	2004	2005	% change 2003-2004	% change 2004-2005
ISE	68,379.4	98,298.9	161,537.6	43.8	64.3
Wiener Boerse	56,522.5	87,776.3	126,309.3	55.3	43.9
Euronext	2,076,410.2	2,441,261.4	2,706,803.5	17.6	10.9
Prague SE	25,121.1	43,670.5	54,124.5	73.8	23.9
Copenhagen SE	118,167.1	155,232.6	170,911.1	31.4	10.1
Helsinki SE	170,283.4	183,765.4	202,324.7	7.9	10.1
Deutsche Borse	1,079,026.2	1,194,516.8	1,221,106.1	10.7	2.2
Athens SE	103,764.5	121,921.4	145,120.7	17.5	19
Budapest SE	18,868.2	28,630.4	32,575.7	51.7	15.1
Irish SE	85,070.6	114,085.9	114,086.2	34.1	0
Borsa Italia	614,841.6	789,562.6	798,072.9	28.4	1.1
Warsaw SE	37,404.5	71,547.2	93,602.2	91.3	30.8
Bolsa Madrid	726,243.4	940,672.9	959,910.4	29.5	2
Stockholm SE	289,877.1	376,781.1	414,836.0	30	10.1
London SE	2,460,064	2,865,243.2	3,058,182.4	16.5	6.7

Source: The World Exchanges Federation

www.world-exchanges.org/publications/WFE%202005%20Annual%20Report.pdf
www.world-exchanges.org/publications/WFE%202004%20Annual%20Report.pdf

From Table 2.4 and Graph 2.1 we can see that the largest market capitalizations have the London Stock Exchange, Euronext, and Deutsche Borse, following by the Spanish Exchanges, the Stockholm Exchange, etc. As for the Istanbul Stock Exchange, we can see that its market capitalization is much smaller than those of the developed markets; at the same time, it is larger than the market capitalizations of Wiener Borse, the Prague, Athens, Budapest, Warsaw, and Irish stock markets.

Graph 2.1. Market Capitalizations of ISE and Some Selected European Stock Markets (2005)

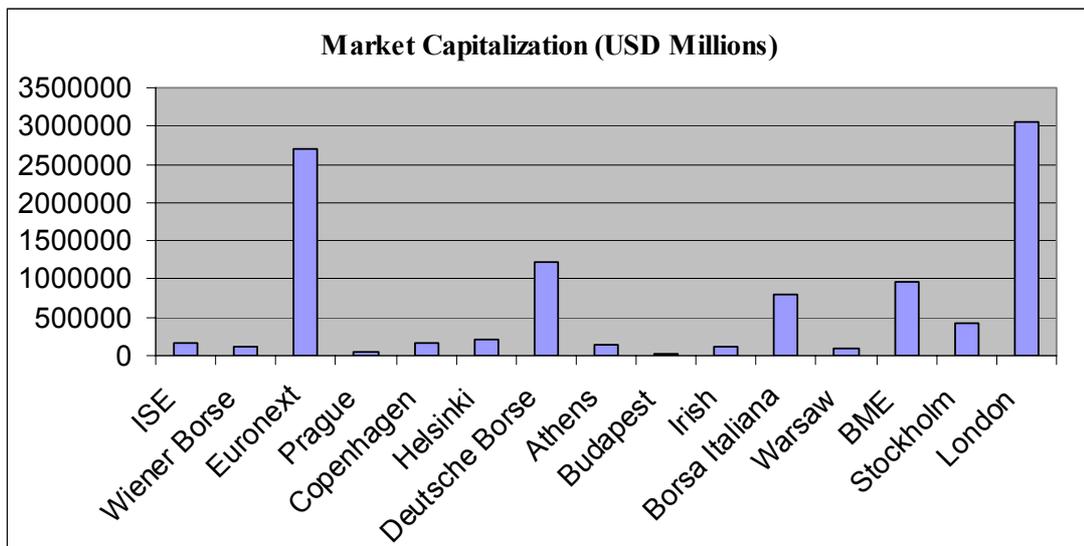


Table 2.5 and Graph 2.2 represent trade values of the Istanbul Stock Exchange and the European Stock Markets.

**Table 2.5. Trade Values of ISE and Some Selected European Stock Markets
during 2003-2005 (USD Millions)**

Stock market	2003	2004	2005	% change 2003-2004	% change 2004-2005
ISE	98,160.4	146,604.9	200,858.3	49.4	37
Wiener Boerse	11,135	24,158.6	46,468.3	117	92.3
Euronext	1,936,573	2,472,131.7	2,906,208.2	27.7	17.6
Prague SE	9,187.4	18,744.3	43,642.8	104.02	132.83
Copenhagen SE	67,958.8	106,058.2	127,163.8	56.1	19.9
Helsinki SE	165,623	223,686.9	268,200.6	35.1	19.9
Deutsche Borse	1,299,327.4	1,541,122.7	1,915,304.5	18.6	24.3
Athens SE	39,672.2	44,383.3	65,131.4	11.9	46.7
Budapest SE	8,269.9	13,369.4	24,151.3	61.7	85.9
Irish SE	44,073.7	45,143.7	64,422.7	2.4	49.4
Borsa Italia	820,641.7	969,234.2	1,293,682.1	18.1	33.5
Warsaw SE	9,662.7	16,269.3	30,421.5	68.4	87
Bolsa Madrid	933,059.9	1,203,360.2	1,566,107.1	29	30.1
Stockholm SE	305,267.1	462,501.3	554,539.1	51.5	19.9
London S E	3,609,718.2	5,169,023.6	5,677,721.0	43.2	9.8

Source: The World Exchanges Federation

www.world-exchanges.org/publications/WFE%202005%20Annual%20Report.pdf
www.world-exchanges.org/publications/WFE%202004%20Annual%20Report.pdf

From Table 2.5 and Graph 2.2 we can see that trade values of the London Stock Exchange, Euronext, and Deutsche Borse are the largest again. The ISE ranks the eighth following these three markets, then the Spanish Exchanges (BME), Borsa Italiana, the Stockholm and the Helsinki Exchanges. The market having the least trade value is the Budapest one.

Graph 2.2 Trade Values of ISE and Some Selected European Stock Markets (2005)

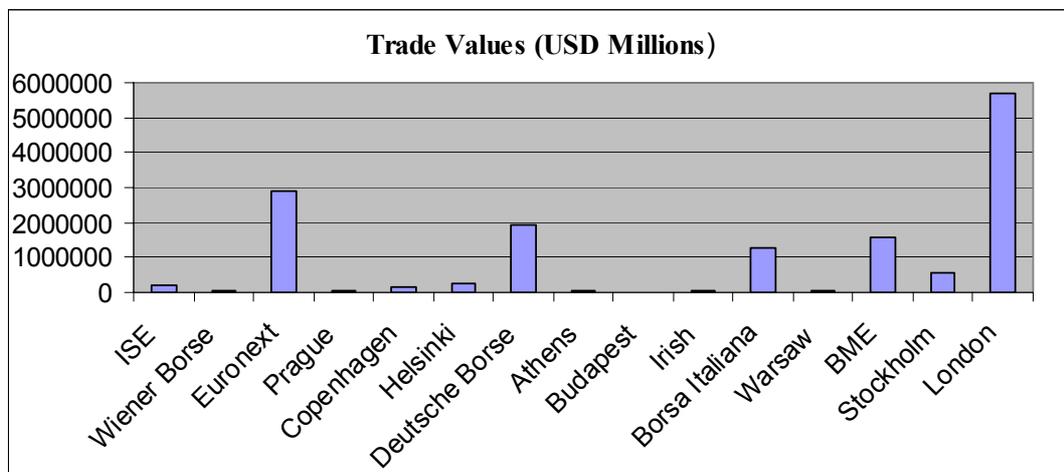


Table 2.6 and Graph 2.3 represent number of listed companies of ISE and the European Stock Markets. Analyzing the markets according to the number of listed companies for the year 2005, we can see again that the London Stock Exchange, Euronext, and Deutsche Borse have the largest numbers of listed companies. The ISE is in the middle of the list ranking the seventh. The market having the least number of listed companies is the Prague one.

Table 2.6. Number of Listed Companies of ISE and Some Selected European Stock Markets for the Years 2003-2005

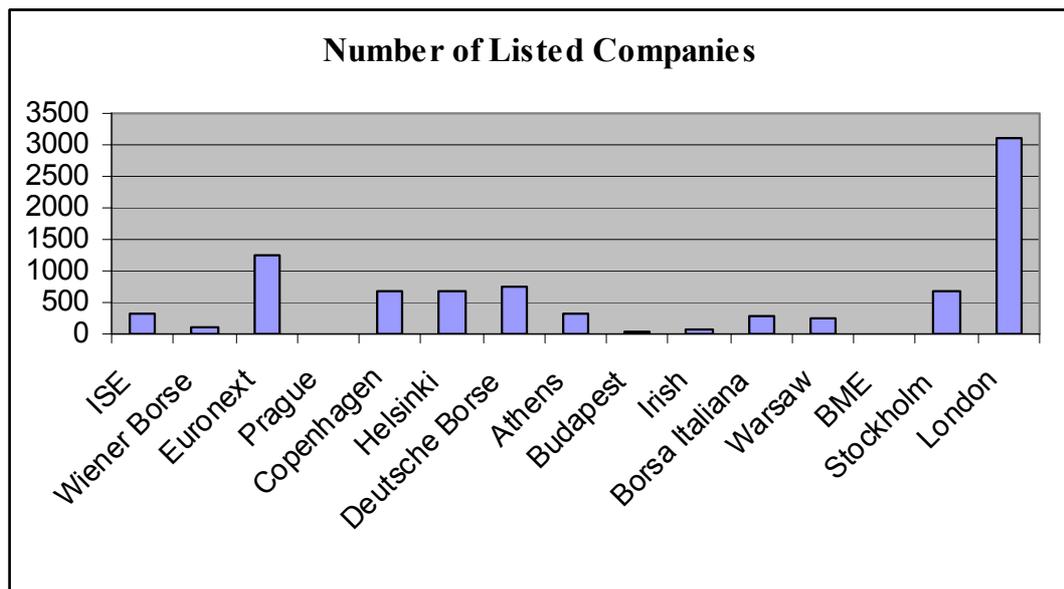
Stock market	2003*	2004	2005
ISE	285	297	304
Wiener Boerse	125	120	111
Euronext	1392	1333	1259
Prague SE	N\A	N\A	N\A
Copenhagen SE	194	685	678
Helsinki SE	145	685	678
Deutsche Borse	866	819	764
Athens SE	332	341	304
Budapest SE	49	47	44
Irish SE	66	65	66
Borsa Italia	279	278	282
Warsaw SE	203	230	241
Bolsa Madrid	3223	N\A	N\A
Stockholm SE	282	685	678
London S E	2692	2837	3091

Source: The World Exchanges Federation

www.world-exchanges.org/publications/WFE%202005%20Annual%20Report.pdf

*www.world-exchanges.org/publications/EQUITY303.XLS

Graph 2.3. Number of Listed Companies of ISE and Some Selected European Stock Markets (2005)



CHAPTER 3

METHODOLOGY AND EMPIRICAL FINDINGS

3.1 Aim of the Study

The aim of the study is to examine whether the Turkish stock market is integrated with the European Union major stock markets. In case it is not, we conclude that portfolio diversification benefits for the European Union investors in the Turkish stock market are limited. The importance of the study is in examining whether the Turkish stock market is integrated or not with the major EU markets as a possible candidate for the EU. The study contributes to the literature in the aspect that it will have important implications for individual investors, portfolio managers, and financial managers of corporations willing to invest in the Turkish stock market.

There are multiple researches analyzing stock market integration around the world. Most of them analyze stock markets among developed markets and between developed markets and relatively well-established emerging markets in Latin America and Asia. There are few works examining integration of the Turkish stock market with the European Union stock ones. For example, Darrat and Benkato (2003) applying cointegration techniques on monthly stock price indices investigate whether the Turkish stock market is integrated with four developed markets of the US, the UK, Japan and Germany for the period of January 1986 to March 2000. They find a significant cointegrating relationship to exist between the ISE and these matured markets only in the post-liberalization period. Lagoarde-Segot and Lucey (2005), in their study on long run equity linkages in the Middle East and North Africa (MENA), using Gregory-Hansen cointegration test on daily data ranging from 01.01.1998 until 11.16.2004 for stock market price indices from Turkey, Morocco, Tunisia, Egypt, Lebanon, Jordan, Israel, found Turkey to have a few cointegrating vectors with the European Monetary Union (EMU) and the US. Berument and Ince (2005) performing recursive VAR model on daily observations from 23.10.1987 to

08.06.2004 analyze relationship between the US stock market and the Turkish stock market. They show that US is not affected by Turkey, but Turkey is influenced by the US market much.

The researchers in their works use various methodologies in analyzing integration of stock markets. In this study I use Engle and Granger methodology in order to examine integration between the Turkish equity market and the European Union equity markets.

3.2 Theoretical Framework and Methodology

The integration of Turkish stock market and the major European Union stock markets can be assessed by investigating measures of the co-movement of stock prices in these countries. If the stock markets are integrated, they can be expected to be highly correlated and to share a common stochastic trend. Hence, the benefits of international diversification would be small if stock prices in these markets are cointegrated. Prior to testing for cointegration of any set of prices, we need first examine the series on non-stationarity and determine the order of integration of the prices and ensure that it is equal for all series. The non-stationary series is the primary condition for performing a co-integration test (Hill, Griffiths and Judge, 2001; 346). Augmented Dickey and Fuller (ADF) (1981) and Phillips and Perron (PP) (1989) unit root tests are used to test for the nonstationarity of the series. Since the null hypothesis in ADF test is that a time series contains a unit root, this hypothesis is accepted unless there is a strong evidence against it.

The ADF test is expressed in the following formula:

$$\Delta Y_t = b_0 + b_1 Y_{t-1} + \sum_{j=1}^p \theta_j \Delta Y_{t-j} + \varepsilon_t$$

where ΔY_t is the first difference of the series y_t .

Phillips and Perron (1988) propose an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root (Dutta, Ahmed, 1997; 466). The PP estimates the non-augmented DF test equation and modifies the ratio of a coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic:

$$\gamma_{\alpha} = t_{\alpha} \left(\frac{\gamma_0}{f_0} \right)^{1/2} - \frac{T(f_0 - \gamma_0)(se(\hat{\alpha}))}{2f_0^{1/2}s}$$

where $\hat{\alpha}$ is the estimate, and t_{α} the ratio of α , $se(\hat{\alpha})$ is coefficient standard error, and s is the standard error of the test regression. In addition, γ_0 is a consistent estimate of the error variance (calculated as $(T - k)s^2 / T$ where k is the number of regressors). The remaining term, f_0 , is an estimator of the residual spectrum at frequency zero.

Next I examine whether the national stock market index series are cointegrated, namely, whether the Turkish stock market index is cointegrated with the European Union stock market indices. For that I run Engle-Granger cointegration test.

I estimate the following cointegration regression:

$$y_t = \beta_0 + \beta_1 x_t + \varepsilon_t$$

where y_t is the Turkish stock market index, x_t is the foreign stock market index. In cointegration test, the null hypothesis is non-cointegration against the alternative of cointegration.

Cointegration is the property of two nonstationary time series and implies a long-term equilibrium relationship between the two variables. The notion of cointegration can be expressed as follows. If the times series X_t and Y_t are both nonstationary in levels (prices), but the first differences of the variables

(returns) are stationary, it is both variables are integrated of order one, $I(1)$. The linear combination are also $I(1)$. However, if there is a linear combination of X_t and Y_t that is stationary, it is said the two variables are cointegrated. If the two variables are cointegrated, then there is some underlying long-term relationship between them (Arbelaez et al., 2001; 245).

Before performing the cointegration test, it is good to first do a visual analysis of the stock price comovements of markets. We can see from the graphs in the Appendix that the stock prices move quite close to each other and in upward trend predetermining a long-run comovement between the markets.

Then I examine whether the integration between the stock markets increased or decreased after the passage to the Customs Union. For that I introduce a dummy variable and assess this formula:

$$Y_t = \beta_0 + \beta_1 X_t + D_t + \varepsilon_t$$

Finally, the next step involves the estimation of the Error Correction Model (ECM). If two variables, i.e., stock price indices, are cointegrated, the following error correction models are tested:

$$\Delta Y_t = \sum_{j=1}^n b_j \Delta X_{t-j} + \sum_{j=1}^n c_j \Delta Y_{t-j} + \phi e_{t-1} + w_t$$

$$\Delta X_t = \sum_{j=1}^n b_j^* \Delta Y_{t-j} + \sum_{j=1}^n c_j^* \Delta X_{t-j} + \phi e_{t-1}^* + w_t^*$$

where e_{t-1} and e_{t-1}^* are the lagged residuals from Equations.

The error correction model reflects deviations from the long-run cointegration relationship. Therefore, the coefficients of the ECM represent the speed of adjustment to deviations from the long-run equilibrium. Higher values of

those coefficients can be interpreted as a higher degree of stock market integration (Pascual, 2003; 198).

Going on, the error correction model shows the long run dynamics of the adjustment process between two national indices. The significance and size of the error-correction terms essentially captures the single-period response of the dependent variable to departures from equilibrium.

According to Engle and Granger (1987), an individual economic variable, viewed as a times series, can wander extensively and yet some pairs of series may be expected to move so that they do not drift too far apart. Typically economic theory will propose forces which tend to keep such series together. A similar idea arises from considering equilibrium relationships, where equilibrium is a stationary point characterized by forces which tend to push the economy back toward equilibrium whenever it moves away.

A class of models, known as the error-correcting, allows long-run components of variables to obey equilibrium constraints while short-run components have a flexible dynamic specification.

3.3 Data

The data used in the study are monthly natural logarithm stock price indices for Turkey and 17 European Union countries (you can see Appendix for graphs analyzing the series on linear and logarithmic relations). They are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden, the UK, the Czech Republic, Hungary, and Poland. Also used in the study are the world, the European, the Eastern European, and the emerging markets indices. The other EU member countries as Luxemburg, the Baltic countries and others are not included in the study for the insufficient data. There are two samples in our study: the sample period of the

18-year period, January 1988 through February 2006, for the developed markets of the EU, and 12-year period from December 1994 through February 2006 for the developing markets of the EU. The data are obtained from Morgan Stanley Capital International (MSCI) country equity indices. All the index series are in US dollars. Monthly stock returns for the twenty two stock price indices are calculated according to the following formula:

$$\text{Returns} = (\ln \text{price index}_t - \ln \text{price index}_{t-1}) / \ln \text{price index}_{t-1}$$

3.4 Empirical Findings

Table 3.1 reports descriptive statistics of returns for the fifteen European Union stock market indices studied as well as of the world and the European indices for the 1988-2006 period. It can be seen that the Turkish stock price indices show the highest average returns together with the Greek ones (0.19%) but the highest standard deviation (3.46). Table 3.2 reports the results of descriptive statistics for the three Eastern European indices with the Turkish ones for the 1994-2006 period, as well as the Eastern European and emerging market indices. We can see that the mean returns are highest for the Hungarian market (0.30), the Turkish one goes second with 0.28, the standard deviation is again higher for Turkey.

Table 3.1. Descriptive Statistics of Returns of Developed Markets of the EU and Turkey (1988-2006)

	Mean	Median	St.dev.	Skewness	Kurtosis	Observ.
Turkey	0.0019	0	0.0346	0.2169	3.6673	217
Austria	0.0012	0.0015	0.0095	-0.2751	4.7449	217
Belgium	0.0011	0.0015	0.0076	-0.0869	6.1020	217
Denmark	0.0014	0.0024	0.0075	-0.1531	3.0565	217
Finland	0.0017	0.0016	0.0177	-0.0092	3.6790	217
France	0.0014	0.0015	0.0084	-0.0014	4.0387	217
Germany	0.0012	0.0015	0.0095	-0.5809	5.7410	217
Greece	0.0019	0.0017	0.0174	1.1359	7.4665	217
Ireland	0.0012	0.0018	0.0107	-0.1914	4.2530	217
Italy	0.0009	0.0017	0.0120	0.0163	3.5927	217
Netherlands	0.0010	0.0015	0.0069	-0.8570	4.8344	217
Portugal	0.0004	0	0.0145	0.1606	4.3653	217
Spain	0.0012	0.0017	0.0117	-0.3239	4.3661	217
Sweden	0.0013	0.0015	0.0096	-0.5124	3.9823	217
UK	0.0008	0	0.0070	0.1465	3.4475	217
World	0.0008	0.0015	0.0063	-0.5173	3.7039	217
Europe	0.0011	0.0016	0.0068	-0.4677	3.8834	217

Table 3.2. Descriptive Statistics of Returns of Eastern European Markets and Turkey (1994-2006)

	Turkey	Czech	Hungary	Poland	EE	EM
Mean	0.0028	0.0023	0.0030	0.0012	0.0019	0.0006
Median	0.0050	0.0044	0.0045	0.0023	0.0062	0.0016
Std. Dev.	0.0323	0.0189	0.0195	0.0174	0.0249	0.0116
Skewness	-0.0992	-0.4617	-0.2779	-0.12867	-1.8029	-1.3435
Kurtosis	3.9733	4.8412	7.6248	4.9137	11.8370	7.5620
Observ.	134	134	134	134	134	134

Table 3.3 presents a simple return correlation matrix involving correlation coefficients for pairs of stock prices. The significance of the correlation coefficients for each potential pair of share price indices provides a preliminary indication about the strength of association of share price movements.

The Table 3.3 indicates that all correlation coefficients are positive. We can see the highest correlation of Turkey being with the Greek index (0.36), the lowest with the Belgian one (0.13). Correlations with Turkey are generally the lowest. However, return correlations are high between the European Union member countries. Correlations are significant at the 0.01 level.

Correlations among the Eastern European and Turkish stock returns are presented in Table 3.4. We see that for the period 1994-2006 the correlations are also positive and higher than among the developed markets of the EU. The Table 3.4 shows that the correlation with the emerging market index is the highest being 0.54, the lowest correlation is with the Czech returns being 0.31. The correlations are also significant at the 0.01 level.

Table 3.3. Pearson Correlation of Major European Union Markets

	Tur	Aus	Bel	Den	Fin	Fra	Ger	Gre	Ire	Ita	Net	Por	Sna	Swe	Uk	Wrl	Eur
Tur	1	.27	.13	.19	.23	.26	.29	.36	.25	.22	.26	.32	.22	.35	.21	.27	.28
Aus	.27	1	.46	.43	.24	.46	.57	.40	.46	.40	.53	.46	.44	.36	.47	.41	.58
Bel	.13	.46	1	.58	.26	.75	.72	.40	.55	.47	.74	.48	.54	.46	.58	.64	.74
Den	.19	.43	.58	1	.37	.60	.66	.29	.56	.51	.64	.47	.57	.58	.59	.61	.70
Fin	.23	.24	.26	.37	1	.40	.47	.21	.41	.46	.44	.32	.47	.62	.46	.56	.54
Fra	.26	.46	.75	.60	.40	1	.81	.41	.57	.53	.77	.51	.66	.66	.65	.75	.86
Ger	.29	.57	.72	.66	.45	.81	1	.41	.61	.58	.82	.51	.64	.71	.64	.72	.87
Gre	.36	.40	.40	.29	.21	.41	.41	1	.37	.36	.36	.50	.43	.36	.28	.33	.41
Ire	.25	.46	.55	.56	.41	.57	.61	.37	1	.42	.66	.50	.61	.56	.69	.68	.72
Ita	.22	.40	.47	.51	.46	.53	.58	.36	.42	1	.54	.44	.60	.55	.44	.55	.63
Net	.26	.53	.74	.64	.44	.77	.82	.36	.66	.54	1	.57	.65	.67	.76	.79	.90
Por	.32	.46	.48	.47	.32	.51	.51	.50	.50	.44	.57	1	.62	.53	.47	.51	.61
Sna	.22	.44	.54	.57	.47	.67	.64	.43	.61	.60	.65	.62	1	.71	.64	.72	.78
Swe	.35	.36	.46	.58	.62	.66	.71	.36	.56	.55	.67	.53	.71	1	.63	.75	.78
Uk	.21	.47	.58	.59	.46	.65	.64	.28	.69	.44	.76	.47	.64	.63	1	.80	.88
wrl	.27	.41	.64	.61	.56	.75	.72	.33	.68	.55	.79	.51	.72	.75	.80	1	.88
Eur	.28	.58	.74	.70	.54	.86	.87	.41	.72	.63	.90	.61	.78	.78	.88	.88	1

All correlations are significant at the 0.01 level (2-tailed)

Table 3.4. Pearson Correlation of Eastern European Markets

	Turkey	Czech	Hungary	Poland	EE	EM
Turkey	1	.31	.45	.37	.51	.54
Czech	.31	1	.59	.55	.69	.51
Hungary	.45	.59	1	.68	.71	.61
Poland	.36	.55	.68	1	.69	.65
EE	.51	.69	.71	.69	1	.78
EM	.54	.51	.61	.65	.78	1

All correlations are significant at the 0.01 level (2-tailed)

Before performing a co-integration test we need first examine the series on non-stationarity. (Here on we will use natural logarithms of index prices for our analysis of cointegration). The non-stationary series is the primary condition for performing a co-integration test. For that we run Augmented Dickey and Fuller (ADF) and Phillips and Perron (PP) unit root tests. Ho hypothesis of the ADF and PP tests is non-stationarity, consequently we accept it unless there is a strong evidence against it.

The results of the ADF tests are presented, respectively, in Tables 3.5, 3.6 for the developed and emerging markets, i.e., Eastern European markets of the EU. The appropriate lag order for the ADF tests were chosen based on Akaike Information Criterion (AIC) according to which the lowest values of the AIC were selected. Lag order for the PP test was set to 4.

Table 3.5. ADF Results of the Developed Markets of the EU

	trend no trend	Level	1st diff.	Conclusion
Intur	trend no trend	-3.06 (3) -2.46 (3)	-13.28 (0) -13.30 (0)	I (1)
Inaus	trend no trend	-0.87 (0) -0.54 (0)	-13.44 (0) -13.45 (0)	I (1)
Inbel	trend no trend	-0.67 (1) -1.87 (1)	-14.40 (0) -14.44 (0)	I (1)
Inden	trend no trend	-2.61 (0) -1.26 (0)	-16.04 (0) -16.07 (0)	I (1)
Infin	trend no trend	-1.73 (2) -0.55 (2)	-10.57 (1) -10.58 (1)	I (1)
Infra	trend no trend	-2.27 (3) -1.41 (3)	-8.63 (2) -8.63 (2)	I (1)
Inger	trend no trend	-2.00 (1) -1.50 (1)	-15.45 (0) -15.48 (0)	I (1)
Ingre	trend no trend	-2.07 (0) -1.75 (0)	-8.89 (1) -8.91 (1)	I (1)
Inirl	trend no trend	-1.96 (0) -1.14 (0)	-14.75 (0) -14.78 (0)	I (1)
Inita	trend no trend	-2.30 (0) -1.05 (0)	-16.35 (0) -16.37 (0)	I (1)
Innet h	trend no trend	-1.45 (0) -1.51 (0)	-16.14 (0) -16.12 (0)	I (1)
Inpor	trend no trend	-2.16 (1) -0.97 (4)	-8.32 (3) -8.30 (3)	I (1)
Inspa	trend no trend	-2.00 (0) -0.33 (0)	-11.67 (1) -11.62 (1)	I (1)
Insw	trend no trend	-1.89 (0) -1.08 (0)	-14.15 (0) -14.19 (0)	I (1)
Inuk	trend no trend	-1.53 (2) -1.08 (2)	-12.54 (1) -12.55 (1)	I (1)
Inwrl	trend no trend	-1.80 (0) -1.08 (0)	-15.13 (0) -15.17 (0)	I (1)
Ineur	trend no trend	-1.87 (0) -1.19 (0)	-14.91 (0) -14.94 (0)	I (1)

Figures in parantheses are lag orders

Table 3.6. ADF Results of the Eastern European Markets

	trend no trend	Level	1st diff.	Conclusion
lncze	trend no trend	-0.81 (0) 1.11 (0)	-7.71 (3) -11.37 (0)	I (1)
lnhun	trend no trend	-1.40 (2) -0.80 (2)	-9.95 (1) -9.99 (1)	I (1)
lnpol	trend no trend	-0.64 (4) -0.40 (4)	-4.25 (3) -6.50 (3)	I (1)
lnee	trend no trend	-1.08 (0) -0.23 (1)	-11.18 (0) -11.05 (0)	I (1)
lnem	trend no trend	-0.83 (1) -0.87 (1)	-10.55 (0) -10.43 (0)	I (1)

Figures in parantheses are lag orders

The Phillips and Perron results are presented in Table 3.7 for developed markets and Table 3.8 for the Eastern European markets. For the PP test the lag order was set to 4. Both ADF and PP tests were performed for both “with trend and without trend” options.

Critical values for ADF and PP tests are for ‘with trend’ - 4.00, -3.43, -3.14 for 1%, 5%, and 10%, respectively, for ‘without trend’ they are - 3.46, -2.87, - 2.57. We can see that we can’t reject H_0 hypotheses for both ADF and PP tests in levels: t-statistics are less in absolute value than 1% critical value, but we can reject H_1 in the 1st differences: t-statistics are greater than 1% critical value. So, we conclude that the series are integrated of order 1, I (1). It means that all the series are non-stationary and stationary only in their first differences.

Table 3.7. PP Results of the Developed EU Markets

		Level	1st diff.	Conclusion
Intur	trend	-2.81	-13.29	I (1)
	no trend	-2.05	-13.30	
Inaus	trend	-0.98	-13.40	I (1)
	no trend	-0.64	-13.42	
Inbel	trend	-2.11	-14.44	I (1)
	no trend	-1.21	-14.47	
Inden	trend	-2.51	-16.10	I (1)
	no trend	-1.23	-16.13	
Infin	trend	-1.68	-12.35	I (1)
	no trend	-0.64	-12.37	
Infra	trend	-2.84	-15.74	I (1)
	no trend	-2.00	-15.75	
Inger	trend	-2.25	-15.47	I (1)
	no trend	-1.84	-15.50	
Ingre	trend	-2.26	-13.86	I (1)
	no trend	-1.86	-13.88	
Inirl	trend	-1.87	-14.80	I (1)
	no trend	-1.07	-14.83	
Inita	trend	-2.15	-16.43	I (1)
	no trend	-0.88	-16.44	
Inneth	trend	-1.32	-16.24	I (1)
	no trend	-1.54	-16.20	
Inpor	trend	-2.42	-13.90	I (1)
	no trend	-1.23	-13.89	
Inspa	trend	-1.88	-14.94	I (1)
	no trend	-0.18	-14.92	
Insw	trend	-1.95	-14.15	I (1)
	no trend	-1.09	-14.18	
Inuk	trend	-1.66	-15.31	I (1)
	no trend	-1.15	-15.34	
Inwrl	trend	-1.72	-15.18	I (1)
	no trend	-1.04	-15.22	
Ineur	trend	-1.77	-14.98	I (1)
	no trend	-1.17	-15.01	

Lag order is set to 4

Table 3.8. PP Results of the Eastern European Markets

		Level	1st diff.	Conclusion
Incze	trend	-0.56	-11.97	I (1)
	no trend	1.53	-11.42	
Inhun	trend	-1.45	-12.13	I (1)
	no trend	-0.45	-12.19	
Inpol	trend	-1.53	-13.26	I (1)
	no trend	-1.24	-13.28	
Inee	trend	-1.08	-11.19	I (1)
	no trend	-0.12	-11.04	
Inem	trend	-0.91	-10.56	I (1)
	no trend	-0.99	-10.45	

Lag order is set to 4

After we have proved the series to be non-stationary, we can pass to the test of co-integration. The results of Engle and Granger co-integration test are shown in Tables 3.9 and 3.10. The lag orders were chosen according to the Akaike Information Criterion. Turkey is the dependent variable. Critical values for the Engle and Granger co-integration test for 1%, 5%, and 10% critical values are -2,5899, -1,9439, -1,6177, respectively (Gujarati, 1995). The null hypothesis for the Engle and Granger test is no co-integration, the alternative hypothesis is there is co-integration. The results indicate the t-values of the test to be higher of the critical values indicated above. We can say that the results are significant at 1% critical value, except that of France: its t-value for “trend” is significant at 5% critical value, “no trend” is significant at 10% critical value. So, we reject the null hypothesis of no cointegration and conclude the ISE to be cointegrated with the major EU stock markets. This indicates limited diversification benefits for the EU investors.

Table 3.9. Engle-Granger Results of the Developed EU Markets

	trend	no trend
Austria	-3.30 (0)	-2.99 (0)
Belgium	-3.46 (3)	-3.47 (3)
Denmark	-3.23 (3)	-3.13 (3)
Finland	-2.84 (3)	-2.83 (3)
France	-2.27* (1)	-1.41** (1)
Germany	-3.00 (1)	-3.06 (1)
Greece	-4.08 (1)	-4.14 (1)
Ireland	-3.25 (3)	-3.26 (3)
Italy	-3.17 (1)	-3.18 (1)
Netherlands	-2.88 (3)	-2.89 (3)
Portugal	-2.73 (0)	-2.67 (0)
Spain	-3.23 (3)	-3.24 (3)
Sweden	-3.18 (3)	-3.20 (3)
UK	-3.09 (3)	-3.12 (3)
World	-3.05 (3)	-3.07 (3)
Europe	-3.09 (3)	-3.12 (3)

Figures in parentheses are lag orders

*significant at 5%, ** significant at 10%, all the rest are significant at 1%

Engle-Granger critical values: 1% -2,5899; 5% -1,9439; 10% -1,6177

Table 3.10. Engle-Granger Results of the Eastern European Markets

	trend	no trend
Czech	-2.35 (0)*	-2.36 (0)*
Hungary	-2.45 (0)*	-2.48 (0)*
Poland	-2.46 (3)*	-2.29 (3)*
EE	-1.94 (3)*	-1.91 (3)**
EM	-2.70 (0)	-2.59 (0)

Figures in parentheses are lag orders

*significant at 5%, ** significant at 10%, all the rest are significant at 1%

Engle-Granger critical values: 1% -2,5899; 5% -1,9439; 10% -1,6177

We are also interested whether the integration between the Turkish stock market and the European Union stock markets increased or decreased after the passage to the Customs Union in 1996. In order to examine this, a dummy variable is introduced. Using a dummy variable is the easiest way to test co-integration with a structural break. The results of the Engle and Granger with the

dummy variable are presented in Tables 3.11, 3.12 for developed and the Eastern European markets, respectively. We see that only the integration of the Turkish stock market with the Austrian stock market after the passage to the Customs Union in 1996 increased by 0.05 percent, the integration with the other markets decreased. Integration with Finland also shows a positive result but it is insignificant. Integration with the Eastern European markets increased except the Hungarian market which decreased. The increasing integration with the Polish market is insignificant.

**Table 3.11. Engle and Granger Results with a Structural Break
(Developed EU Markets)**

	Time period	Statistical value	t value	p-value
Austria	before 1996	0.90	11.47	0.00
	after 1996	0.05	7.03	0.00
Belgium	before 1996	1.21	7.38	0.00
	after 1996	-0.03	-1.85	0.06
Denmark	before 1996	1.29	12.47	0.00
	after 1996	-0.07	-5.50	0.00
Finland	before 1996	0.22	2.63	0.00
	after 1996	0.04	1.48	0.14
France	before 1996	1.27	10.18	0.00
	after 1996	-0.07	-4.07	0.00
Germany	before 1996	1.41	11.98	0.00
	after 1996	-0.06	-4.61	0.00
Greece	before 1996	0.97	17.00	0.00
	after 1996	-0.03	-2.74	0.01
Ireland	before 1996	1.56	9.42	0.00
	after 1996	-0.10	4.37	0.00
Italy	before 1996	1.25	8.51	0.00
	after 1996	-0.02	-1.50	0.13
Netherlands	before 1996	0.94	6.73	0.00
	after 1996	-0.04	-2.19	0.03
Portugal	before 1996	1.17	7.62	0.00
	after 1996	-0.01	-0.43	0.66
Spain	before 1996	1.12	7.36	0.00
	after 1996	-0.07	-2.73	0.00
Sweden	before 1996	1.23	12.20	0.00
	after 1996	-0.10	-6.53	0.00
UK	before 1996	9.32	9.32	0.00
	after 1996	-4.11	-4.11	0.00
World	before 1996	8.38	8.38	0.00
	after 1996	-3.64	-3.64	0.00
Europe	before 1996	1.60	10.86	0.00
	after 1996	-0.10	-5.55	0.00

Table 3.12. Engle and Granger Results with a Structural Break (EE Markets)

	Time period	Statistical value	t value	p-value
Czech	before 1996	0.33	4.45	0.00
	after 1996	0.07	2.73	0.01
Hungary	before 1996	0.74	9.37	0.00
	after 1996	-0.08	-3.08	0.00
Poland	before 1996	1.22	11.56	0.00
	after 1996	0.02	1.56	0.12
EE	before 1996	0.47	5.29	0.00
	after 1996	0.08	3.11	0.00
EM	before 1996	1.11	9.55	0.00
	after 1996	0.09	5.92	0.00

We found the existence of long-run relationships between the Turkish stock market and the European Union stock markets. As in short-run there can be some departures from a common co-movement, we are interested what percent of them are corrected each month. The results of the Error Correction Model are presented in Tables 3.13 and 3.14. Analyzing the results for the developed markets, we see that in average 7 % of disequilibrium is corrected each month, the highest being that of the Greek market, 13%, indicating that the ISE has a high degree of stock market integration with this market. As for the Eastern European markets, average 8% of disequilibrium is corrected each month, the highest being of the Polish market, 12%, implying that the integration with the Polish market is high.

Table 3.13. Error Correction Model Results (Developed EU Markets)

	statistics	t-value	p-value
Austria	0.0704	2.63	0.0089
Belgium	0.0753	2.78	0.0059
Denmark	0.0872	2.96	0.0033
Finland	0.0682	2.75	0.0064
France	0.0789	2.81	0.0054
Germany	0.0903	3.05	0.0026
Greece	0.1334	3.74	0.0002
Ireland	0.0798	2.91	0.0040
Italy	0.0809	2.93	0.0037
Netherlands	0.0749	2.81	0.0054
Portugal	0.0790	2.89	0.0042
Spain	0.0741	2.80	0.0055
Sweden	0.0806	2.93	0.0038
UK	0.0813	2.94	0.0037
World	0.0781	2.92	0.0038
Europe	0.0790	2.85	0.0047

Table 3.14. Error Correction Model Results (EE Markets)

	statistics	t-value	p-value
Czech	0.0788	2.33	0.0212
Hungary	0.1129	2.99	0.0033
Poland	0.1219	2.76	0.0066
EE	0.0649	2.08	0.0391
EM	0.0623	1.89	0.0608

Thus, we have conducted the analysis of co-integration of the Istanbul Stock Exchange with the European Union equity markets. We first conducted the descriptive statistics and found that the returns of the ISE are the highest among the developed markets of the EU, but the standard deviation is also highest; among the emerging markets of the EE countries, the returns of the ISE are also high ranking the second after the Hungarian market, the standard deviation is also the highest among the EE markets. As for the correlations between the ISE and EU markets,

they are positive and rather high.

Before performing the Engle and Granger cointegration test we first analyzed the series on non-stationarity as it is the primary condition for the cointegration analysis. For that we ran ADF and PP tests and proved our index series to be non-stationary. Conducting then the Engle and Granger test we found that the Turkish equity market is cointegrated with the EU equity markets, both the developed and the developing ones. Obtaining these results we concluded that for the EU investors diversification strategies are limited in the Turkish market. The Engle and Granger test with a structural break showed that only integration with the Austrian market and the EE markets, except the Hungarian and Polish ones, increased after the passage of Turkey to the Customs Union in 1996. The ECM results for the developed markets indicated that in average 7 % of disequilibrium is corrected each month, the highest being of the Greek market, 13%. As for the Eastern European markets, average 8% of disequilibrium is corrected each month, the highest being of the Polish market, 12%.

The overall conclusion to the study is that the Istanbul Stock Exchange is integrated with the European Union major stock markets.

CONCLUSION

In this study I investigate the integration of the Turkish equity market with the European Union equity markets. Since the EU aims at the economic, commercial and political integration of the European countries, it is interesting to examine whether the Turkish equity market is integrated with European Union equity markets as a possible candidate for the entrance.

The financial industry makes a distinction between two main categories of international markets: developed and emerging. The markets differ in size, liquidity, risk, volatility, accessibility, and the impact they have on the global economy.

The developed markets include the USA, Japan, Western Europe, Canada, New Zealand, and Australia. They account for more than 80% of the market capitalization in the global equity market. The nations of Asia (except Japan), the Indian subcontinent, Eastern and Central Europe, the Middle East, Africa, and South America are generally considered emerging markets.

In contrast with developed markets, emerging markets are usually significantly smaller, often newer, and may be considerably less liquid, which results in greater volatility. Also, there is much political instability as well. According to the International Financial Corporation's definition, emerging market is any market in a developing economy, with the implication that it has all the potential for development.

As Turkey is considered to be an emerging market, I divide the markets of the EU into the developed markets of the EU and the emerging markets of the EU (these are the Eastern European markets) in order to find out whether the ISE, as an emerging market, is integrated more with the developed markets or with the emerging markets, or both.

The issue of world market integration has been very popular in the financial literature. In an integrated world equity market, individual stock prices are expected to have long-run relationships, i.e., share common stochastic trends. Many researchers using different methods analyzed long-run relationships between markets or groups of markets. Early researches were mostly devoted to developed markets as the USA, Japan, and Western Europe, while recent ones to emerging markets. The most investigated among them have been the markets of Asia and Latin America, as well as the Central and European markets. This focus on emerging markets has been determined by the fact that emerging markets provide good portfolio diversification opportunities for assets invested only in developed markets. This becomes possible because of low correlation coefficients between developed and emerging markets.

In general, integration of markets implies long-run relationships between markets and limited diversification benefits for investors.

Opportunities in international investments do not come free of risk. These risks are political risk, currency risk, information risk, liquidity risks, volatility, costs, access, repatriation of capital, and fiduciary constraints.

The issue behind the fact that emerging markets have offered attractive investment opportunities is that despite the local risks in emerging economies are higher, the expected profit is large.

I also give in my study market characteristics and comparisons of the stock exchanges of the countries we examine: the ISE and the European Union stock markets.

Many researches have used different co-integration tests in order to examine long-run relationships between equity markets, in this thesis, I use Engle-Granger co-integration test and Error Correction Model to investigate long-run co-integration relations between the Turkish stock market and the EU stock markets.

The data used in the study are monthly stock price indices for the period 1988-2006 for developed markets of the EU and for the period 1994-2006 for emerging markets of the EU. I found the presence of long-run co-movements for all the markets, both the developed and emerging, i.e., there is co-integration between the Turkish stock market and the EU stock markets. I make a conclusion that the benefits for portfolio diversification are limited for the European Union investors in the Turkish stock market. Also, using a dummy variable I examined whether integration between the markets increased or decreased during the post-Customs Union period. The results showed increasing integration of the Istanbul Stock Exchange only with the Austrian market from the developed markets of the EU and with the Eastern European markets except Hungary, integration of the ISE with all the other markets decreased after the passage to the CU. And finally I analyzed short-run relations between the markets using Error Correction Model. I found that in average 7% of disequilibrium in every market is corrected each month in the developed markets of the EU and in average 8% in the emerging markets of the EU.

The overall conclusion of the study is that the Istanbul Stock Exchange is integrated with the European Union major stock markets, both the developed and developing ones.

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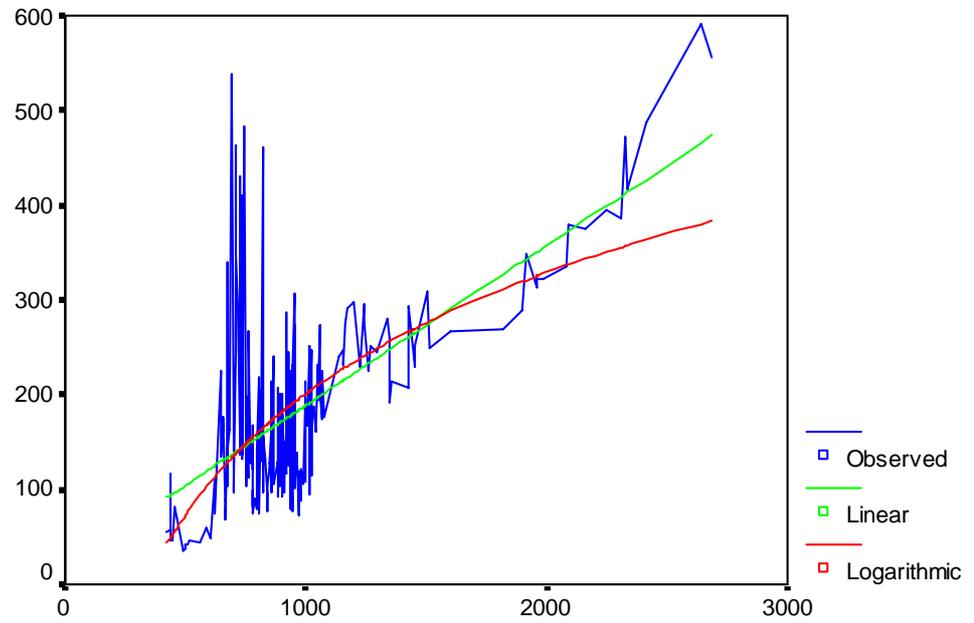
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APPENDIX

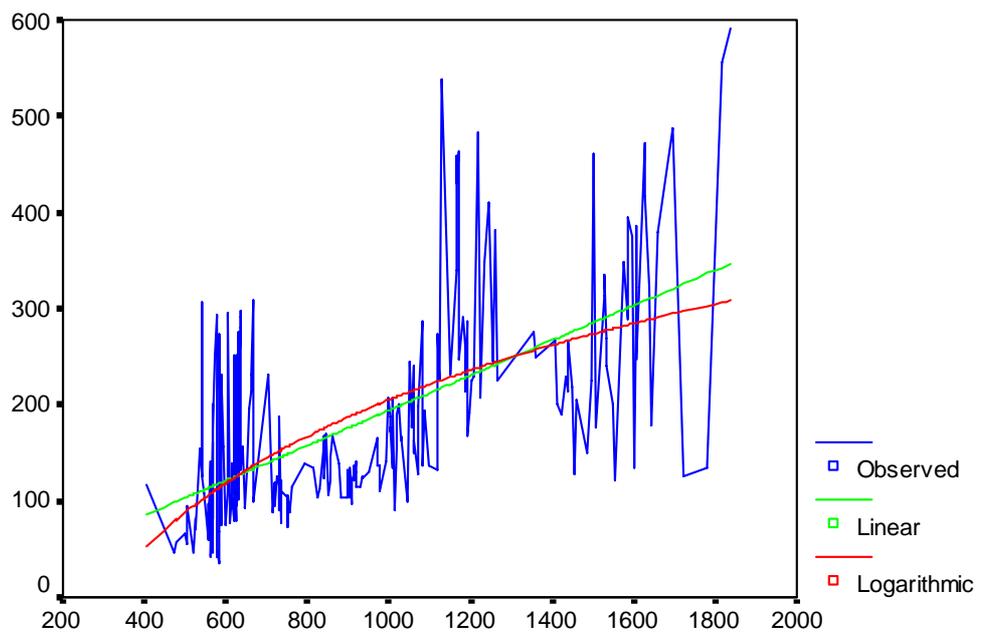
Analyzing the Series on Linear and Logarithmic Relationships

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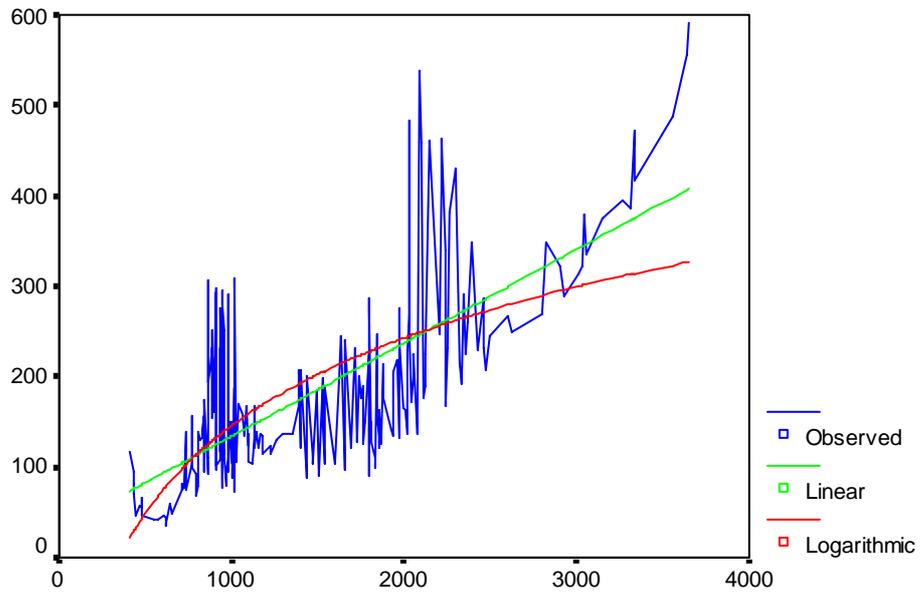
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TURKEY



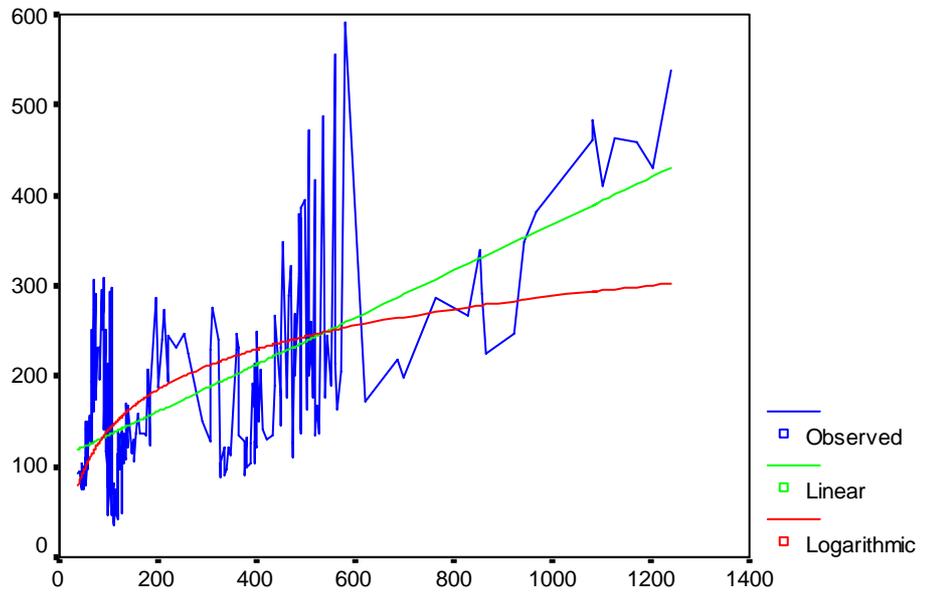
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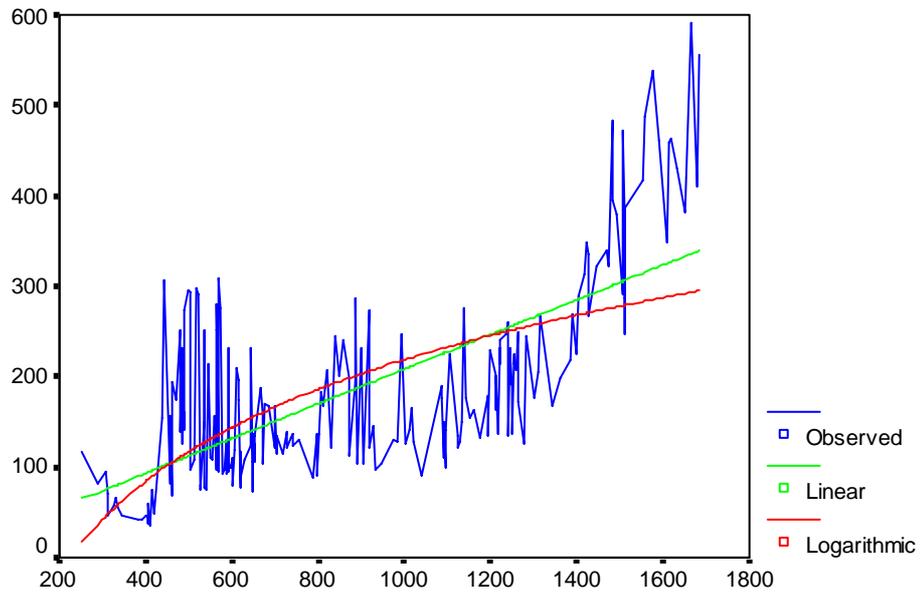
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TURKEY



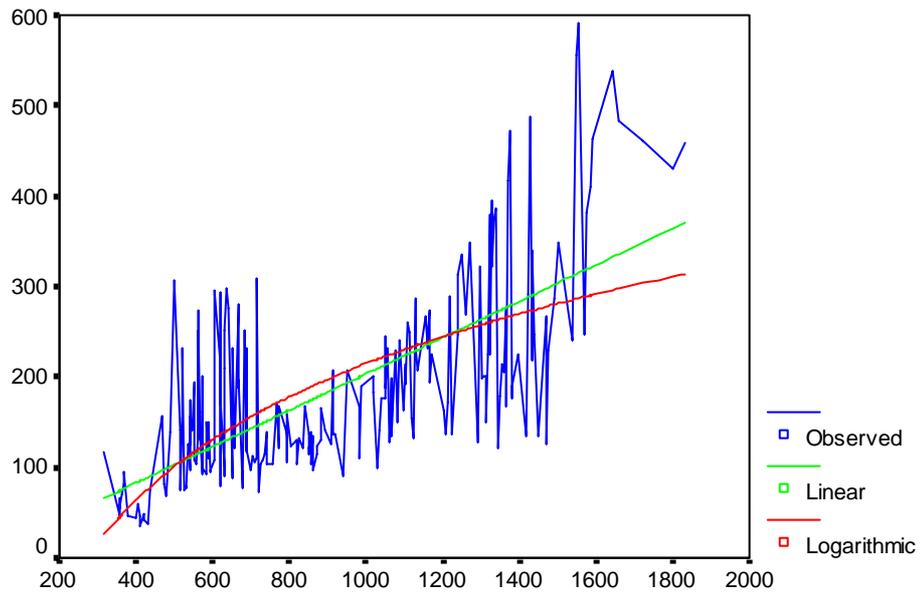
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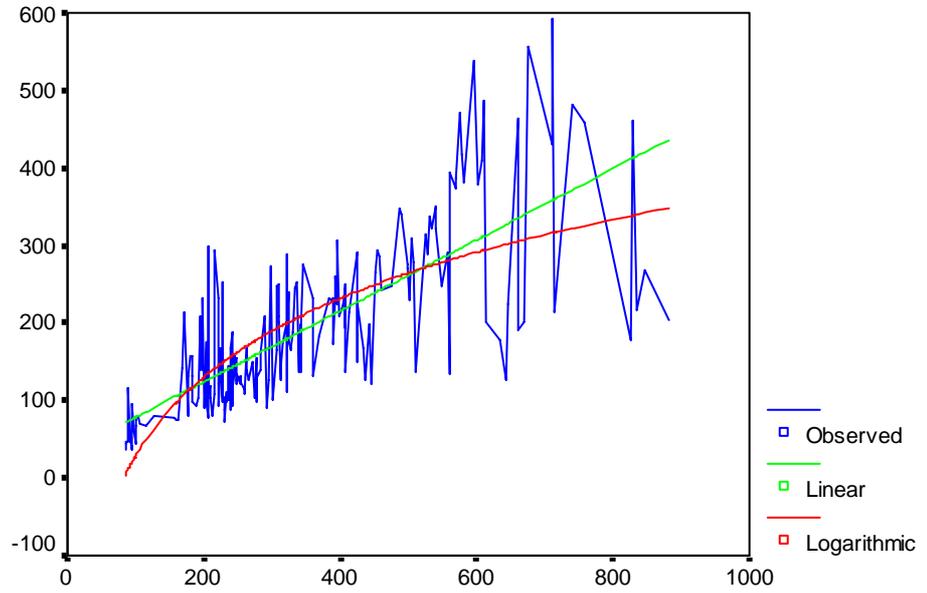
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TURKEY



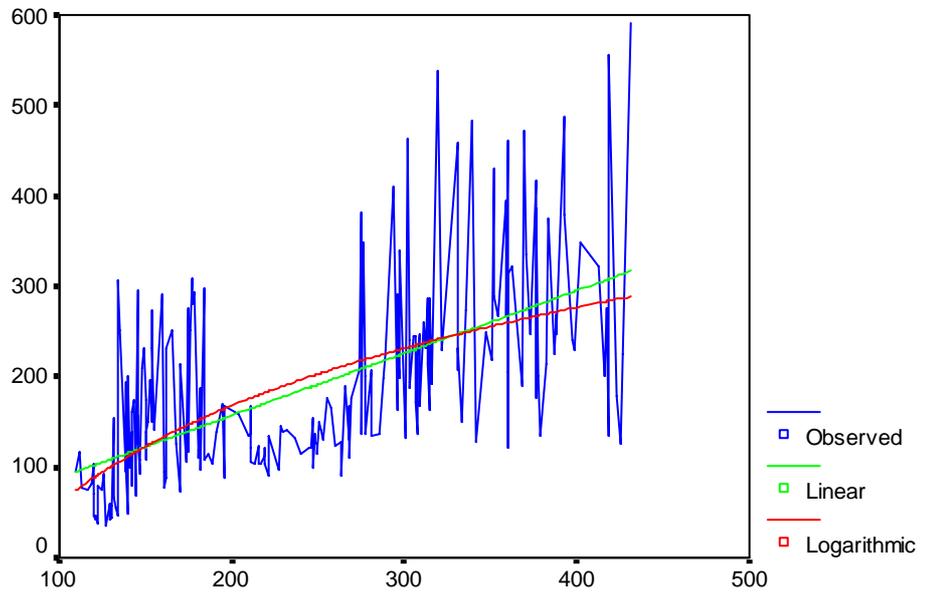
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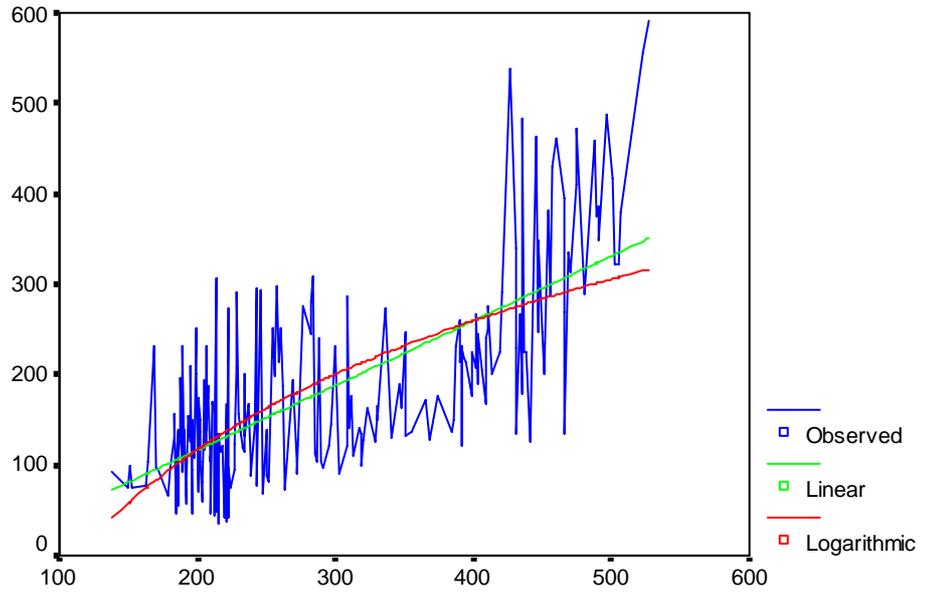
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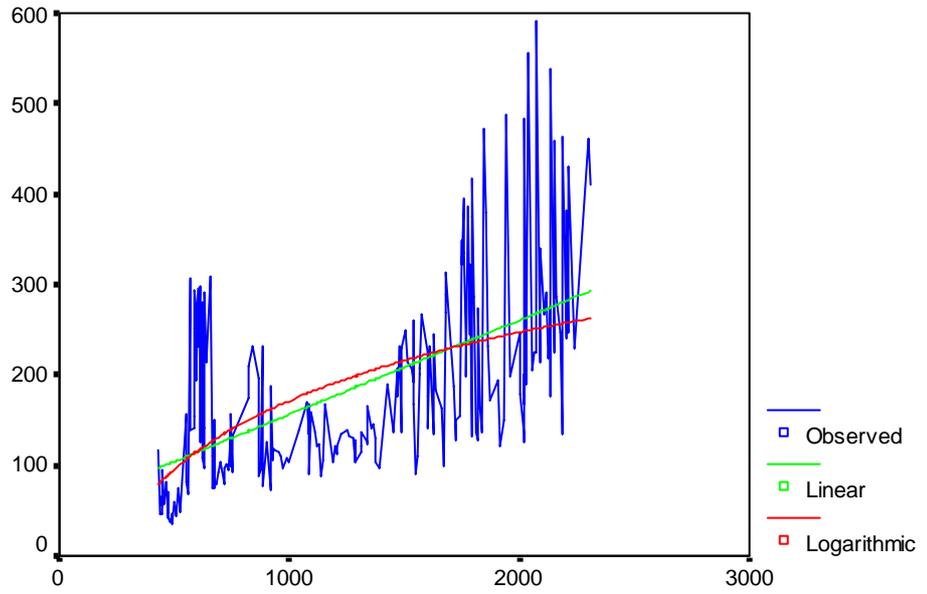
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TURKEY



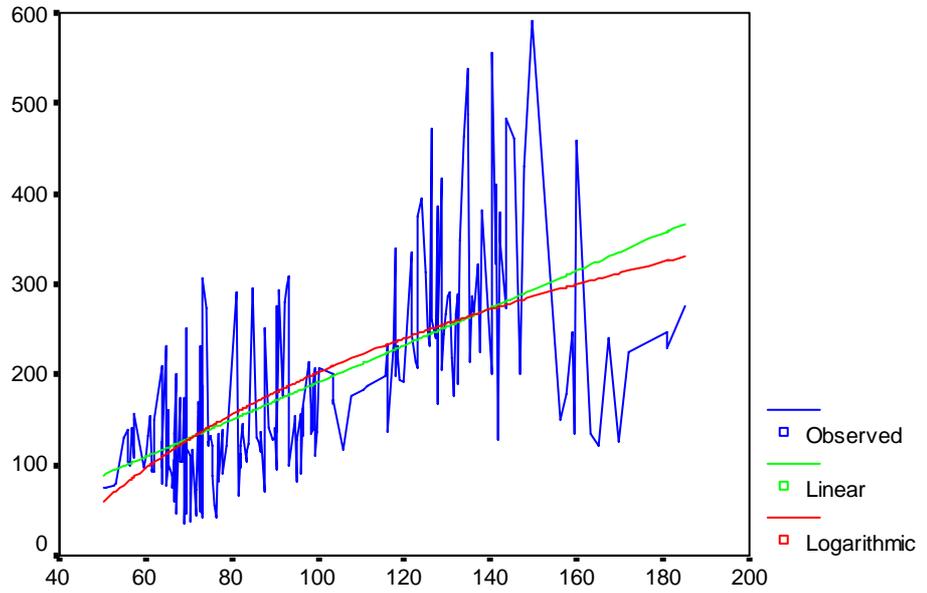
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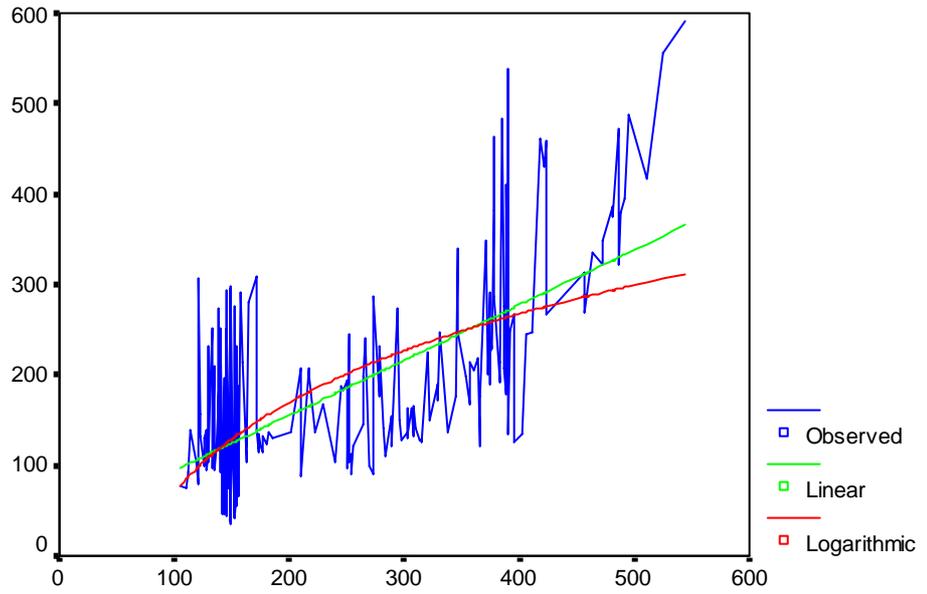
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TURKEY



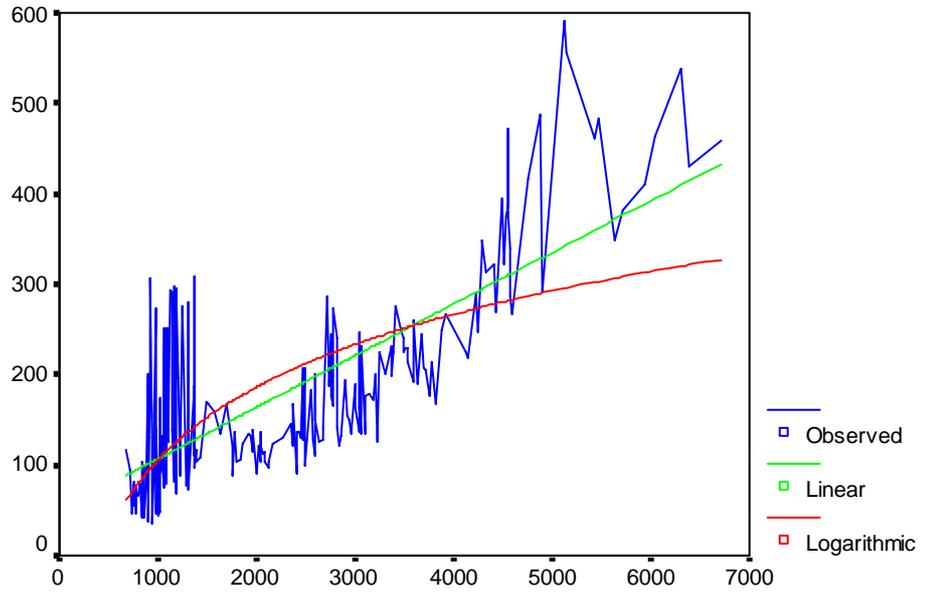
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TURKEY



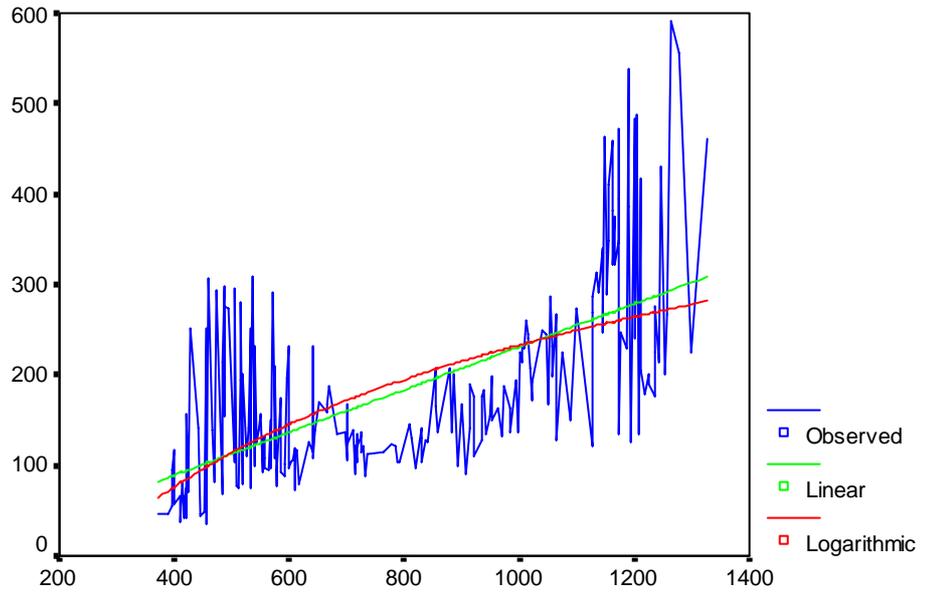
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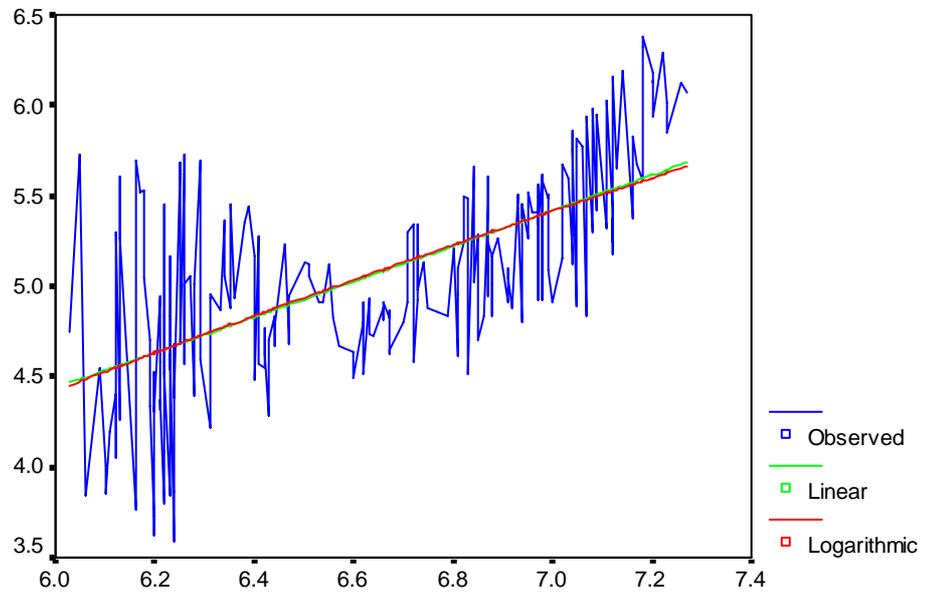
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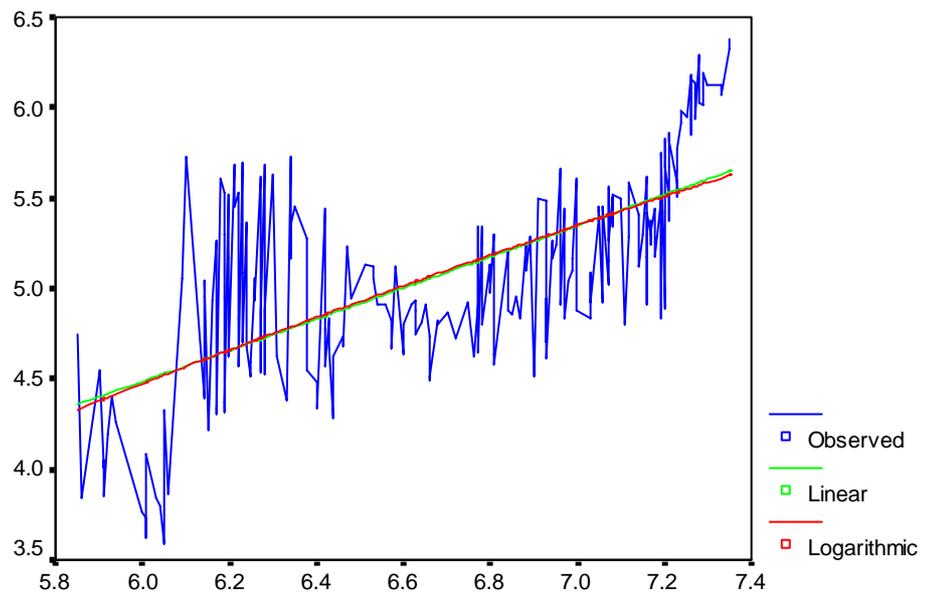
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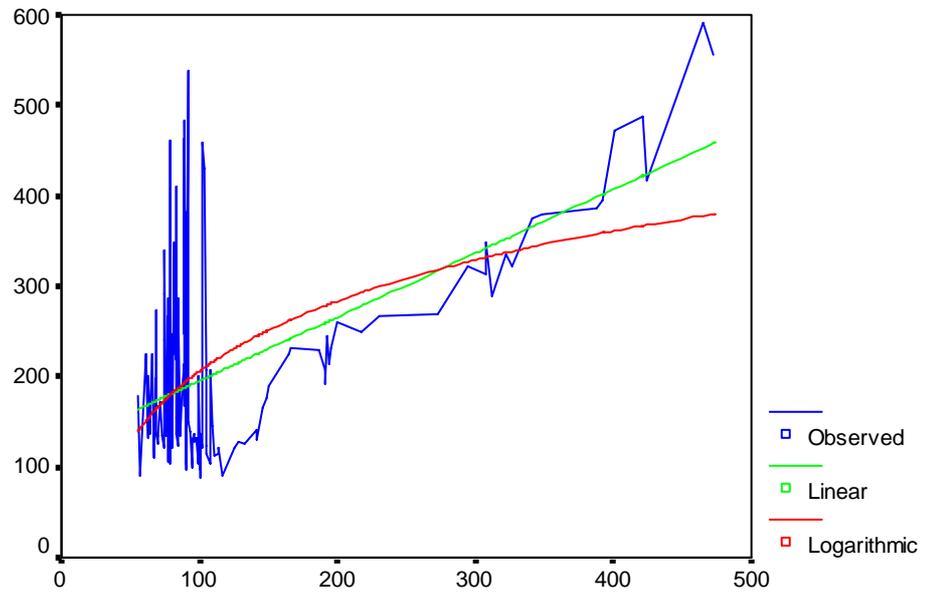
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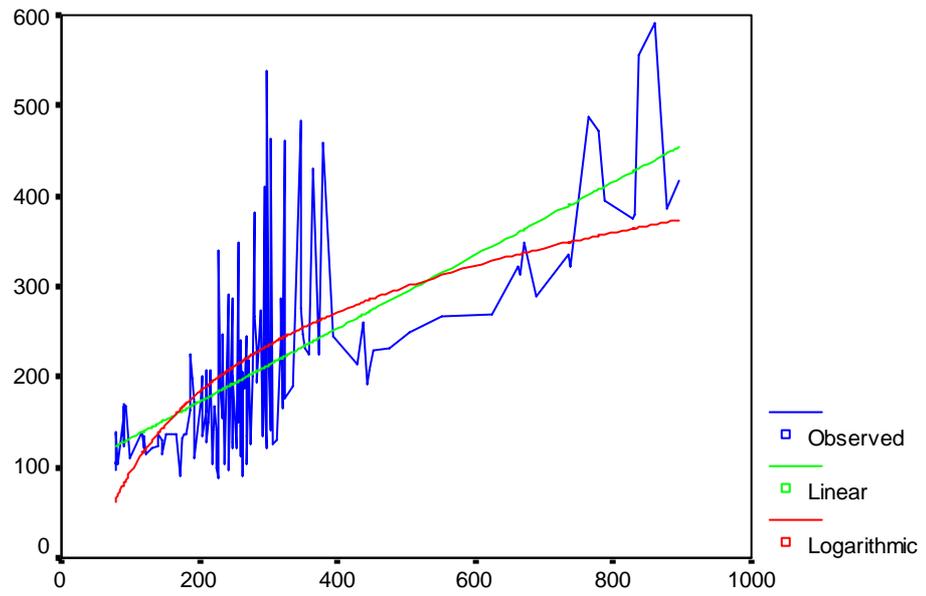
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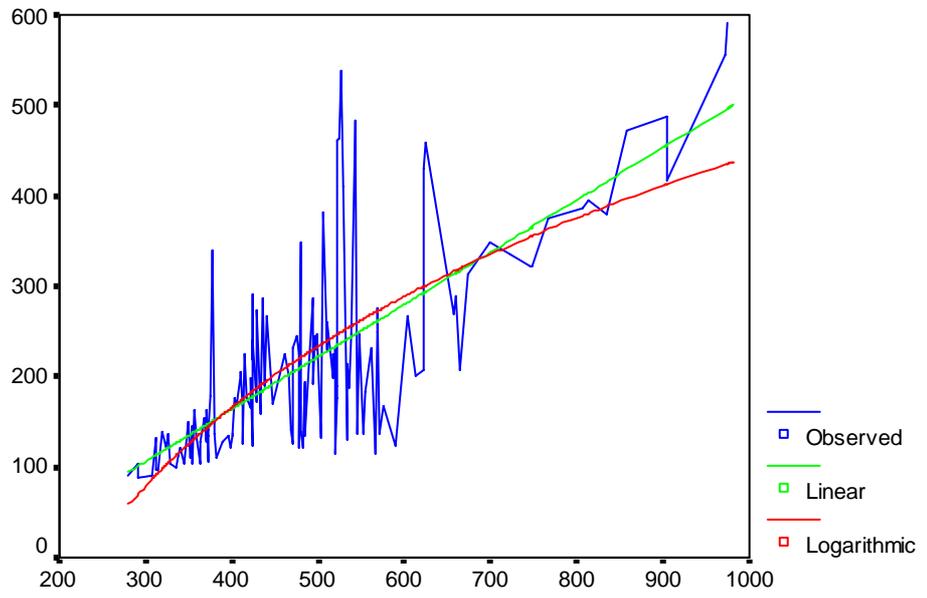
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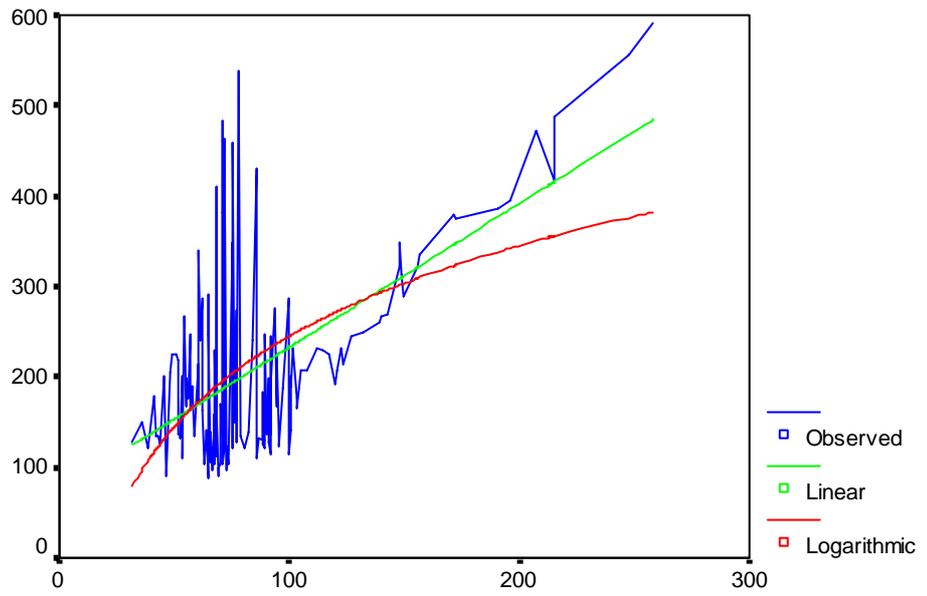
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TURKEY



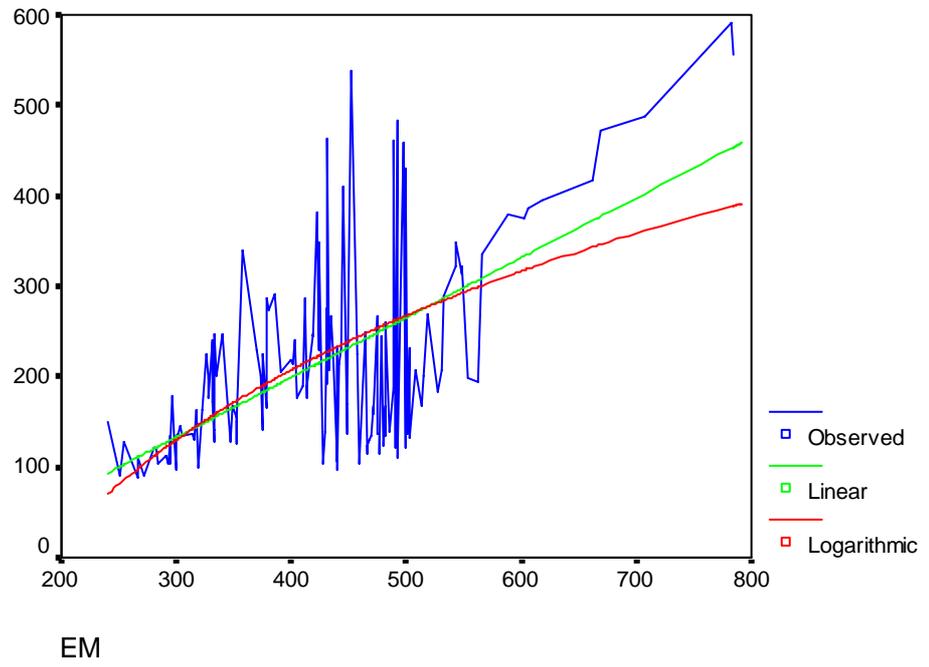
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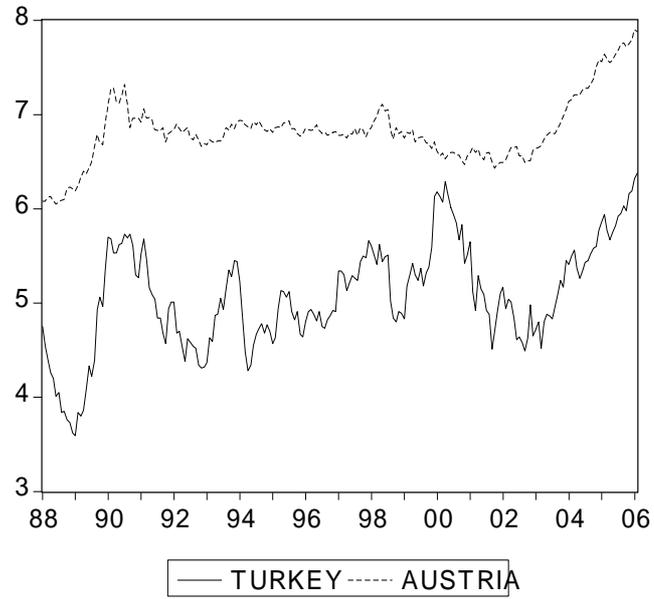
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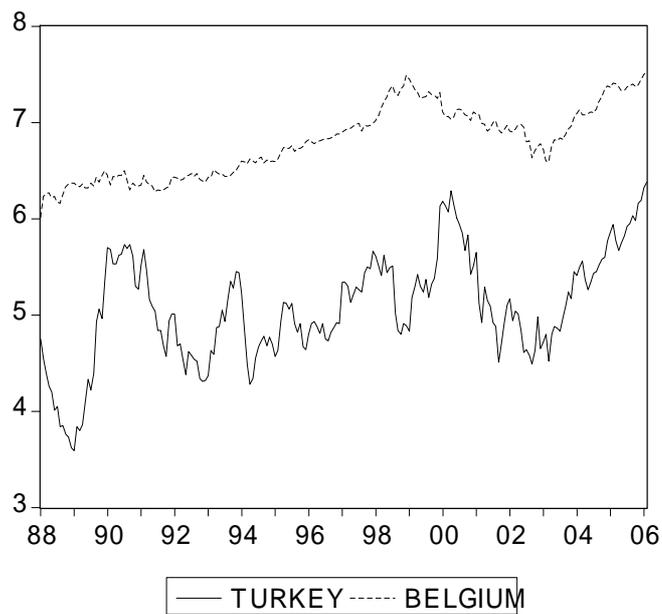
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1988-2006**

Price index (USD \$)



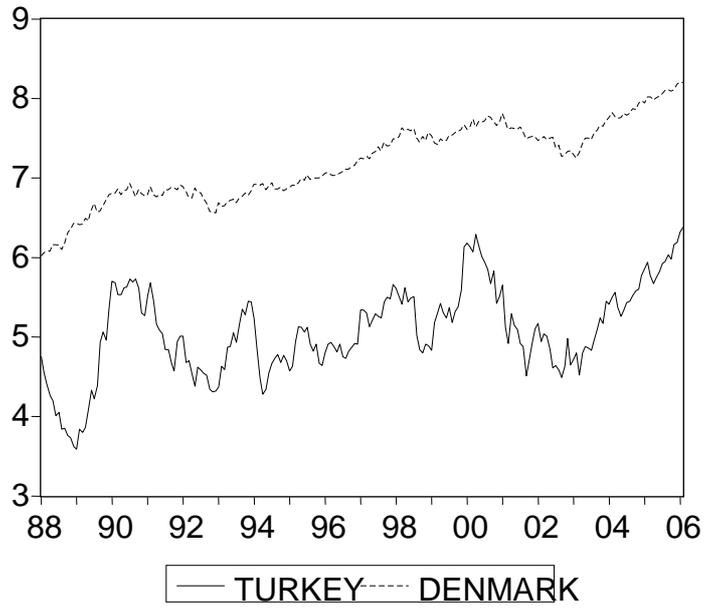
Time period

Price index (USD \$)



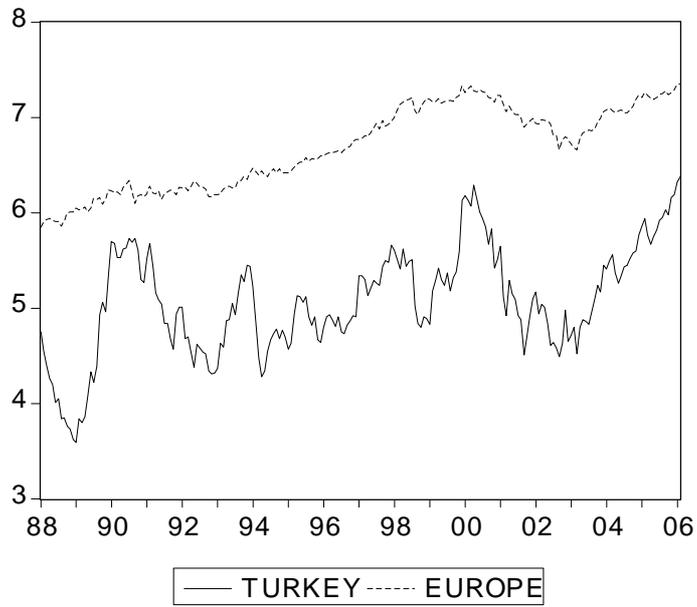
Time period

Price index (USD \$)



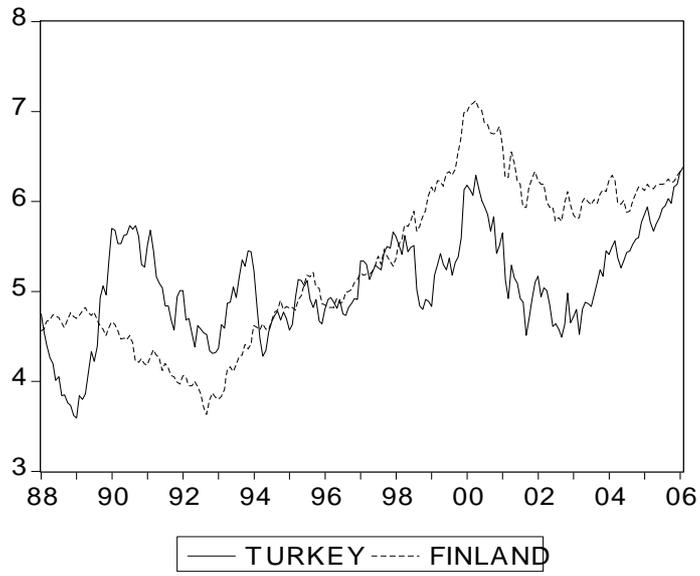
Time period

Price index (USD \$)



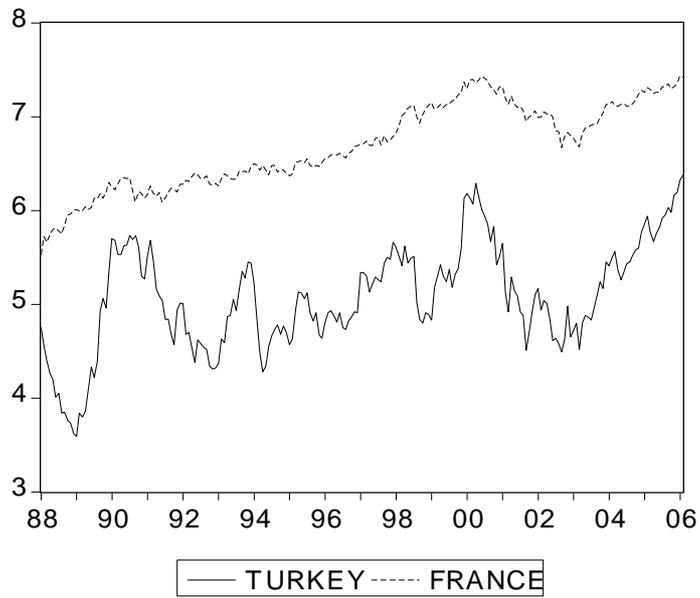
Time period

Price index (USD \$)



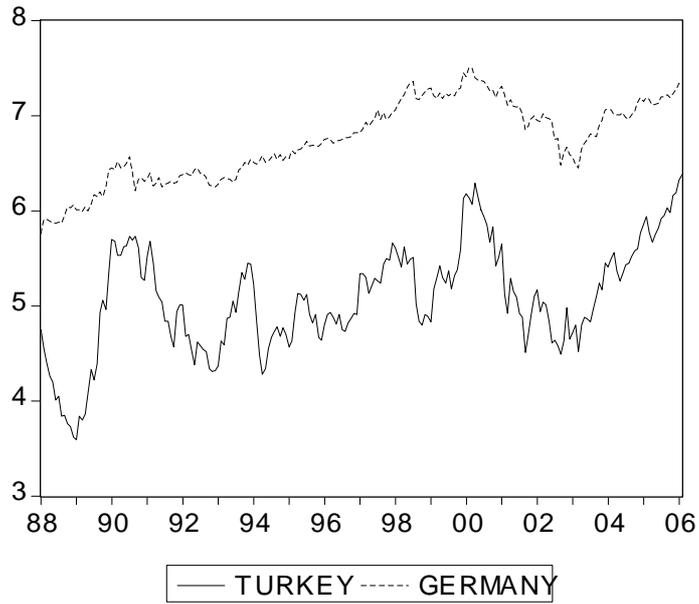
Time period

Price index (USD \$)



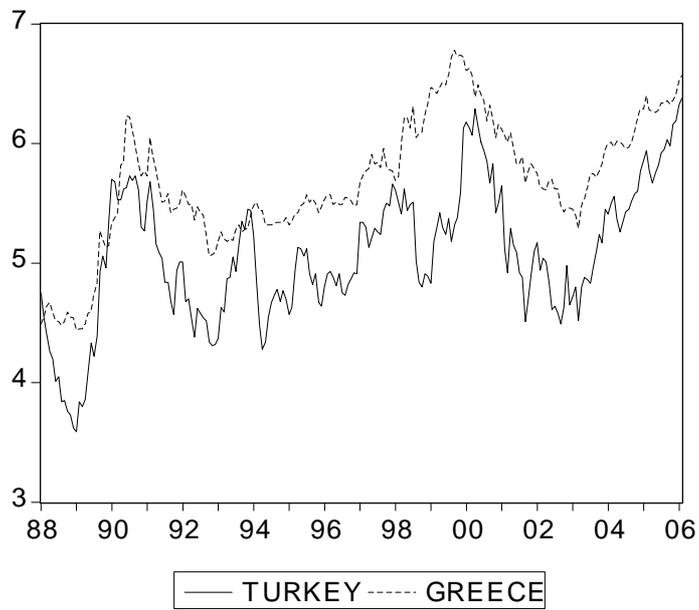
Time period

Price index (USD \$)



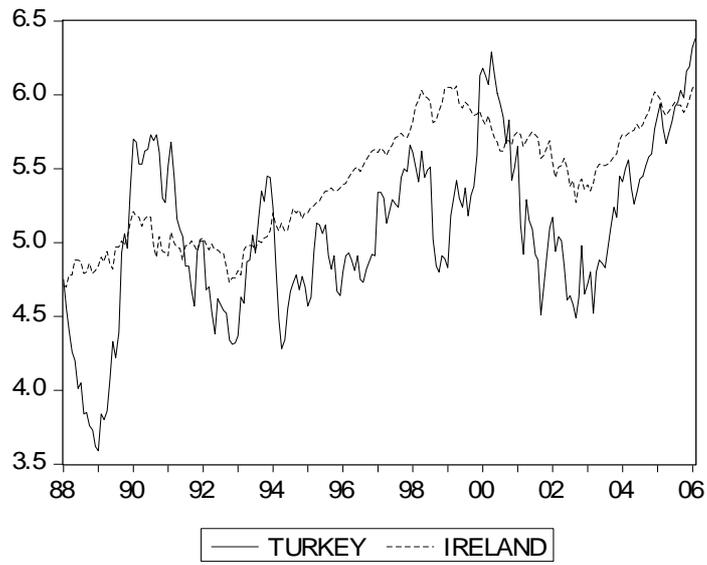
Time period

Price index (USD \$)



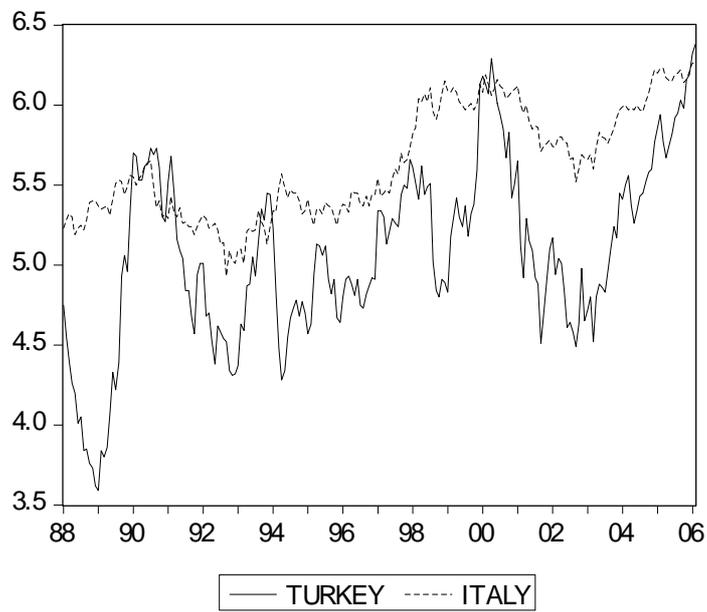
Time period

Price index (USD \$)



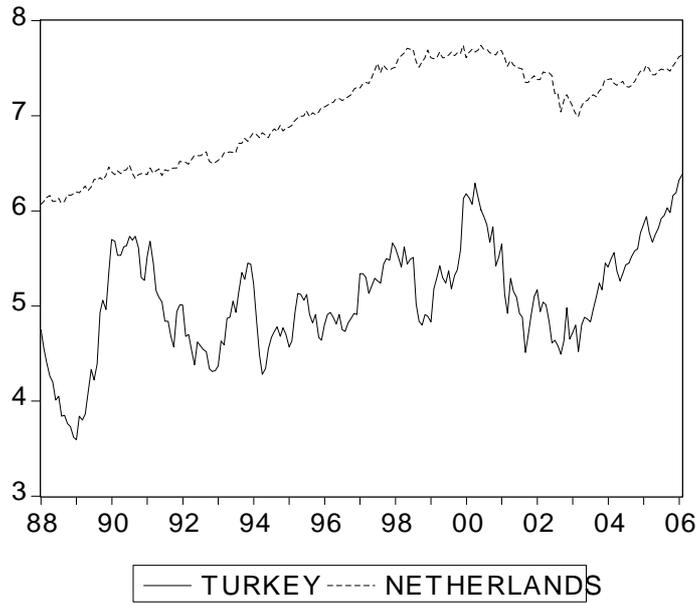
Time period

Price index (USD \$)



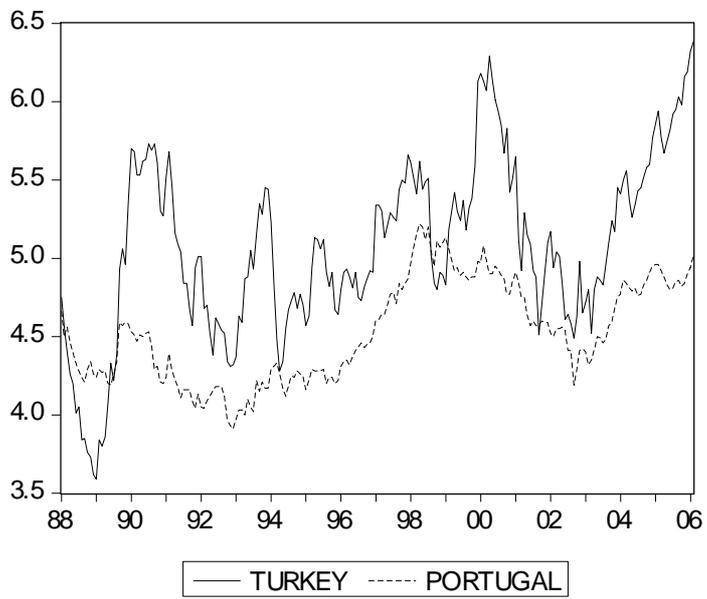
Time period

Price index (USD \$)



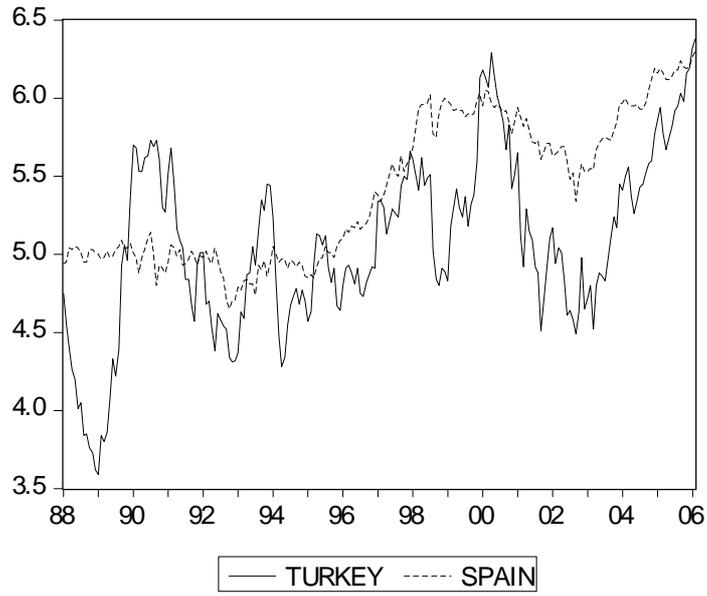
Time period

Price index (USD \$)



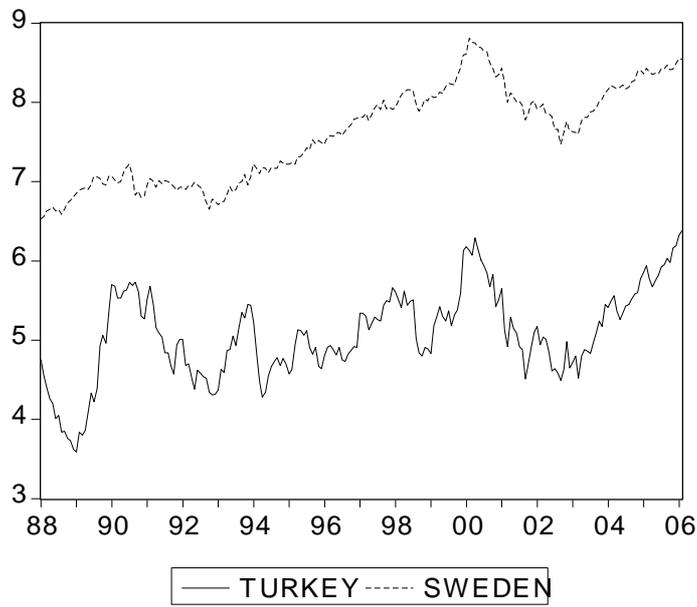
Time period

Price index (USD \$)



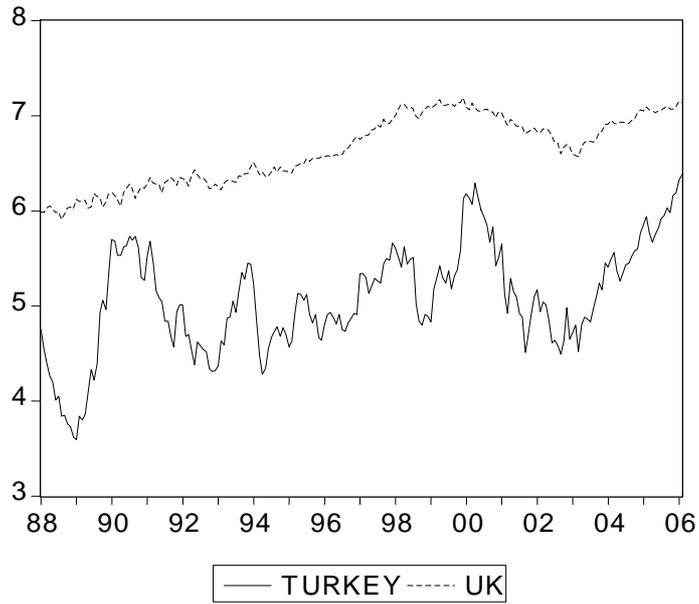
Time period

Price index (USD \$)



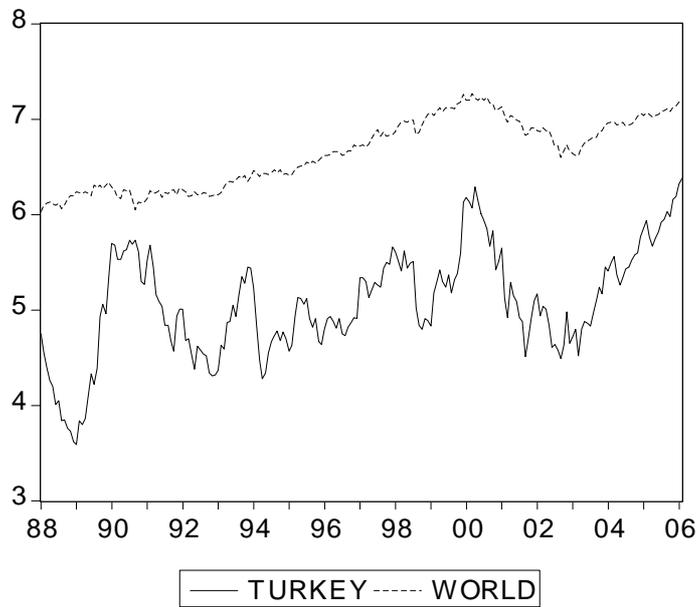
Time period

Price index (USD \$)



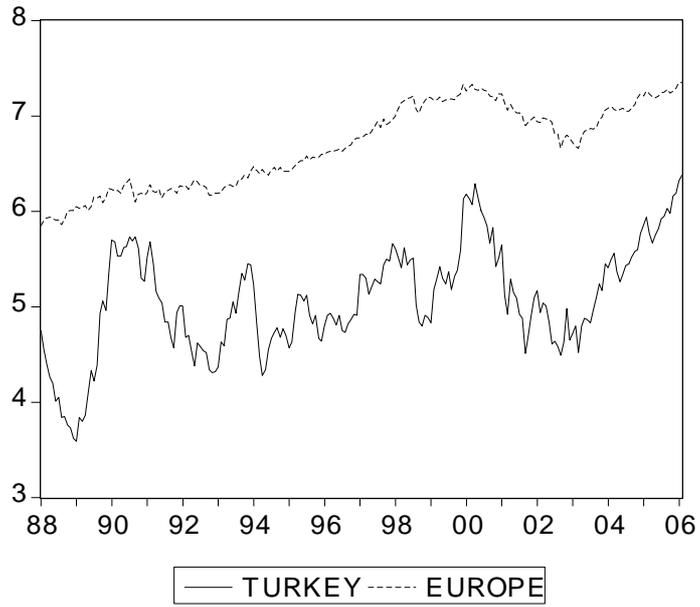
Time period

Price index (USD \$)



Time period

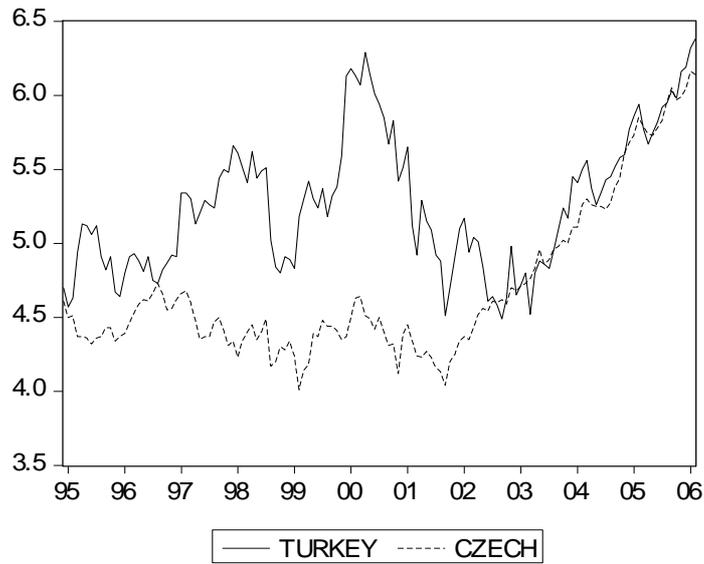
Price index (USD \$)



Time period

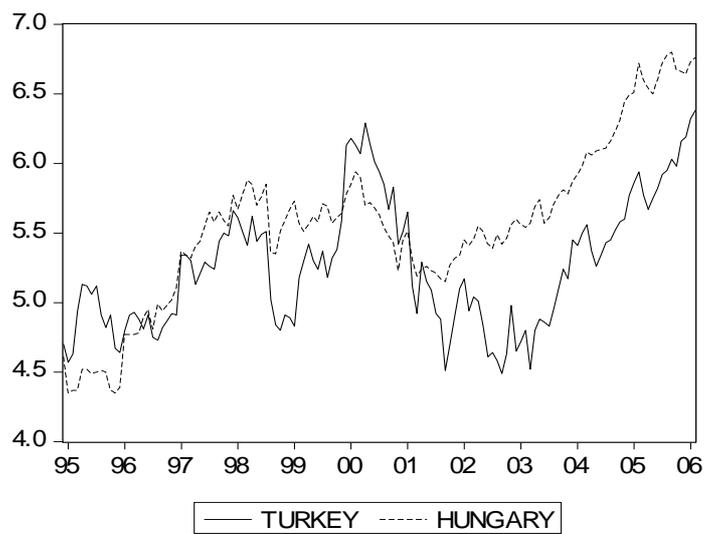
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Price index (USD \$)



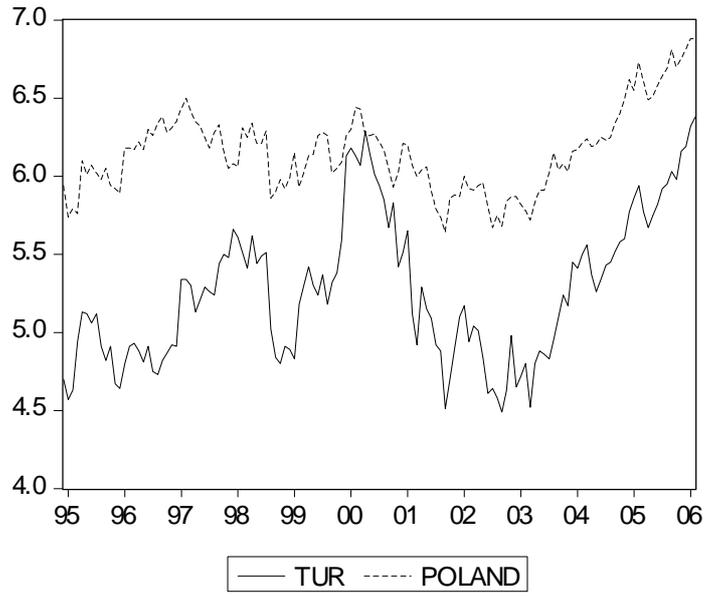
Time period

Price index (USD \$)



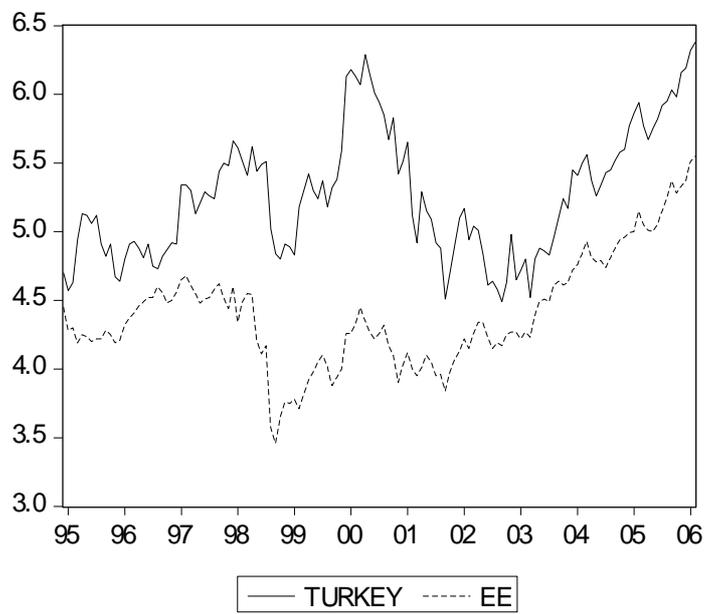
Time period

Price index (USD \$)



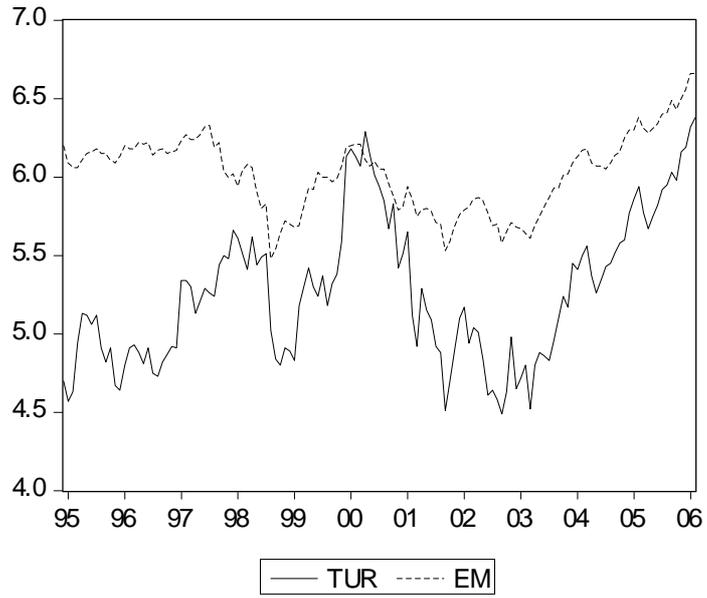
Time period

Price index (USD \$)



Time period

Price index (USD \$)



Time period