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Article *in* International Research Journal of Finance and Economics · January 2012

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International Research Journal of Finance and Economics
ISSN 1450-2887 Issue 87 (2012)

http://www.internationalresearchjournaloffinanceandeconomics.com

Stock Market Development and Economic Growth in Developing Countries: An Empirical Analysis for Turkey

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Abstract

In this current study the causality relationship between the economic growth of a developing country, (Turkey) and the ISE (Istanbul Stock Exchange) 100 Index has been empirically analyzed on the basis of monthly data. Prior to conducting the analysis in a time series, in order to test the stability of the series, a Unit Root Test was initially applied. Subsequent to stabilization, and aiming towards the aim of detecting long-term relationships between the series, a cointegration test was applied, and finally the causality relationship between the series was measured via the Granger Causality Tests. The obtained findings showed that there is a long-term relationship between economic growth and the ISE 100 Index, and a one-way causality relationship with the ISE 100 towards Economic Growth.

Keywords: Stock Market, Economic Growth, VAR Model, Granger Causality, Cointegration
JEL Classification Codes: G10, G21, O16

1. Introduction

A positive correlation between growth and the indicators of financial development was first documented by Goldsmith (1969), McKinnon (1973) and Shaw (1973) who obtained considerable evidence that financial development has a close relationship with economic growth. On the other hand, these studies were generally conceptional, and therefore, lacked an analytical foundation. In addition, these studies failed to provide a detailed explanation of financial development, and advocated the hypothesis that financial liberalization enabled a direct and spontaneous financial development (Greenwood and Jovanovic, 1990; Bencivenga and Smith, 1991). Generally, Pagano (1993) asserts that financial development mostly has a positive effect on growth, but there are exceptions: improvements in risk-sharing and in the household credit market may decrease the saving rate, hence the growth rate. Thus, 'financial development' is too generic a term; to gauge the impact on growth. Thus, if one wants

to conduct research on the relationship between financial development and long-term economic growth one must specify the particular financial market concerned.

International portfolio investments prove advantageous in terms of meeting financial needs of countries, yet due to their short-term characteristics and their disappearance whenever the bells of the economic crisis ring, they pose great risks for the economies of developing countries. In that sense the management of international capital flows is not an easy task. Given that developing countries integrate into the financial liberalization process with no rational policies, then they may lose more than they could gain from the liberalization of capital accounts. However, despite the aforementioned risks, it is an acknowledged reality that international portfolio investments are significant sources for economic growth.

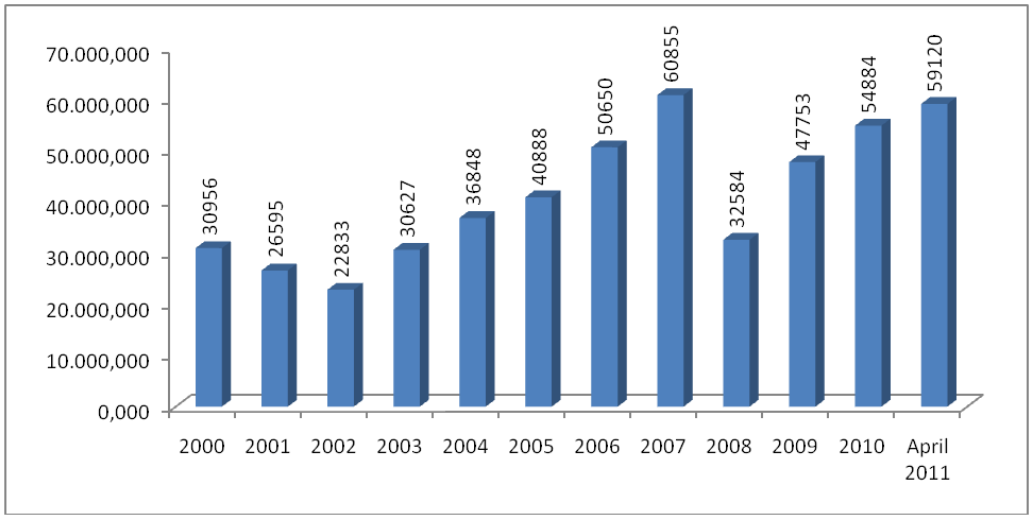
International portfolio investments enter a particular country by means of financial markets. Financial systems stand before us as a salient factor since they bear the mission of fund supply to enable the spread of state-of-the-art technologies and to achieve capital accumulation. The primary function of financial markets is to collect financial savings and allow their use in meeting the needs of the economy. The secondary function of financial markets is to create liquidity. The most notable sub-markets functioning to that end are markets of money and capital. The institutions of these markets are the banking system in money markets and securities exchange in capital markets. One of the most significant indicators of financial developments is the analysis of the development level of securities exchanges in related countries.

It was reported in the World Bank's World Development Report (1989) that customarily development specialists have focused on banks, and thus, viewed stock markets as unimportant. They note that much more corporate capital is raised from banks than from equity issues. Levine (1997) asserts that this traditional view, however, fails to recognize that stock markets and banks may provide different financial services. Stock markets may positively affect economic development even though firms obtain the bulk of their capital elsewhere. As a conclusion Levine (1997) declares that each of these components of the financial system is an independently strong predictor of growth.

Stock markets -thanks to their speed in meeting the capital needs of companies, and reducing investment risks- functions operate as a bridge between economic activity and financing. A proper-functioning stock market is considered by many as one of the basic elements of the finance sector, and it is advocated that the development of the stock market plays a critical role in sustainable economic development (Twerefou and Nimo, 2005). It takes place in two ways. Firstly, an effective stock market –by providing finance to companies- offers them a chance for long-term indebting (Levine and Zervos, 1996). Secondly; a developing stock market attracts foreign investors and intensifies the tight linkage between domestic and foreign markets (Singh, 1993). Also Pagano (1993) states that the stock market contributes to the mobilization of domestic savings by enhancing the set of financial instruments available to savers to diversify their portfolios, providing an important source of investment capital at a relatively low cost. A well functioning and liquid stock market, that allows investors to diversify away unsystematic risk, will increase the marginal productivity of capital.

The most significant establishment releasing the data of the global stock market is the World Federation of Exchanges. The Paris-based World Federation of Exchanges, an association of 52 regulated stock market exchanges around the world, released data on the total world stock market capitalization, which increased to 59.12$ trillion in April 2011 from 57.8$ trillion in March 2011 (Perry, 2011). The graphic prepared based on the data of total world stock market capitalization released by the World Federation of Exchanges is below. As indicated in the Graph 1, the total world stock market capitalization has showed a steady increase every year starting from 2000, except for 2008 when the effects of international financial crisis were the highest. The total world stock market capitalization, which was around US$ 31 trillion in the year 2000, rose to US$ 59 trillion in April 2011 which corresponded to almost double the increase during one decade.

Graph 1: Total World Stock Market Capitalization (US$ billion)



Source: World Federation of Exchanges Report, http://www.world-exchanges.org / Date of access: 26.01.2012

The total world stock market capitalization is increasing day by day. Emerging markets compose of a disproportionately large amount of this increase. The rapid development of the total world stock market capitalization has attracted the attention of academics and policymakers. The growing importance of stock markets in developing countries around the world over the last few decades has shifted focus from academicians exploring the relationship between the stock market development and economic growth. (Deb and Mukherjee, 2008)

Therefore, the relationship between the stock market and long-term economic development has been the subject of intensive theoretical and empirical studies. (Adamopoulos, 2010) asserts that more recently, the emphasis has been increasingly shifting towards the stock market indexes and the effect of stock markets on economic development.

In the current study the causality relationship between economic growth in Turkey, which has recently attracted attention with its development potential, and ISE (Istanbul Stock Exchange) 100 Index has been analyzed empirically on the basis of monthly data. In the 2nd part of the research, economic growth in Turkey and development of the stock market has been explored. In the 3rd part, the relevant literature has been scrutinized. In the 4th part, information on the model and data sets have been presented and the empirical findings of the research have been evaluated. The last and fifth part is the conclusion.

2. Economic Growth in Turkey and Development of the Stock Market

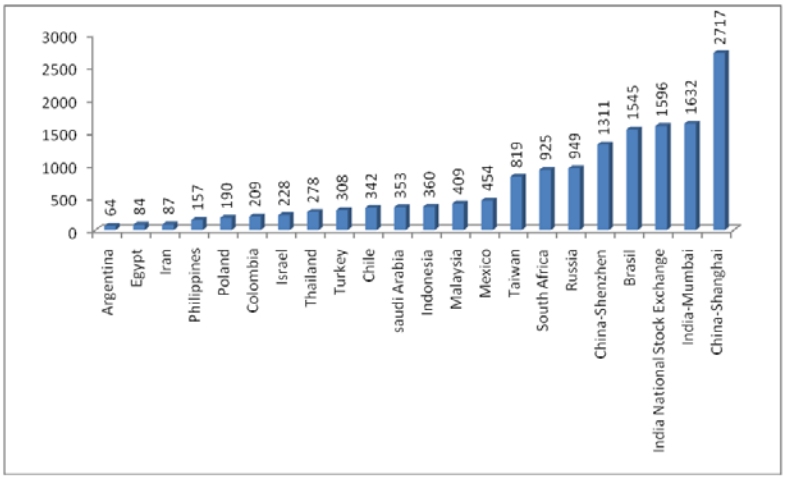
The Turkish economy, which entered a rapid recovery period after the global crisis, achieved an 8.9% of growth rate in GDP in 2010, and became the second fastest growing economy among the G-20 countries, with a 9.2% of the increase registered in the GDP in the last quarter of 2010 (2010-Q1: 12%, 2010-Q2: 10.3%, 2009-Q3: 5.2%). Industrial production caught up by 16.9% in 2010, and the capacity utilization rate went up to 75.6% (December 2009: 67.7%) as of the year-end. The unemployment rate was 11.4% (December 2009: 13.5%) as of the year-end. The current account deficit, undergoing a rise due to increasing domestic demand and private investments, registered at US$ 48.5 million in 2010. The foreign direct investment inflow surged slightly up to US$ 9 billion (2009: US$ 8.4 billion) in 2010. (ISE Annual Report, 2010)

Turkey, which embraced a closed economy until the 1980s, started to be affected by the liberalization movements of the age, which in turn necessitated appropriate regulations in capital markets also. Following the passage of 1981 dated the Capital Market Law, the Capital Market Board

of Turkey (CMB), established in 1982, started to function as the top authority in the management, auditing and regulations of the securities market.

The Istanbul Stock Exchange was established on December 26, 1985, for the purpose of ensuring that securities are traded in a secure and stable environment, and commenced operation on January 3, 1986. The ISE has contributed to the development of Turkish capital markets and the Turkish economy since the date of its establishment. As seen in Graph 2, with a market capitalization of US$ 308 billion, the ISE ranks fourteenth among emerging markets in terms of market capitalization. (ISE Annual Report, 2010)

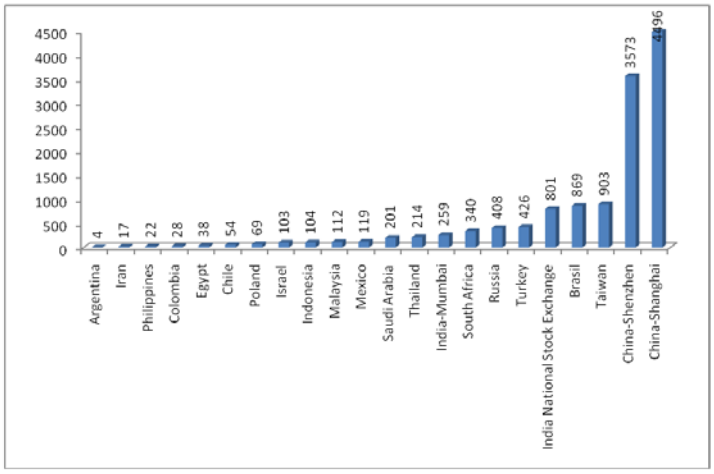
Graph 2: Stock Market Capitalization (Emerging Markets, End-2010, US$ billion)



Source: ISE 2010 Annual Report, http://www.ise.org/Home.aspx / Date of access: 26.01.2012

As seen in Graph 3, the ISE is maintaining its position as the most developed and liquid exchange in its region, and ranks sixth among the emerging markets in terms of stock trading value. The total amount of funds raised through the ISE since its establishment in1986 to the end of 2010 totaled US$ 48.6 billion. In 2010, the return of the ISE 100 Index on the US dollar basis was registered as 21%, while the returns of the MSCI Developed Markets and the MSCI Emerging Markets indexes were 10% and 16%, respectively. The ISE 100 index, hitting the all-time high closing value of 71,543.3 during the year, was among the best performing indexes in 2010, with a 24.9% of returns in TL terms. (ISE Annual Report, 2010)

Graph 3: Stock Market Traded Value (Emerging Markets, Yearly Total 2010, US$ billion)



Source: ISE 2010 Annual Report, http://www.ise.org/Home.aspx / Date of access: 26.01.2012

3. Literature

The relationship between the development of the stock market and economic growth has recently become a popular topic of research (Levine, 2004). There is not, a full consensus yet in the literature questioning the link between the stock market development and economic growth. This is particularly true in the empirical analyses starting from the 1980s up to the present day in the comparisons between developed and developing countries and also in individual countries the question whether a causality relationship existed between stock market and economic growth and if yes, the direction of this relationship have all presented dissimilar findings. On the other hand, an overwhelming majority of researchers have verified the causality relationship between the stock market and economic growth. In this part of our research the findings obtained from the empirical studies conducted up to the present day are discussed. There have been a number of academicians who have contributed to the research on the relationship between the financial system and economic growth; however, the works of King and Levine (1993a, 1993b), Levine (1997), Demirgüç-Kunt and Levine (1996), Singh (1993, 1997), Pagano (1993) and Levine and Zervos (1996) in particular are noteworthy since these studies directly question the relationship between stock market and economic growth.

Levine and Zervos (1996) analyze the empirical relationship between the measures of the stock market development and long-run growth rates. They produced indexes of the overall stock market development that bring together information on stock market size, liquidity, and international integration. Levine and Zervos used instrumental variables procedures, and controls for many other variables related to economic growth, to estimate the strength of the empirical relationship between economic growth and stock market development. After controlling the initial level of GDP per capita, initial investment in human capital, political stability, the level of banking development, and measures of the monetary, fiscal, and exchange rate policy, the predetermined component of stock market development remains positively and significantly correlated with long-term economic growth.

Levine and Zervos (1998) claim that the stock market encourages savings by providing individuals with an additional financial instrument that may better meet their risk preferences and liquidity needs. Better savings mobilization may increase the savings rate (Levine and Zervos, 1998). Stock markets also provide an avenue for growing companies to raise capital at lower costs. In addition, companies in countries with developed stock markets are less dependent on bank financing, which can reduce the risk of a credit crunch. Stock markets therefore are able to positively influence economic growth through encouraging savings amongst individuals, and by providing avenues for firm financing.

Looks like Levine, Dailami and Atkin (1990) announced that for a long-term perspective, stock markets are playing several crucial roles. First, by spreading the risks of long-term investment projects, the growth of stock markets can lead to a lower cost of equity capital, and thereby strengthening investment and growth. Second, by imposing a degree of control over the investment behavior of companies through the continuous monitoring of their share prices, and thereby of the implied possibility of merger and takeover, stock markets can contribute to more efficient investments. Third, by pulling foreign portfolio capital inward, the enlargement of stock markets can serve to increase the supply of investable resources in developing countries. Stock markets also have a role in domestic resource mobilization and provision of fresh equity capital to the corporate sector. This is particularly important in emerging capital markets, where the early enlargement of stock markets is often characterized by an increase in the number of companies going public, or by enhanced offerings of seasoned shares by listed companies.

Levine (1997) also asserts that the reduction of international investment barriers significantly increase the liquidity of stock markets, with positive effects on economic growth. Although stock market volatility tends to rise for a few years after financial liberalization, a greater openness to international capital has been associated with lower stock return volatility in the long term. Moreover, stock return volatility does not appear detrimental to long-term growth. Thus, if policymakers have the

patience to weather some short-term volatility, liberalizing restrictions on international portfolio flows offers expanded opportunities for economic development.

In the literature, amidst the factors affecting economic growth of countries in the aftermath of financial liberalization, it is evident that a comparison can be made between the banking system and stock markets. In relation to this subject Levine (1997) claims that countries with both liquid stock markets and well-developed banks grew faster than countries with both liquid markets and underdeveloped banks. More interestingly, greater stock market liquidity implies faster growth no matter what the level of banking development. Similarly, greater banking development implies faster growth regardless of the level of stock market liquidity. Thus, it is not stock markets versus banks; it is stock markets and banks. Each of these components of the financial system is an independently strong predictor of growth. Related to this subject also Atje and Jovanovic (1993) state that stock market liquidity has been a catalyst for long-term growth in developing countries. Also, they conclude that stock markets produce higher growths than banks.

On the other hand Singh (1993) examines the role that the stock-market can play in the economic and industrial development of newly industrializing countries, taking into account their particular circumstances and drawing on the experience of the countries with well-functioning markets. The main conclusion of the study is that, to the extent that developing countries do have a choice, they should attempt to promote bank-based financial systems rather than to establish and encourage stock-markets.

Enisan and Olufisayo (2009) examined the long-term and causal relationship between stock market development and economic growth for seven countries in sub-Saharan Africa. Using the autoregressive distributed lag (ARDL) bounds test, the study found that the stock market development is cointegrated with the economic growth in Egypt and South Africa. Moreover, this test suggests that stock market development has a significantly positive long term impact on economic growth. The Granger causality test based on the vector error correction model (VECM) further shows that the stock market development Granger causes economic growth in Egypt and South Africa. However, Granger causality in the context of VAR shows evidence of a bidirectional relationship between stock market development and economic growth for Cote D'Ivoire, Kenya, Morocco and Zimbabwe. This implies that the stock market helps to induce economic growth and in turn economic growth stimulates stock market development.

Nowbutsing and Odit (2009) examine the impact of stock market development on growth in Mauritius. They perform a time series econometric investigation for the period 1989 -2006. Two measures of stock market development, namely size and liquidity are used. They define size as the share of market capitalization over the GDP and liquidity as the volume of the share traded over GDP. They found that stock market development positively affect economic growth in Mauritius, both in the short- and long-term.

Deb and Mukherjee (2008) used the Granger causality test to find the causal relationship between stock market development and economic growth in the Indian economy for the period 1996-2007. The study primarily revolved around two major questions: first whether at all any relationship exists between stock market development and economic growth, and secondly, what could be the nature and direction of the causal relationship, if any i.e. does development of stock market promote economic growth or vice versa? They concluded two main findings. First, the results showed bidirectional causality between the real GDP growth rate and the real market capitalization ratio. Secondly, the results suggested unidirectional causality from both stock market activity and volatility to the real GDP growth in the Indian economy.

Shahbaz et al. (2008) conducted analysis to find the dynamic relationship between stock market development and economic growth in the case of Pakistan by using annual time series data from 1971-2006. They found that there is a long-term relationship between stock market development and economic growth. The results indicated that stock market development is an important wheel for economic growth. The Engle-Granger-Causality estimation confirms the bi-directional causality between stock markets development and economic growth in the case of Pakistan in the long-term.

However, in the short-term, the causality goes only one way, i.e., from stock markets development to economic growth.

Nowbutsing B.M. and Odit M. P. (2009) perform a time series econometric investigation to explore the relationship between stock market development and economic growth in Mauritius for the period 1989-2006. They found that stock market development is an important ingredient for growth in Mauritius since the stock market gives a general idea of economy health. As a conclusion they assert that stock market development positively affecteconomic growth in Mauritius both in the short and long-term.

Ake and Dehuan (2010) used the Granger Causality Test to find the causal relationship between stock market proxies through market capitalization, total trade value, turnover ratio and economic growth (GDP and FDI). The results of the study suggest positive links between the stock market and economic growth for some countries (France and United Kingdom) for which the stock market is liquid and highly active. However, the causality relationship is rejected for the countries (Belgium and Portugal) in which the stock market is small and less liquid.

As regards to the research concerning Turkey, Karagöz and Armutlu (2007) in their study reveal manifestingly a causality relationship between financial development and economic growth, have analyzed the relationship between the ISE 100 Index and GNP (Gross National Product) for the period 1988-2006. They concluded in this research that the growth in GNP is influential on the growth in the stock market index.

Contrary to the general aim of the literature, Shleifer and Vishney (1997) claim that very liquid markets hurt economic development. By allowing investors to sell stocks quickly, liquid markets may reduce investor commitment, and discourage stock owners to exert corporate control by monitoring the performance of managers and firms. In other words, dissatisfied owners sell their shares instead of working to make the firm operate better. According to this view, greater stock market liquidity may obstruct economic growth by disturbing corporate governance.

Ake and Ognaligui (2010) used the Granger Causality Test to examine the causality relationships between stock markets and economic growth in Cameroon, based on the time series data from 2006 to 2010. They found that the Douala Stock Exchange has not yet affected Cameroonian economic growth. They assert that the results can be explained by the low value of market liquidity. It means that the Douala Stock Exchange is not active enough to boost the Cameroonian economy.

Harris (1997) examines the empirical relationship between stock markets and economic growth. Contrary to studies by Atje and Jovanovic (1993) it reveals no strong evidence that the level of stock market activity helps to explain growth in per capita output. The sample is divided into developed and less developed countries. For the less developed sample, the stock market effect, as with the full sample, is at best very weak. For developed countries, however, stock market activity does have some explanatory power.

As can be seen, is not a full consensus amidst the studies focusing on the relationship between the stock market development and economic growth. However in a great number of studies it has been detected that there still exists either a one-way relationship from the stock market towards economic growth, or from economic growth towards the stock market, or a mutual relationship. These different findings reveal that the research analyzing the relationship between the stock market and economic growth must be explored respectively for every single country. In the current study, we have also taken this finding into consideration and analyzed a respective sample; Turkey, which has recently achieved great progress in economic growth and stock markets.

4. Data Description, Methodology and Empirical Results

4.1. Data Description

In the present study, an attempt was made to detect the relationship between economic growth in Turkey, and the ISE 100 Index via the VAR model. Towards this end, monthly data between 1998:1

and 2010: 12 periods was utilized. The variables employed in this research are the Gross Domestic Product in reference to economic growth, and the ISE 100 index in reference to the stock market. Information on the utilized variables is given below. Relevant data was retrieved from the website of the TCMB (Central Bank of Turkey).[1]

4.1.1. ISE 100 Index

The index is used as the basic index for the ISE Stock Market. It is the successor of the Composite Index which was introduced in 1986 including the stocks of 40 companies, and was in time limited to the stocks of 100 companies. It consists of 100 stocks, which were selected from among the stocks of companies listed on the National Market and the stocks of real estate investment trusts, and venture capital investment trusts listed on the Corporate Products Market. The ISE 100 index automatically covers ISE 30 and ISE 50 stocks. Indices are weighted by the market value of shares outstanding, and the most recent registered prices are used in the calculation. The following formula is used in the calculation of indices:[2]

$$Et = \frac{\sum_{i=1}^{n} Fit * Nit * Hit}{Bt}$$

Et	=	Value of the index at period t
n	=	Number of stocks (companies) included in the index
Fit	=	Price of the stock "i" at period t
Nit	=	Total number of stock "i" at period t
Hit	=	Rate of shares outstanding of the stock "i" at period t
Bt	=	Divider value of the index at period t

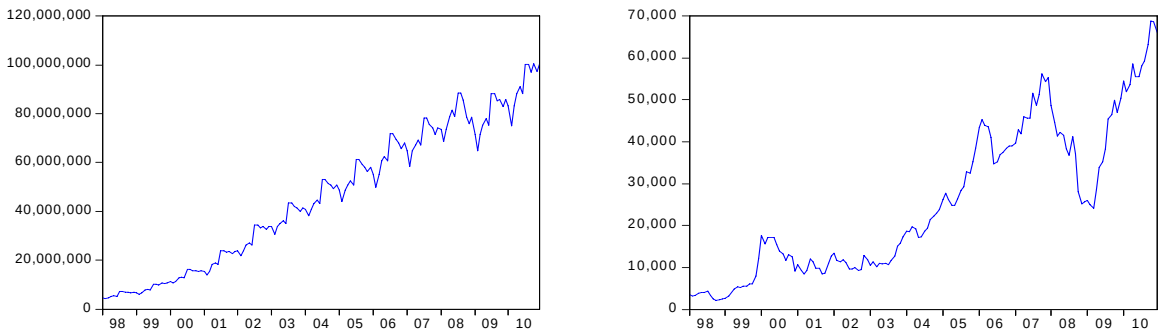
4.1.2. GDP (Gross Domestic Product)

Economic growth is measured in terms of an increase in the size of a nation's economy. The most widely-used measure of economic output is the Gross Domestic Product (abbreviated GDP). GDP generally is defined as the market value of the goods and services produced by a country.[3]

4.2. Methodology and Empirical Results

As the graphics of the series were analyzed, we witnessed that the series was not stationary or level. In that case, the means, variance and covariance of the series are not fixed in the course of time.

Graph 4: Variables Volatility



[1] http://evds.tcmb.gov.tr/yeni/cbt-uk.html - Date of access: 26.01.2012
[2] http://www.imkb.gov.tr/Publications/AnnualReports.aspx - Date of access: 26.01.2012
[3] http://www.quickmba.com/econ/macro/gdp/ - Date of access: 26.01.2012

Descriptive statistics related to the variables in the current study are given in Table 1. In particular, as the normal distribution qualities of the series are analyzed; with respect to the J-Bera statistics hypothesis "H_0: Series are Normal Distributed" is rejected on a 5% level of meaningfulness. As the skewness and kurtosis values of the series are analyzed, it can be asserted that both series are of a right-trend and vertical.

Table 1: Descriptive Statistics

	GDP	ISE
Means	46183755	25294,45
Standard Deviation	28783324	17827,51
Skewness	1,733644	2,131191
Kurtosis	0,106785	0,559256
J-Bera	10,72025	13,03833
Probability	0,004700	0,001475

4.2.1. Unit Root Test

In econometric models it should be tested initially to conclude whether or not the series are stationary. The variables to be employed in the model need to be stationary. Stationarity of the time series is a salient pre-condition in future estimations. That is related to the fact that when analysis is conducted with a non-stationary time series, a spurious regression problem occurs. In that case a series with no actual interrelationship may seem as if they are interrelated (Özata and Esen, 2010). In this study the unit root test was employed to test the stationarity of variables. Towards this end, the Phillips-Perron (PP) test as the unit root test was applied on the series.

The findings of the PP Unit Root Test revealed that none of the series were stationary on their levels, but became stationary when their first differences were taken. In other words it was concluded that the series became stationary when their first differences were obtained, which indicated that they were not unit roots. Therefore, it can be argued that the series are first-order integrated I (1). On that account, in the present study, the first difference of the series was taken, and in the model, the first differences were utilized. The findings from the PP Unit Root Test related to the levels of the series and values of which the first differences are eliminated are given in Table 2.

Table 2: PP Unit Root Test Results Related to Variables

TEST	GDP	DGDP	ISE	DISE
PP (c)	0,9605	0,0000	0,9424	0,0000
PP(t)	0,0003	0,0000	0,4649	0,0000

* c with constant term and without trend
* t with constant term and with trend

Subsequent to stabilizing the series, it is required to an implement cointegration test is required over the series in order to determine the long-term relationship between them. Thus, the Johansen Cointegration test was applied.

4.2.2. Cointegration Test

Prior to the implementation of the Johansen Cointegration Test, the Vector Autoregression **(**VAR) model was applied on the series to determine lagged values. The lagged value detected according to the Akaike Information Criteria was identified as 12. With the identified lag length, the Johansen Cointegration Test results, the Trace Test and the Maximum Eigenvalue test results are illustrated in Table 3 and Table 4.

Table 3: Trace Test Results

Hypothesized Number of CE(s)	Eigenvalue	Trace Statistics	%5 Critic Value	Probability
None (r=0)	0.325333	25.04614	15.49471	0.0014
At Most 1 (r≤1)	0.051443	7.499518	3.841466	0.0062

Table 4: Maximum Eigenvalue Test Results

Hypothesized Number of CE(s)	Eigenvalue	Maximum Trace Statistics	%5 Critic Value	Probability
None*(r=0)	0.116238	17.54662	14.26460	0.0146
At Most 1 *(r≤1)	0.051443	7.499518	3.841466	0.0062

When the tables demonstrating the findings obtained from the Trace Test and Maximum Eigenvalue Test are analyzed, the null hypothesis claiming the non-existence of cointegration or in other words the long-term relationship "H_0: There is no Cointegration" shall be rejected since the test statistics are higher than the critical values. It can be concluded that there is a long-term relationship amidst the variables.

4.2.3. Granger Causality Test

When there is a long-term relationship amidst variables it is plausible to employ the Vector Error Correction Model (VECM). Thanks to the Vector Error Correction Model it is possible to envisage that a deviation likely to emerge in the long-term can be corrected. To that end, in the rest of study, the Vector Error Correction Model was employed. The Vector Error Correction Model also enables the elimination of spurious regression that may emerge between both the dependent and independent variables.

Given that a long-term relationship exists between the variables, it is necessary to have at least one-way causality relationship. The results of the causality test conducted via the Vector Error Correction Model are given in Table 5, below.

Table 5: Granger Causality Test Results

	m=12	
Hypothesis	**Test Statistics**	**p Value**
H_0: GDP does not Granger cause ISE 100	1.65670	0.0853
H_0: ISE 100 does not Granger cause GDP	**2.97313**	**0.0012**

Table 5 demonstrates that there is a one-way causality relationship from the ISE 100 towards the Gross Domestic Product. Accordingly the ISE 100 is the Granger cause of Economic Growth.

4.2.4. Variance Decomposition

Variance decomposition or forecast error variance decomposition indicates the amount of information each variable contributes to the other variables in a vector autoregression (VAR) models (Lütkepohl, 2007). Variance decomposition determines how much of the forecast error variance of each of the variable can be explained by exogenous shocks to the other variables. Variance decomposition reveals how much of the changes in each variable may be explained by itself, and how much is explained by other variables. Accordingly, the results of the variance decomposition of our variables are as given in Table 6 and Table 7.

Table 6: Variance Decomposition of DGDP Variable

Period	DGDP	DISE 100
1	100	0.000
2	99.989	0.011

Table 6: Variance Decomposition of DGDP Variable - continued

3	99.837	0.163
4	95.434	4.566
5	90.448	9.552
6	90.370	9.630
7	88.644	11.356
8	83.355	16.645
9	83.055	16.945
10	81.791	18.209
11	81.133	18.867
12	80.423	19.577

Table 7: Variance Decomposition of DISE 100 Variable

Period	DGDP	DISE
1	0.758	99.242
2	1.778	98.22
3	1.820	98.180
4	2.073	97.927
5	2.099	97.901
6	2.116	97.884
7	2.319	97.681
8	2.446	97.554
9	2.432	97.568
10	2.668	97.332
11	2.731	97.269
12	2.776	97.224

The findings of the Variance Decomposition indicate that a **2.776%** forecasting error variance of the ISE 100 can be explained by Economic Growth, **97.224%** is explained by itself; likewise **80.423%** of Economic Growth is determined by itself and **19.577%** is explained by the ISE 100. This is a finding equivalent to the results of the causality analysis.

5. Summary and Concluding Remarks

In the present study, an attempt was made to detect the relationship between economic growth in Turkey and the ISE 100 Index via the VAR model. Towards this end, monthly data between the periods 1998:1 and 2010: 12 were utilized. The variables employed in this research are the Gross Domestic Product in reference of economic growth and the ISE 100 Index in reference to the stock market. In our study the VECM was implemented in order to explore the existence of a long-term relationship between the variables. The findings from the Vector Error Correction Model have verified that there is a one-way causality relationship from the ISE 100 towards the Gross Domestic Product. Accordingly, the ISE 100 is the Granger cause of Economic Growth. As a final step, the Variance Decomposition was conducted in the present study. The variance decomposition reveals how much of the changes in each variable can be explained by itself, and how much is explained by other variables. The findings of the Variance Decomposition indicate that a 2.776% forecasting error variance of the ISE 100 can be explained by Economic Growth, 97.224% is explained by itself; likewise 80.423% of Economic Growth is determined by itself and 19.577% is explained by the ISE 100. This is a finding equivalent to the results of the causality analysis.

In our study, focusing on the case of Turkey, the findings obtained from the empirical analyses demonstrated that there is a long-term relationship between economic growth and the ISE 100 Index, and a one-way causality relationship from the ISE 100 towards Economic Growth.

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Annex 1: Graphs of Impulse-Response Functions (ISE-GDP)