Oil Price Shock, Stock Market and Economic Growth in OECD Countries

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ABSTRACT

This thesis focuses on the estimation of the effect of the stock and oil markets on economic growth in the USA, Spain, Sweden, Turkey and Japan. Annual data have been used with this respect. Time series analysis shows that real income in these countries is in long term interaction with oil and stock prices. This reveals that stock prices and oil prices are determinants of real income for these countries under inspection. However, it is found that not only oil prices but also stock prices in these selected countries exert negative effects on real income in both long and short terms.

Keywords: Oil Price; Stock Price; Income; Co-integration Analysis.

ÖZ

Bu çalışma ABD, İsveç, Türkiye, İspanya ve Japonya gibi seçilmiş ülkelerde petrol ile borsa piyasalarının reel gelir üzerindeki etkisini tahmin etmeye yönelik yürütülmüştür. Bu sebeble, yıllık veri seti çalışmada kullanılmıştır. Zaman serisi analizi sonuçlarına göre, çalışma, bu ülkelerde reel gelir düzeyinin borsa performansı ve petrol fiyatları ile uzun dönem denge ilişkisi içerisinde olduğunu ortaya koymuştur. Bu durum, petrol ve hisse senedi fiyatlarının, çalışmada seçilmiş olan ülkelerde, reel gelir'in belirleyicileri olduğu anlamına gelmektedir. Fakat, yine çalışmanın bulgularına gore sadece petrol fiyatlarının değil borsa dalgalanmalarının da reel gelir üzerinde ters yönde bir etki yarattığı ortaya konmuştur.

Anahtar Kelimeler: Petrol Fiyatı; Borsa; Gelir; Eşbütünleme Analizi.

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LIST OF ABBREVIATIONS

OECD:	Organization and Economic Corporation Development
ADF test:	Augmented Dickey-Fuller test
PP test:	Phillips-Perron test
GDP:	Gross Domestic Product
OIL:	Oil Price Index
SI:	Stock Price Index
ECT:	Error Correction Term
ECM:	Error Correction Mechanism
VAR:	Vector Auto Regressive model
CPI:	Consumer Price Index

Chapter 1

INTRODUCTION

1.1 Introduction

Oil is one of the most important economic factors in the world from an economic point of view due to the fact that the stock market and economic growth of the countries are very sensitive to price changes in oil. Moreover, oil is the world's most popular source of energy. It is used as a production good in many manufacturing transactions and it is mainly used for transportation. Asia is the world's largest importer of oil and it brings an enormous contribution economically in the importing countries. Price of oil and the amount of products has negative correlations because the oil price has a direct effect on prices of products so if the oil price rises in an oil-importer country, it may cause a decrease of preferred products. Also countries' supply and demands, financial markets and economic activities are affected on oil price shocks. Due to these reasons, each countries' economics depend on the oil movements. However, previous studies have proven that oil price shocks have different effects on oil-importing and oil-exporting country (Mark, Olsen and Mysen, 1994).

Even though many studies are concerned with oil price shocks regarding Japan, United States and Chinese's economic growth, the current study aims to identify whether the oil price has an effect on different OECD countries' stock market and economic growth such as Japan, Spain, Sweden, Turkey and United States. The main research focus of the study is to examine how oil price effects on the economic situation of different OECD countries since the oil crisis in 1973.

Many studies have proven that an oil price and GDP/GNP have a reverse relationship in some developed countries like US, UK and Canada. This means higher oil price would decrease GDP/GNP (Darby, 1982; Hamilton, 1983; Burbidge and Harrison, 1984). In fact, low oil price shocks don't have any direct impact on stock price (Abeysinghe, 2001). Different industries' stock prices are affected by the relationship between oil price shocks and the economic growth (Scholtens and Yurtsever, 2012). However, Ciner (2001) proves that stock index returns are affected from oil price movements and among them a strong interaction occurred in the 1990's.

Many industrial countries' economic growth depends on oil price and oil consumption (Darrat, Gilley and Meyer, 1996). High oil price is not proper for the stock markets of oil-importing countries. This leads to the discussion of informationally efficient stock markets which may affect oil price movement. A decline in oil prices contributes to the economy which also shows that the effect of the national economy in general is positive, especially in the U.S. and Canada. On the contrary, when the oil prices go up, they have negative impacts on the economy and this is valid for the number of countries except Norway which is affected positively by rising oil prices because it is an oil-producing country and it has an enormous advantage for the economy (Park and Ratti, 2008). The result of oil price shock explained as a decline in the output level, it may cause an increase in unemployment and higher price level (Chang and Wong, 2003).

1.2 The Aim of This Study

One of the most important factors regarding oil is determined by ongoing fluctuation within an economy. More precisely, the economic crisis that occurred all around the world is due to the oil movements, since 2008.

The purpose of this study is to examine the connection between oil price changes, stock markets and economic growth in the selected Organization for Economic Cooperation and Development (OECD) countries. In this study, owing to the fact that the oil price is the most important factor for evaluating products (Papapetrou, 2001). It is frequently investigated how oil price shocks have impacts on stock market and economic activity. This means that oil price has a significant effect on the countries' economy. The income of oil exporter countries becomes higher when they transfer oil to importer countries. Also different manufacturers have miscellaneous energy densities because of that price changes impressed the whole sectors. Therefore currency exchange, unemployment, and financial distress impressed by oil price changing.

1.3 Structure of the Study

Section 2 will be includes literature review. The data and methodology for all economic approaches for five different OECD countries' economy are presented in Section 3. Section 4 focuses on the empirical analysis results and the conclusions of the study are presented in section 5.

Chapter 2

LITERATURE REVIEW

There are many researches that focus on the oil price shocks' effects in many countries and in most of them it is found that the oil price has the most vital source for various manufactures for many countries. In addition, it effectively takes a part in the country's economy. Although most of the researches are about relations among oil price shocks and economic activity, fortunately some researcher refers to certain ties between oil price changes and financial markets. As also mentioned by Scholtens and Yurtsever (2011) some scholars such as Arouri (2011), Jones and Kaul (1996), Papapetrou (2001), Sadorsky (1999), and Scholtens and Wang (2008) utilized different methodologies and data periods, who found that oil future returns and stock returns have different relations with each other.

To investigate the relationship between oil price and economic growth in the OECD countries the scholars focused on the stock market returns. Sadorsky (1999) suggest that oil price has a significant and negative effect on the real stock returns and he used the VAR model and US data to prove that the oil price has strong connection with other economic factors with the inclusion of stock returns.

When oil price shocks have impacts on international stock markets they can determine real cash flows and fluctuation in expected returns . Jones and Kaul (1996) used quarterly data from 1947 to 1991. They realized that using the quarterly data, oil price affects whole stock returns. While, in 1979 to 1990 other researchers chose to use daily data for oil price, their result did not show any effect oil price and whole stock returns (Haung, Masulis, Stoll, 1996). Sadorsky showed that the stock markets may be affected by changing oil prices whether oil price increases, real stock return goes down because of the interest rate and industrial productions as an impact of shocks to real stock returns.

Oil is the most important substance for manufacture. Oil price and manufacture costs move together, thus, they have impacts on industries by reducing or/and removing low-energy quality industries. Many researchers demonstrated that many industries' inventory price are influenced by oil price shocks (Faff and Brailsford, 1999). Although oil price shocks assist oil companies, it has an inverse impact on other organizations or sectors. Sadorsky (2001) claimed that, it will provide income for companies, while increasing the oil price and stock market index. On the other hand, high interest rate and exchange rate inflict loss to oil companies' return. Oil producing countries may get a large amount of money or property from oil importing countries when they export their oil to the importers. As an example Cuando and Perez (2005), proved that some Asian countries came to the brink of bankruptcy when the oil price raised.

Chapter 3

METHODOLOGY AND DATA

3.1 Data Source

This research investigates oil price effects on economic growth and stock markets in the selected OECD countries. The influence of variables is examined in time series data and data are collected from World Bank (2012) website and Datastream. The period of data is 1973-2010 and data are annual. Variables are Gross Domestic Product (GDP) which is at constant 2000 US$, Oil price (OIL) is Dubai $ divided by the Consumer Price Index (CPI) of each country and Stock Price Index (SI) which is gathered from the data stream. The natural logarithm of all variables will be used in econometric approaches to get the growth effects (Katircioglu, 2009).

3.2 Methodology

Three different analyses were used in this investigation which are unit root tests including Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) approaches, Johansen and Juselius (1990) cointegration test and error correction modelling. First test started with ADF and PP tests to decide the data are stationary or non-stationary from unit root test for each countries’ GDP, OIL and SI. Secondly, Johansen-Juselis (1990) co-integration test was conducted to determine the possibility of a long-run equilibrium relation between GDP and its independent variables which are OIL and SI. Third and the last, Error Correction model was employed to estimate short run coefficients and error correction term.

3.2.1 Empirical Model of Time Series Data

There are many studies to identifying the sources of growth in the countries. Economic growth is proxied by a growth real income so various empirical and theoretical studies were employed to specify its determinant variables. In this study, it is supposed that oil price index (OIL) and stock price index (SI) are possibly driving GDP in five different countries. The functional relationship can be presented such as:

$$GDP_t = f\,(OIL_t, SI_t) \qquad (1)$$

The above equation was used for this study where GDP (real income) is a function of oil price (OIL) and stock price index (SI).

Equation (1) can be written in logarithmic form to estimate growth effects (Katircioglu, 2010).

$$\ln GDP_t = \vartheta_0 + \vartheta_1 \ln OIL_t + \vartheta_2 \ln SI_t + \varepsilon_t \qquad (2)$$

In the period of t; lnGDP, lnOIL and lnSI are the natural log of real income, oil price and stock price index respectively and ε is error term at period t. ϑ_0 is the intercept; ϑ_1 shows the long term elasticity coefficient of OIL and ϑ_2 shows the long term elasticity coefficient of SI (Katircioglu, 2010).

3.2.2 Unit Root Test for Time Series Analysis

Augmented Dickey Fuller (ADF) and Phillips Perron (PP) tests are implemented in order to check whether the series are stationary. Also these two tests are applied to identify the possibilty of cointegration and to find integration levels of dependent variable and its regressors (Dickey and Fuller 1981; Phillips and Perron 1988). This implementation is significant for the reason of functional relationship with logarithmic form depends on the variables stationary if factors are not stationary the relationship between functions will be ineffectual. ADF and PP test is a means to determine the results from unit root. Moreover, PP processes are implemented to find the unit root and the test results are clearer than ADF test.

The unit root test has three different stages: the first one includes the model with the trend and intercept, the second one comprises with intercept without trend, and last option consists of without trend and intercept. The test has two different hypotheses: non-stationary (H_0=unit root) and stationary (H_1=no unit root) . However many scholars believed that trend and intercept is the most general model and the test should start with this option (Enders, 1995).

Non-stationary series gives the null hypothesis in ADF and PP test and it should be rejected because there is a unit root (H_0). Moreover, the coefficient is obviously different from zero. The stationary series is symbolized as I (0) and non-stationary series are symbolized as I (1). When the series is I (1) at level $H_{0,}$ it can be accepted, then the first differences are tested to make it stationary.

3.2.3 Cointegration Tests for Time Series Analysis

Firstly, unit root test was applied to find stationary and then cointegration between the variables to be tested was carried out. The results are going to be determined by the availability of a long-term equilibrium relation. If there is a cointegration vector, it may be proved that a long-term equilibrium relationship between GDP and its independent regressors exist. Johansen's trace test was analyzed to determine the co-integration in three different hypotheses but the same integration order must be taken into consideration. Three different hypotheses of Johansen are I (1) means that the number of co-integration vectors must be one or less than one, I (2) can be maximum two and I (0) may be *none*, thus the variables have any co-integrated vector (Enders, 1995). Furthermore, trace test of Johansen must be carried out to identify the amount of co-integration vectors for variable relations. There must be a minimum one co-integration vector in the same order between variables in order to test error correction analysis.

3.2.4 Error Correction Analysis

It is assumed that according to all changes, the real income expressed in formula (2) may not be with its long run in steady level (Katircigolu, 2010). Thus, the difference between the short and the long term level of income can be considered by utilizing this error correction model:

$$\Delta \ln GDP_t = \vartheta_0 + \sum_{i=0}^{n} \vartheta_1 \Delta \ln GDP_{t-j} + \sum_{i=0}^{n} \vartheta_2 \Delta \ln OIL_{t-j} + \sum_{i=0}^{n} \vartheta_3 \Delta \ln SI_{t-j} + \vartheta_4 \varepsilon_{t-1} + u_t \quad (3)$$

Where Δ points out a variety of changes in the GDP, OIL and SI variables and ε_{t-1} are in the one period lagged error correction term (ECT), derived from equation (2) (Katircioglu, 2010). The ECT in this equation stands for the high speed of the disequilibrium between the short run and the long term values of the dependent variable which was not taken into consideration as period. While the predictable value of ECT is not positive (Katircioglu, 2010).

Chapter 4

EMPIRICAL RESULTS

4.1 Unit Root Tests for Stationary Nature

The study applied two different tests to find whether the variables are stationary or non-stationary. These tests are the ADF test and PP test. Tables represent the results of ADF and PP test with level form and first differences. Tests have been done individually for each country.

4.1.1 Unit Root Test for Japan

According to Japanese data, unit root test results show that GDP is non-stationary at their original level but GDP is stationary at ADF and PP in level form with intercept and without trend. In the same way, OIL and STOCK are non-stationary at level so this result is rejected and thus the first differences test is carried out. The first results show that the variables are stationary and they each have a long-run relationship.

Table 4.1.1 ADF and PP Tests for Japan

Statistics (Level)	ln GDP	Lags	ln Oil	Lags	ln SI	Lags
τ_T (ADF)	0.18	(0)	-2.10	(0)	-1.83	(1)
τ_μ (ADF)	-3.12**	(0)	-2.01	(0)	-2.37	(1)
τ (ADF)	2.74	(1)	0.89	(0)	0.94	(0)
τ_T (PP)	0.05	(1)	-2.29	(3)	-1.32	(3)
τ_μ (PP)	-2.76***	(2)	-2.16	(3)	-1.86	(3)
τ (PP)	3.70	(4)	0.97	(1)	0.94	(0)
Statistics (First Difference)	**Δln GDP**	**Lags**	**Δln Oil**	**Lags**	**Δln SI**	**Lags**
τ_T (ADF)	-5.09*	(0)	-7.55*	(0)	-4.91*	(0)
τ_μ (ADF)	-3.66*	(0)	-7.63*	(0)	-4.63*	(0)
τ (ADF)	-1.11	(2)	-7.61*	(0)	-4.47*	(0)
τ_T (PP)	-5.07*	(2)	-7.55*	(0)	-4.85*	(6)
τ_μ (PP)	-3.66*	(2)	-7.63*	(1)	-4.62*	(3)
τ (PP)	-2.00**	(2)	-7.58*	(2)	-4.48*	(1)

Note:

*Logarithmic is used as a kind of model by all series. The drift and trend are shown as the most general model by τ_T; τ_μ is a type of model which consists of intercept without trend.; τ has the majority of limitation without a drift and trend. For removing sequent correlation in the remainders, the ADF test is used which numbers in bracket are lag length in it. Also, numbers in brackets show Newey-West Band with using PP test (as determined by Bartlett-Kernel). By disregarding trend and drift across the models (Enders, 1995) both in ADF and PP test unit roots test were considered from the general to specific model. *, ** and *** with refusing denote of the null hypothesis at the level of 0.01, 0.05 and 0.10. The analysis with unit roots have been tested in E-VIEWS 7.1*

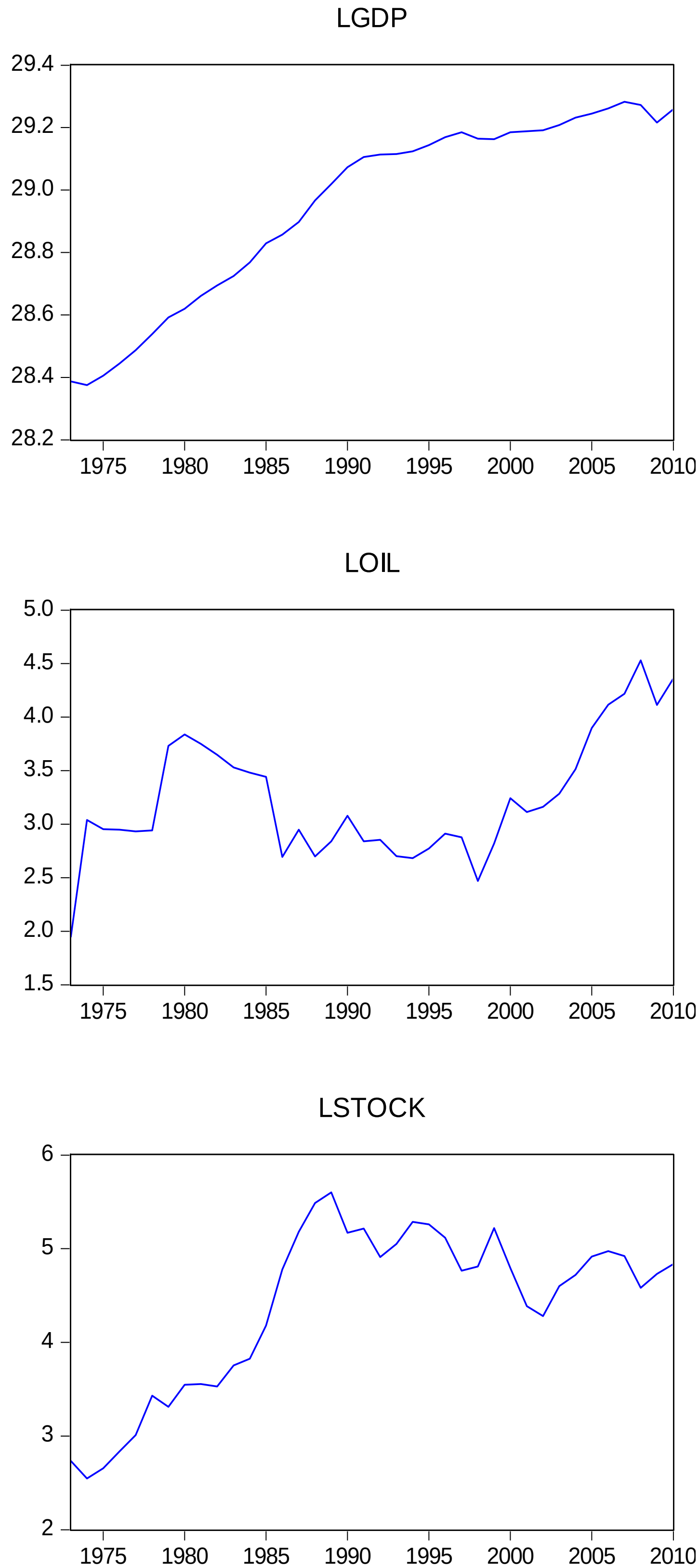

Figure 3.1 Line Plots of GDP, OIL and Stock Index in Japan.

4.1.2 Unit Root Test for Spain

At the original level in ADF test, Spain data results point that SI may be stationary according to ADF test but this is not enough as SI is non-stationary in PP test. Therefore, OIL, GDP and STOCK are non-stationary at level but they become stationary at first differences according to ADF and PP test. The PP test should be checked because it is better than ADF test in order to decide if the model is stationary or non-stationary (Katircioglu, 2009). Therefore, this model is stationary in first differences but not in at their original level. The GDP and its independent variables have long-run equilibrium relations in first differences.

Table 4.1.2 ADF and PP Tests for Spain

Statistics (Level)	ln GDP	Lags	ln Oil	Lags	ln SI	Lags
τ_T (ADF)	-3.16	(1)	-1.58	(0)	-3.73**	(2)
τ_μ (ADF)	-0.19	(1)	-1.48	(0)	-0.47	(0)
τ (ADF)	1.91	(2)	0.05	(0)	0.63	(0)
τ_T (PP)	-1.94	(3)	-1.67	(2)	-2.95	(1)
τ_μ (PP)	-0.39	(3)	-1.50	(2)	-0.81	(3)
τ (PP)	5.59	(3)	0.08	(1)	0.46	(2)
Statistics (First Difference)	**Δln GDP**	**Lags**	**Δln Oil**	**Lags**	**Δln SI**	**Lags**
τ_T (ADF)	-3.25***	(0)	-7.89*	(0)	-3.67**	(3)
τ_μ (ADF)	-2.37	(1)	-7.74*	(0)	-3.81*	(3)
τ (ADF)	-2.27**	(0)	-7.86*	(0)	-4.21*	(0)
τ_T (PP)	-3.35***	(1)	-8.09*	(2)	-4.22**	(2)
τ_μ (PP)	-3.38**	(1)	-7.71*	(2)	-4.20*	(2)
τ (PP)	-2.24**	(1)	-7.81*	(2)	-4.23*	(2)

Note: Look to Table 4.1.1.

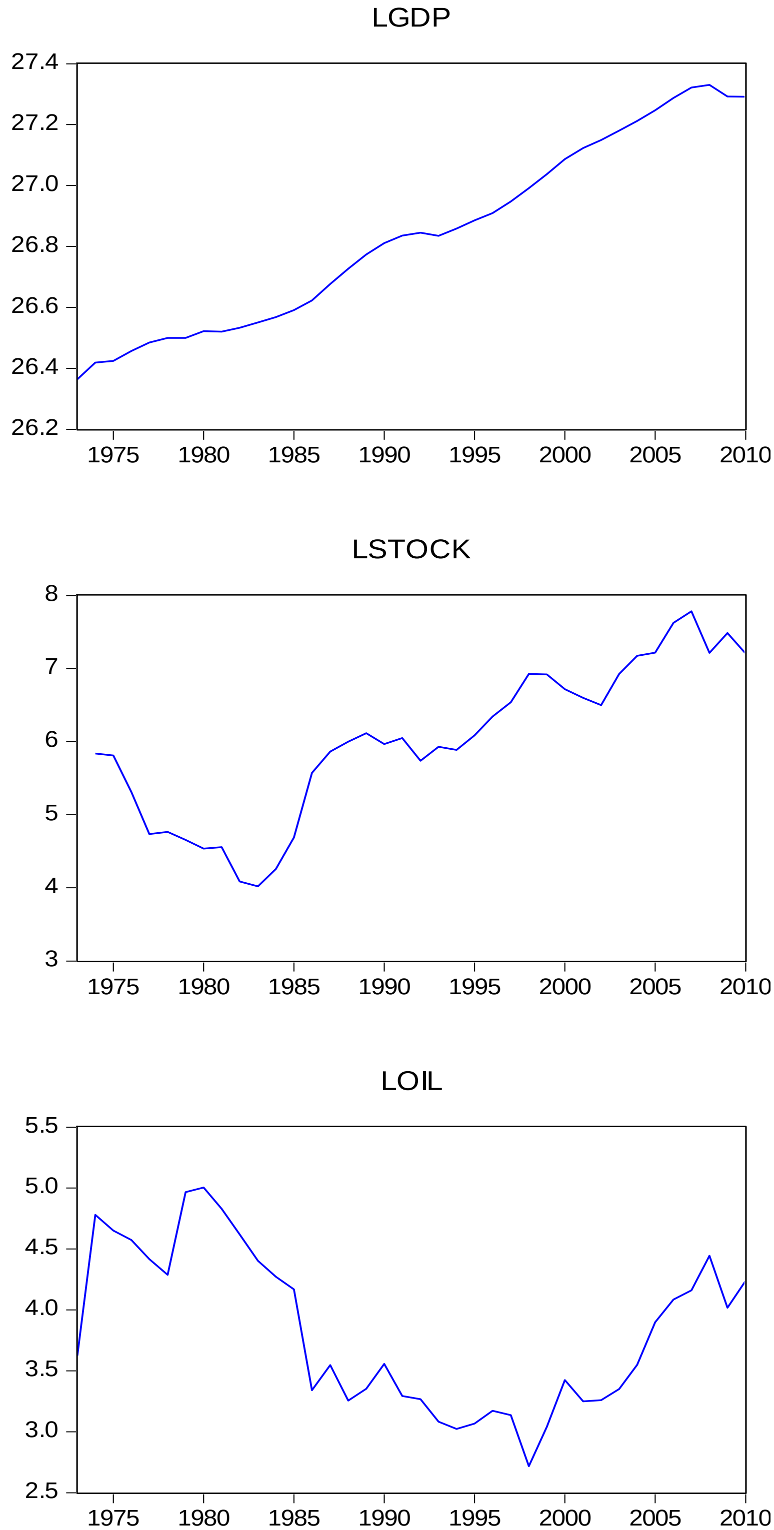

Figure 3.2 Line Plots of GDP, OIL and Stock Index in Spain.

4.1.3 Unit Root test for Sweden

The unit root test results for Sweden depicted that in the original level form, SI is stationary with drift (intercept) and without trend in PP test. However it is not suitable because all variables must be stationary in order this model to be approved. All variables are non-stationary at level form but at first differences form, the results are stationary for all variables. In first differences form, GDP, OIL and SI are integrated order of one therefore they have a long-term relationship.

Table 4.1.3 ADF and PP Tests for Sweden

Statistics (Level)	ln GDP	Lags	ln Oil	Lags	ln SI	Lags
τ_T (ADF)	-2.34	(1)	-1.88	(0)	-2.48	(0)
τ_μ (ADF)	0.25	(0)	-1.85	(0)	-2.18	(0)
τ (ADF)	5.53	(0)	0.44	(0)	2.00	(0)
τ_T (PP)	-2.08	(2)	-2.09	(3)	-2.31	(6)
τ_μ (PP)	0.25	(4)	-2.03	(3)	-3.53**	(13)
τ (PP)	5.44	(4)	0.44	(0)	1.93	(1)
Statistics (First Difference)	**Δln GDP**	**Lags**	**Δln OIL**	**Lags**	**Δln SI**	**Lags**
τ_T (ADF)	-4.47*	(0)	-7.66*	(0)	-5.59*	(0)
τ_μ (ADF)	-4.50*	(0)	-7.69*	(0)	-5.30*	(0)
τ (ADF)	-2.85*	(0)	-7.82*	(0)	-4.45*	(0)
τ_T (PP)	-4.18**	(8)	-7.66*	(0)	-7.56*	(11)
τ_μ (PP)	-4.24*	(7)	-7.66*	(2)	-5.37*	(5)
τ (PP)	-2.82*	(8)	-7.79*	(2)	-4.43*	(1)

Note: Look to Table 4.1.1.

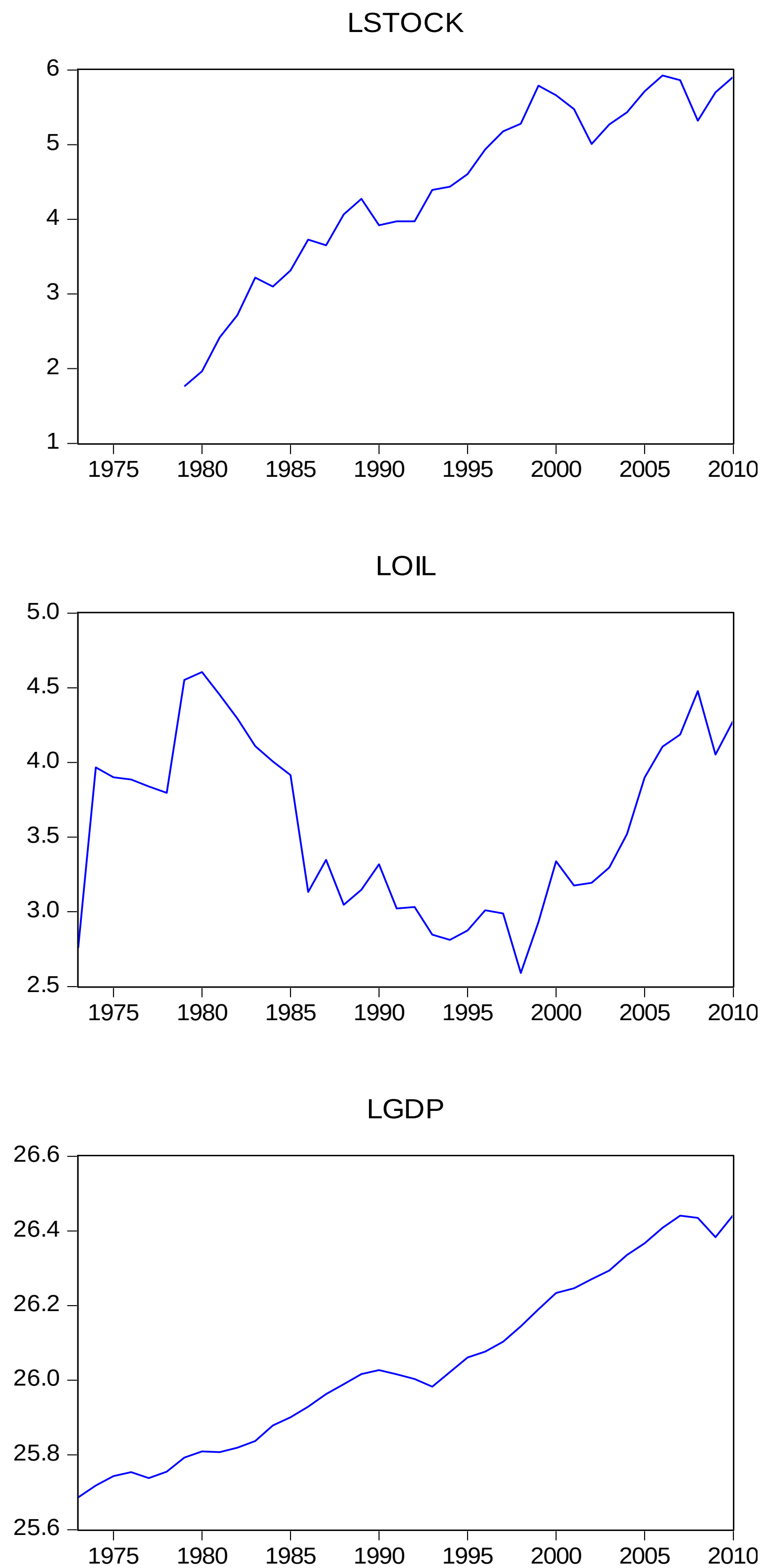

Figure 3.3 Line Plots of GDP, OIL and Stock Index in Sweden.

4.1.4 Unit Root Test for Turkey

According to test results for Turkey, SI is integrated order of zero for ADF and PP test with intercept and without trend. GDP and OIL are also integrated order of zero for ADF and PP test, in without trend and without intercept but totally GDP and OIL are I (1) and SI is I(0) at level form, that is OIL and GDP are non-stationary and SI is stationary at level form and all variables are stationary I(1) at first differences in ADF and PP test. Thus, GDP, OIL and STOCK have a long-run equilibrium relationship.

Table 4.1.4 ADF and PP Tests for Turkey

Statistics (Level)	ln GDP	Lags	ln Oil	Lags	ln SI	Lags
τ_T (ADF)	-1.23	(2)	-1.28	(0)	-5.00*	(0)
τ_μ (ADF)	-1.24	(1)	-0.29	(0)	-3.09**	(0)
τ (ADF)	-2.96*	(1)	-3.59*	(0)	0.85	(1)
τ_T (PP)	-1.38	(4)	-1.91	(4)	-5.00*	(0)
τ_μ (PP)	-0.70	(4)	-0.40	(4)	-3.11**	(2)
τ (PP)	-3.75*	(4)	-2.57**	(4)	1.79	(5)
Statistics (First Difference)	**Δln GDP**	**Lags**	**Δln Oil**	**Lags**	**Δln SI**	**Lag**
τ_T (ADF)	-5.93*	(0)	-5.59*	(0)	-4.41**	(4)
τ_μ (ADF)	-6.01*	(0)	-5.30*	(0)	-4.15*	(4)
τ (ADF)	-2.22**	(1)	-4.45*	(0)	-7.39*	(0)
τ_T (PP)	-5.93*	(2)	-7.56*	(11)	-17.89*	(14)
τ_μ (PP)	-6.01*	(3)	-5.37*	(5)	-14.95*	(12)
τ (PP)	-3.63*	(4)	-4.43*	(1)	-9.52*	(7)

Note: Look to Table 4.1.1

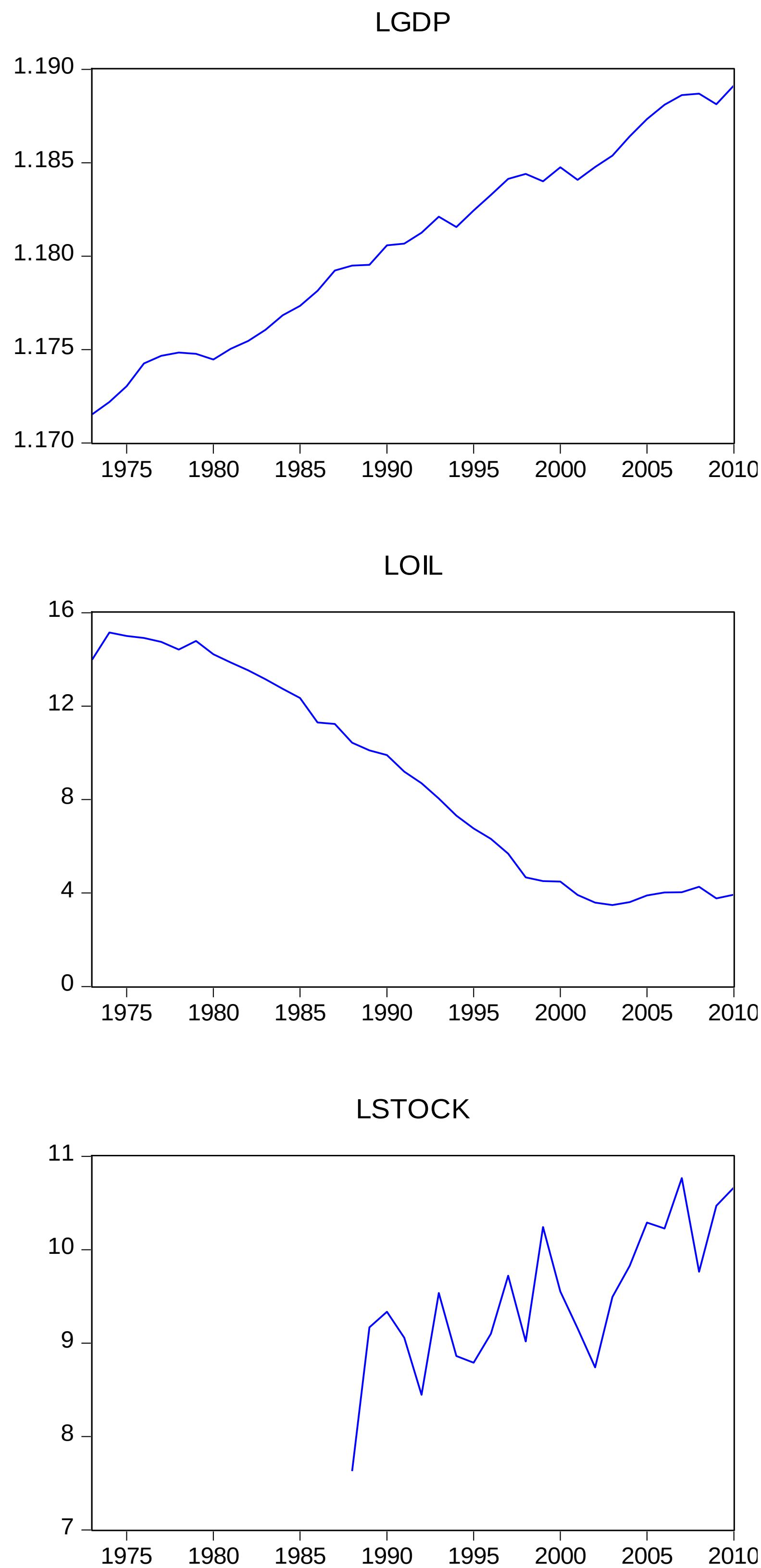

Figure 3.4 Line Plots of GDP, OIL and Stock Index in Turkey.

4.1.5 Unit Root test for USA

The test results have shown that GDP is stationary in ADF at level form with trend and with intercept, but it is non-stationary in PP test at level form that GDP is non-stationary in level form. OIL and STOCK are also non-stationary at level form. Therefore, the first difference test is applied and results showed that this data is stationary for all variables, that is, they have long-run equilibrium.

Table 4.1.5 ADF and PP Tests for USA

Statistics (Level)	ln GDP	Lags	ln Oil	Lags	ln SI	Lags
τ_T (ADF)	-2.64**	(1)	-2.36	(0)	-1.83	(0)
τ_μ (ADF)	-0.91	(0)	-2.36	(0)	-0.78	(0)
τ (ADF)	3.58	(1)	0.54	(0)	2.15	(0)
τ_T (PP)	-1.71	(1)	-2.57	(3)	-1.92	(2)
τ_μ (PP)	-0.89	(4)	-2.56	(3)	-0.76	(2)
τ (PP)	6.47	(3)	0.54	(0)	2.23	(0)
Statistics (First Difference)	Δln GDP	Lags	Δln Oil	Lags	Δln SI	Lags
τ_T (ADF)	-4.45*	(1)	-7.86*	(0)	-6.98*	(0)
τ_μ (ADF)	-4.22*	(1)	-8.00*	(0)	-6.87*	(0)
τ (ADF)	-2.25**	(0)	-8.10*	(0)	-5.70*	(0)
τ_T (PP)	-4.49*	(6)	-7.86*	(0)	-7.19*	(4)
τ_μ (PP)	-4.34*	(4)	-8.02*	(1)	-6.86*	(2)
τ (PP)	-2.25**	(0)	-8.13*	(2)	-5.74	(3)

Note: Look Table 4.1.1.

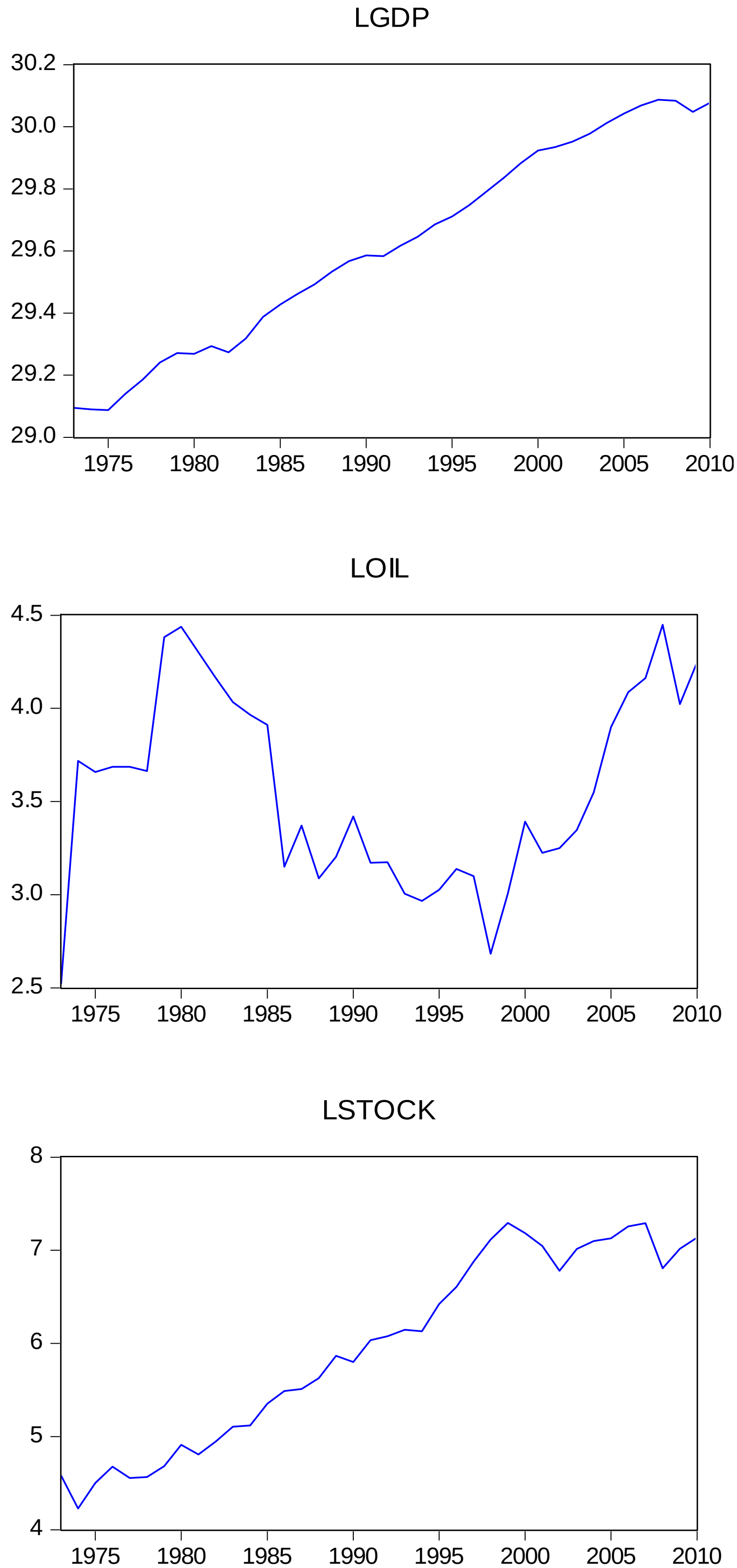

Figure 3.5 Line Plots of GDP, OIL and Stock Index in USA.

4.2 Johansen Co-Integration Test

The first test is a unit root test to find whether the model is stationary I (0) or non-stationary. If the model has a non-stationary variable, Johansen-Co-integration test should be applied to the model. In this model, there are three different variables, these are GDP which is dependent variable and the other variables OIL and SI are independent variables. Each country's variables are I(1). Johansen-Co-integration test has three different hypotheses**.** First hypothesis is *none* that means that there is no co-integration vector between variables. In addition, it can also be considered as a null hypothesis**.** Hypothesis at most 1 means that it is an alternative hypothesis and co-integration vectors' number is equal to one or less than one. The last hypothesis vectors are less than two or equal two. The model has a co-integration vector explained, and there is a possibility to find long-run equilibrium relationship.

4.2.1 Johansen Test for Spain and Turkey

According to test results for Spain and Turkey, in the first hypothesis, trace statistic is greater than 5 percent critical value (α=0.05). One or more co-integration vector should be included in the hypothesis, whether it has co-integration and possibility to have a long-run equilibrium relationship between GDP and its expository variables of OIL and SI in both countries. Consequently, in this level (null) hypothesis of no co-integration vector may not be supported.

Table 4.2.1.1 Johansen-Cointegration Test of Spain

Number of Co-integration Equation(s)	Eigen Test	Trace Value	Critical Value (α=0.05)	Critical Value (α=0.01)
H_0: r = 0 *	0.449800	31.97112	29.68	35.65
H_0: r ≤1	0.210493	11.05955	15.41	20.04
H_0: r ≤ 2	0.076552	2.787428	3.76	6.65

Table 4.2.1.2 Johansen - Cointegration Test of Turkey

Number of Co-integration Equation(s)	Eigen Test	Trace Value	Critical Value (α=0.05)	Critical Value (α=0.01)
H_0: r = 0 *	0.618965	31.83628	29.68	35.65
H_0: r ≤ 1	0.365819	11.57414	15.41	20.04
H_0: r ≤ 2	0.091290	2.010309	3.76	6.65

4.2.2 Johansen Test for Sweden and Japan

Japan and Sweden have also similar results. Trace statistics are greater than 1 percent and 5 percent critical value in both countries and they have two co-integration vectors (α=0.01). Therefore, the first null hypothesis cannot be accepted in this level and a long-run relationship between GDP, OIL and SI in Japan and Sweden may be feasible.

Table 4.2.2.1 Johansen - Cointegration Test of Sweden

Number of Co-integration Equation(s)	Eigen Test	Trace Value	Critical Value (α=0.05)	Critical Value (α=0.01)
H_0: r = 0 **	0.571253	40.73622	29.68	35.65
H_0: r ≤ 1	0.394921	15.32954	15.41	20.04
H_0: r ≤ 2	0.008551	0.257644	3.76	6.65

Table 4.2.2.2 Johansen –Cointegration Test of Japan

Number of Co-integration Equation(s)	Eigen Test	Trace Value	Critical Value (α=0.05)	Critical Value (α=0.01)
H_0: r = 0 **	0.472292	37.03961	29.68	35.65
H_0: r ≤ 1	0.285473	14.66720	15.41	20.04
H_0: r ≤ 2	0.079583	2.902489	3.76	6.65

4.2.3 Co-integration-Johansen Test for USA

These test results show that trace statistics are greater than 5 percent for each hypothesis and three co-integration vectors arise. However, there is no co-integration vector at the 1% critical value. The test can be rejected for each hypothesis at the level of 5%.

Table 4.2.3 Johansen - Co-integration Test for USA

Number of Co-integration Equation(s)	Eigen Test	Trace Value	Critical Value (α=0.05)	Critical Value (α=0.01)
H_0: r = 0 *	0.406260	34.89687	29.68	35.65
H_0: r ≤ 1*	0.321175	18.21481	15.41	20.04
H_0: r ≤ 2 *	0.166250	5.818281	3.76	6.65

4.3 Error Correction Model and Long Run Coefficients

Johansen-co-integration test was carried out and the co-integration vectors were found. If there is a co-integration vector within the test, a long-term equilibrium relationship between GDP and its independent regresses which are OIL and SI should also be present. Johansen test results proved that there are long-term equilibrium relationships among GDP, Oil and SI. The error correction model was used to forecast the long-term and short-term levels, error correction term (ECT) and error correction mechanism (ECM) and estimate the coefficients.

The subsequent tables show that the ECM and term results as long-term coefficients and short-run coefficients of the equations are included. All countries lag levels were tested until the variables were found significant and each result is different than the others.

4.3.1 Estimation of Error Correction and Level Coefficient of Japan

Table 4.3.1 presents level estimation and short term model estimation plus error correction term for Japan. Results show that STOCK movements have a significant but negative impact on GDP in the long term period. Coefficient of stocks (-0.226) is statistically significant at $\alpha=0.01$ level. But, in the short term period, there is a positive and statistically significant interaction from stocks to GDP in Japan. Oil prices do not exert significant impact on GDP, neither in the long run nor in the short run for Japan. Error correction term in Table 4.3.1 is negative and statistically significant as expected. It reveals that real income converges to its long run term equilibrium path through the channels of OIL and STOCK prices in the case of Japan.

Table 4.3.1 Level Coefficient and Error Correction for Japan

LR Model:	ECM
$lnGDP_{t-1}$	1.000000
$lnOIL_{t-1}$	-0.064266 (0.04938) [-1.30149]
$lnSI_{t-1}$	-0.226603 (0.02932) [-7.72773]
C	-27.75034

Table 4.3.1 Level Coefficient and Error Correction for Japan (Continued)

SR Model:	D(LGDP)
ECT	-0.095655 (0.02650) [-3.61020]
$\Delta \ln GDP_{t-1}$	0.040633 (0.13909) [0.29213]
$\Delta \ln OIL_{t-1}$	-0.000377 (0.00913) [-0.04133]
$\Delta \ln SI_{t-1}$	0.030176 (0.01275) [2.36621]
C	0.021973 (0.00436) [5.03444]
Adj. R-squared	0.582285
F- value	13.19730

4.3.2 Estimation of Error Correction and Level Coefficient of Sweden

Table 4.3.2 presents short term model estimation, level estimation and error correction term for Sweden. It is concluded that OIL and STOCK movements have a significant but negative impact on GDP in the long term period. Coefficient of STOCK is (-0.162) and coefficient of OIL is (-0.121) which are statistically significant at α=0.05 level.

Furthermore, in the short term period, there is a negative and statistically significant interaction from OIL to GDP at lag level of 1, and there is also a negative and statistically significant interaction from STOCK to GDP at lag level of 2 in Sweden. Error correction term in Table 4.3.2 is negative and statistically significant as expected. Then, it reveals that real income converges to its long run term equilibrium path through the channels of OIL and STOCK prices in the case of Sweden.

Table 4.3.2 Level Coefficient and Error Correction for Sweden

LR Model:	ECM
ln GDP_{t-1}	1.000000
ln OIL_{t-1}	-0.121782 (0.00908) [-13.4069]
ln SI_{t-1}	-0.162522 (0.00913) [-17.8004]
C	-24.95389

Table 4.3.2 Level Coefficient and Error Correction for Sweden (Continued)

SR Model:	D(LGDP)
ECT	-0.346429 (0.16113) [-2.14997]
$\Delta lnGDP_{t-1}$	1.083197 (0.29234) [3.70528]
$\Delta lnGDP_{t-2}$	-0.756843 (0.38615) [-1.95996]
$\Delta lnGDP_{t-3}$	0.764261 (0.40201) [1.90111]
$\Delta lnGDP_{t-4}$	-0.150750 (0.29730) [-0.50707]
$\Delta lnOIL_{t-1}$	-0.028847 (0.01943) [-1.48433]
$\Delta lnOIL_{t-2}$	-0.007791 (0.01609) [-0.48429]
$\Delta lnOIL_{t-3}$	0.010784 (0.01512) [0.71345]
$\Delta lnOIL_{t-4}$	0.003852 (0.01567) [0.24583]

Table 4.3.2 Level Coefficient and Error Correction for Sweden (Continued)

$\Delta lnSI_{t-1}$	0.012437 (0.02556) [0.48654]
$\Delta lnSI_{t-2}$	-0.073801 (0.02862) [-2.57829]
$\Delta lnSI_{t-3}$	-0.010319 (0.02566) [-0.40224]
$\Delta lnSI_{t-4}$	-0.065834 (0.02396) [-2.74790]
C	0.021136 (0.00942) [2.24466]
Adj. R-squared	0.541964
F- value	3.366468

4.3.3 Estimation of Error Correction and Level Coefficient of USA

Table 4.3.3 presents short term model estimation, level estimation and error correction term for the USA. Results show that OIL and STOCK movements have a specific factor, although, negative impact on GDP in the long term period is observed. The coefficient of STOCK (-0.319) and the coefficient of OIL (-0.075) are statistically significant at α=0.05 level. There is a negative and statistically significant interaction of OIL to GDP at lag level of 1, and there is also a negative and statistically significant interaction from STOCK to GDP at lag level of 2 in USA.

Error correction term in Table 4.3.3 is negative and statistically significant as expected. It reveals that the channels of OIL and STOCK prices for USA converge through real income to its long run term equilibrium path by 15% speed of adjustment.

Table 4.3.3 Level Coefficient and Error Correction for USA

LR Model:	ECM
$\ln GDP_{t-1}$	1.000000
$\ln OIL_{t-1}$	-0.075603 (0.03037) [-2.48978]
$\ln SI_{t-1}$	-0.319712 (0.01337) [-23.9186]
C	-27.43767

SR Model:	D(LGDP)
ECT	-0.152551 (0.06856) [-2.22515]
$\Delta \ln GDP_{t-1}$	0.472973 (0.16376) [2.88821]
$\Delta \ln GDP_{t-2}$	-0.132186 (0.14210) [-0.93022]

Table 4.3.3 Level Coefficient and Error Correction for USA (Continued)

$\Delta lnOIL_{t-1}$	-0.023436 (0.01035) [-2.26362]
$\Delta lnOIL_{t-2}$	-0.012955 (0.00950) [-1.36317]
$\Delta lnSI_{t-1}$	0.031280 (0.02137) [1.46368]
$\Delta lnSI_{t-2}$	-0.053271 (0.02138) [-2.49172]
C	0.020883 (0.00565) [3.69378]
Adj. R-squared	0.503611
F-value	5.927802

4.3.4 Estimation of Error Correction and Level Coefficient of Turkey

Table 4.3.4 presents short term model estimation, level estimation and error correction term for Turkey. Results show that STOCK movements have a significant and negative impact on GDP but OIL movements have a significant and positive impact on GDP in the long term period. Coefficient of STOCK (-0.004) and coefficient of OIL (-0.0005) are statistically significant at α=0.01 level. There is a positive and statistically significant interaction from OIL and STOCK to GDP, but OIL prices do not exert a statistically significant impact on GDP for Turkey in the short term period.

Error correction term in Table 4.3.4 is statistically significant and positive. It reveals that real income does not convergence (but shows divergence from) to its long run term equilibrium path by 20 % speed of adjustment through the channels of OIL and STOCK prices in the case of Turkey.

Table 4.3.4 Level Coefficient and Error Correction for Turkey

LR Model:	ECM
LR Model:	ECM
$\ln GDP_{t-1}$	1.000000
$\ln OIL_{t-1}$	0.000505 (0.00013) [3.82026]
$\ln SI_{t-1}$	-0.004793 (0.00061) [-7.80530]
C	-1.141650

SR Model:	D(LGDP)
ECT	0.205367 (0.10003) [2.05303]
$\Delta \ln GDP_{t-1}$	-0.429765 (0.23305) [-1.84407]
$\Delta \ln OIL_{t-1}$	0.000363 (0.00038) [0.95336]

Table 4.3.4 Level Coefficient and Error Correction for Turkey (Continued)

$\Delta \ln SI_{t-1}$	0.000680 (0.00026) [2.64907]
C	0.000657 (0.00021) [3.15364]
Adj. R-squared	0.176878
F-value	2.074435

4.3.5 Estimation of Error Correction and Level Coefficient of Spain

Table 4.3.5 presents short term model estimation, level estimation and error correction term for Turkey. Results show that STOCK movements have a significant and negative impact on GDP but OIL movements have an insignificant and negative impact on GDP in the long term period. Coefficient of stocks (-0.295) is statistically significant at α=0.01 level while the coefficient of OIL (-0.067) is not. There is a positive and statistically significant interaction from STOCK to GDP and OIL price is negative and does not exert a statistically significant impact on GDP for Spain in short term period. Error correction term in Table 4.3.5 is negative and but is not statistically significant. It reveals that real income does not significantly converge to its long run term equilibrium path through the channels of OIL and STOCK prices in the case of Spain.

Table 4.3.5 Level Coefficient and Error Correction for Spain

LR Model:	ECM
$\ln GDP_{t-1}$	1.000000
$\ln OIL_{t-1}$	-0.067757 (0.05287) [-1.28156]
$\ln SI_{t-1}$	-0.295820 (0.02974) [-9.94736]
C	-24.82719

SR Model:	D(LGDP)
ECT	-0.023051 (0.01784) [-1.29201]
$\Delta\ln GDP_{t-1}$	0.530330 (0.12335) [4.29927]
$\Delta\ln OIL_{t-1}$	-0.000845 (0.00883) [-0.09566]
$\Delta\ln SI_{t-1}$	0.028099 (0.00776) [3.62319]
C	0.010203 (0.00377) [2.70655]
Adj. R-squared	0.546443
F- value	11.24073

Chapter 5

CONCLUSION

5.1 Summary of Major Findings

This thesis searches the empirical relationship between economic growth and stock prices and oil prices. With this regard, five countries of the OECD have been selected from different regions which are USA, Spain, Sweden, Japan and Turkey. Based on data availability, the countries' sample is chosen from World Bank Development Indicators (2012) for the period of 1973-2010.

To sum up, real income (GDP), oil prices and stock index in the selected countries are non-stationary at their level forms, however, they turn out stationary at their first differences; therefore, it is said that they are integrated of order one, I(1), according to results of this study. Since variables of this study are non-stationary, it is necessary to employ time series analysis in order to estimate the impact of oil and stock markets on the economic growth of countries under inspection. Johansen methodology has been employed with this regard. Johansen co-integration tests suggest that, there are co-integrating vectors between real GDP and its regresses (Oil and Stocks) in these countries which are statistically significant. This proves that oil and stock movements have long term affection on the treatment of real GDP in these five countries.

Once a long term relationship has been confirmed between economic growth and its explanatory variables. Long term and short run coefficients should be also analyzed in addition to error correction terms. In order to achieve this, vector error correction model has been estimated for five countries. Results from vector error correction models reveal that real income in the selected countries converge to its long term equilibrium path through the channels of oil and stock markets except the cases of Turkey and Spain. Furthermore, oil and stock prices have generally negative impact on real income in these countries. When movements occur in oil and stock prices, real income generally reacts to these movements in negative directions. Based on these findings, there is no difference between short and long terms according to the estimations within this study. The results of this study deserve attention from policy makers.

5.2 Policy Implication and Further Research

It is suggested that, economic growth in the selected countries can be in long term interaction with stock and oil markets. However, movements in oil markets and stock markets have adverse impacts on the real income movement. Although real income converges to its long term path by oil and stock markets, the authorities need to figure out why stock movements might adversely influence on economic activity with only a few exceptions at different lag structures. The results of the study show that, stock market activity adversely relates to macroeconomic activity. Therefore, further investigation is needed for a larger sample of countries and alternative methodologies based on data availability.

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