ENERGY IMPORT AND ECONOMIC GROWTH: AN ANALYSIS ON SOME ENERGY IMPORTER COUNTRIES

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Abstract

In many studies analyzing the relationship between energy production or energy consumption, and economic growth; unilateral or bilateral causality relationship and mostly a cointegration relationship are discovered. Although quite a lot of studies about energy consumption and economic growth relationship have been done in the literature without making a distinction between energy importer and energy exporter countries; the number of studies that analysis the relationship between the change in energy import of net energy importer countries and economic growth is quite small. In this study, the relationship between the change in energy import and economic growth within the context of energy consumption in the sample of 23 net energy importer developed and developing countries has been tested with this purpose by using Pedroni (1999, 2004) panel cointegration test and Granger causality analysis. In the conclusion of the study, the findings that a change in energy import increases economic growth in a way that supports growth hypothesis, and the existence of bilateral causality between two variables in a way that confirms feedback hypothesis have been obtained.

Key Words: energy import, economic growth, panel cointegration, Granger causality

JEL Codes: C23, O47, Q43

Introduction

Importance of energy resources increases gradually in the World. Especially in developed and developing countries, in which energy consumption increases quickly, the supply of energy, which is provided not only by local energy resources but also from imported resources in cases that home production is not sufficient, to be consistent and cheap has great importance. The importance of energy supply stability takes its source from energy to take place in almost all production activities, to be an important input in terms of economic growth and

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dependence of humanity to have a better life standard on energy procurement. The importance of energy supply stability has been better understood after 1973 oil shock (high increases in energy prices). After the oil shock, developed and developing countries realized the importance of obtaining energy from sound, cheap and alternative resources, together with the importance of effective usage of available and imported energy. Accordingly, energy supply stability and efficient usage of energy take an important place for countries among the topics requiring future oriented planning, particularly economic growth.

On the other hand, uneven distribution of energy resources on the World and growth differences between developed countries and less developed countries owning energy supply resources may cause conflicts and disagreements on energy resources. At this point, it is clear that energy resources are deterministic in the future of the World, besides food and water. Within this framework, when the matter is thought broadly it can be stated that there is a mutual dependence between energy exporter countries and energy importer developed and developing countries, on the points of increasing world's wealth, and increasing their production, continuing exports, protecting macroeconomic balance in their countries, increasing citizens' life standards and prosperity in accordance with free foreign trade policies.

Since this mutual dependence includes searches for more production and prosperity over economic growth, the relationship of economic growth in the sample of net energy importer countries and change in energy import within the context of energy consumption is analyzed. Within this framework, plan of the study has been formed as follows. In the first title theoretical framework of the study was discussed, and in the second title the literature examining the relationship between energy and economic growth, which can be approached as energy production, consumption or import, is introduced. In the third title used data set and method of the study were given place, and in the fourth title panel data analysis was conducted in the sample of 23 energy importer countries. In the last title, findings obtained as a result of application were expressed.

1. Theoretical Framework

The theoretical framework of the interaction between the change in energy import and economic growth is basically same with the theoretical framework that grounds on the relationship between change in energy consumption and economic growth. The reason for this is the fact that imported energy resources form the source of total energy consumption of this economy at total level, since available domestic energy resources and domestic production are

not sufficient in an economy for energy consumption. The relationships below can be stated simply as follows;

$$Energy\ Poduction = Domestic\ Energy\ Resources + Imported\ Energy\ Resources \quad (1)$$

Since energy production will be equal to energy consumption in balance;

$$Energy\ Consumption = Domestic\ Energy\ Resources + Imported\ Energy\ Resources \quad (2)$$

Even as an extreme case, for a country that obtains all of its energy need through imported energy, energy consumption will be equal to energy import. In this regard, as energy importation constitutes a complimentary source of energy consumption and country energy production, basically the relationship between the change in energy consumption and economic growth forms the theoretical framework of this study. Therefore, in this study the relationship between energy consumption and economic growth is taken as the theoretical framework, instead of energy importation.

As the relationship of energy production/consumption and economic growth is viewed in a theoretical framework, it is seen that a concensus among economists regarding the relationship between energy consumption and economic growth does not exist. There are especially evident differences in approaches of the ones that build a linear relationship between economic growth and energy consumption, and the ones that have a critical approach from the environmentalist/ecological perspective (Ockwell, 2008: 4601). In fact, four approaches can be mentioned, which acts with reference to four different possibilities in the energy consumption and economic growth relationship. These approaches are growth hypothesis, conservation hypothesis, neutrality hypothesis and feedback effect hypothesis (Apergis and Payne, 2009: 212).

In the first approach of growth hypothesis, energy or energy consumption is claimed to be directly and indirectly effective in the production process as the complementary of workforce and physical capital, and to play an important role in economic growth (Ebohon, 1996: 448). In this hypothesis, which claims energy to be a kind of engine of economic growth, an increase experienced in energy consumption in an economy is selected as the baseline to increase GNP. According to this hypothesis, extreme conservative (environmentalist) policies, which decrease energy consumption, may negatively affect real GDP increase. However, opposite to this hypothesis and although they are few in number, there are also explanations, which claim that

a negative relationship may occur between energy consumption and economic growth. According to this, for instance in case of production to lead to a less energy dense services in the economy, it is stated that less energy may be needed in a growing economy. Additionally, when inefficient energy supply is the case in sectors in a country's economy that use excess energy with a low productivity, it is also argued that energy consumption may have a negative effect on real GNP increase (Squalli, 2007: 1193).

According to the second approach, which is conservative/environmentalist hypothesis, energy policies that decrease energy consumption and reduce energy waste produce negative side effects directed to real GNP increase. Defenders of this hypothesis also accept that a potential real GNP increase may raise energy consumption. Nonetheless, inefficiencies may occur in an economy, whose growth rate is under its potential because of political instability, infrastructure problems and unproductive usage of resources, and in this case since product and service demands will actualize at a low rate, energy consumption may remain at a low level (Squalli, 2007: 1193-1194).

In the third approach, neutrality hypothesis, energy consumption is claimed to constitute a small portion of the total product (GDP). Within this framework, the effect of energy consumption on demand oriented economic growth to be at a minimal level depends on the thought that the effect of energy consumption may be neutral on economic growth (Wolde-Rufael, 2005: 893). Similar to environmentalist hypothesis, in this hypothesis it is claimed that the effect of environmentalist energy policies based on energy efficiency on economic growth will not be negative; additionally since energy sector has a relatively small place in GDP, there is not a causality relationship between energy consumption and economic growth.

According to the fourth approach, which is feedback effect hypothesis, feedback effects that affect each other positively and have continuity exist between energy consumption and economic growth. According to this approach, there is a bidirectional causality relationship between energy consumption and economic growth. According to this approach, since energy policies that increase productivity in energy production emerges productivity increasing effects on economic growth in the long term, they will not form a negative effect on economic growth (Apergis and Payne, 2009: 212).

2. Literature Review

The causal relationship between energy production/consumption and economic growth has great importance in theoretical terms, as well as empirical terms foreign trade policies of

countries that fulfill a significant amount of their required energy. Within this context, there are many studies, which associate energy production/consumption/import and economic growth directly or indirectly. In an important deal of these studies, time series analysis are used in the sample of just one or a few countries. Within this framework, standard regression analysis, cointegration tests, error correction model and causality analysis are conducted. In the recent studies, especially after 2000, panel data analysis including a large number of countries are being done. Within this framework, usage of cointegration and causality analysis, which associate energy production, consumption or importation related variables and economic growth are observed.

Within the context of studies performed on a single country, the first study that approaches the relationship between energy consumption and economic growth based on countries is realized by Kraft and Kraft (1978) for the USA economy. In their study, in which Kraft and Kraft (1978) performed in the USA sample by using data of 1947-1974 period, they concluded that causality is realized from economic growth to energy consumption under Granger causality analysis.

Abosedra and Baghestani (1989) on the other hand researched the relationship between energy consumption and economic growth for the USA sample in 1947-1987 period via cointegration and Granger causality analysis. In their study, they reached the conclusion of a causality relationship from economic growth to energy consumption.

Cheng (1999) tested the relationship between energy consumption and economic growth for 1952-1995 period in the Indian sample through cointegration analysis, error correction model and Granger causality analysis. As a result of the study, a causality relationship from economic growth to energy consumption was concluded.

Stern (2000) analyzed the relationship between energy consumption and economic growth in the USA sample for 1948-1994 period via multivariate cointegration and Granger causality analysis, and found a causality relationship from energy consumption to economic growth.

Paul and Bhattacharya (2004) researched the causal relationship between energy consumption and economic growth for India by using Engle-Granger cointegration and Granger causality tests. Analysis conducted with data belonging to 1950-1996 period demonstrated that variables are in mutual interaction and a bidirectional causality relationship.

In their study, in which they approached 1970-2003 period in Turkey sample, Lise and Montfort (2007) conducted cointegration analysis. A cointegration relationship between two variables was found in their study, and a unidirectional causality relationship was reached from economic growth to energy consumption in the causality analysis.

In his research, Zamani (2007) examined the relationship between economic growth and energy consumption in Iran sample for 1967-2003 period using cointegration analysis, vector error correction model and Granger causality analysis. As a result of the study, he concluded a unidirectional causality relationship from economic growth to total energy level.

Ang (2008) analyzed the relationship of energy consumption, emission of pollutive resources depending on energy consumption and economic growth through Johansen cointegration and vector error correction model in Malaysia sample for 1971-1999 period. In his study, was faund a causality relationship from economic growth to energy consumption.

In their study, Bowden and Payne (2009) examined the relationship between energy consumption and economic growth in the USA sample for 1949-2006 period via Toda-Yamamato causality analysis. In their study, they finalized a causality relationship from energy consumption to economic growth.

In their study Zhang and Cheng (2009) subjected the relationship of energy consumption, carbon emissions and economic growth to Granger causality analysis and as a result of the study a unidirectional causality relationship was found from economic growth to energy consumption.

Shahiduzzaman and Alam (2012) investigated the relationship between energy consumption and economic growth in Australia sample for 1960-2009 period within the framework of cointegration and Granger causality analysis. In the study, it was concluded that cointegration between energy consumption and economic growth appeared strongly and bidirectional causality relationship exists between energy consumption and economic growth.

Studies that investigate the relationship between energy consumption and economic growth in multi-country sample are as many as the studies with at least one sample. In this context, Yu and Choi (1985) analyzed the relationship between energy consumption and economic growth in their study in the sample of five countries (England, USA, Poland, Philippines and Korea) for 1950-1976 period under Granger causality analysis. While causality relationship was found in three countries (England, USA and Poland); unidirectional causality

relationship was concluded for Philippines from energy consumption to economic growth and for Korea from economic growth to energy consumption.

Erol and Yu (1987) examined the relationship between energy consumption and economic growth under Granger causality analysis in their study for 1952-1982 period in the sample of six industrialized countries (Japan, Italy, Germany, Canada, France and USA). In the study, bidirectional causality relationship was found in the Japan sample, unidirectional causality relationship from economic growth to energy consumption was found in Italy and Germany samples, and a unidirectional causality relationship was found from energy consumption to economic growth in the Canada sample. A causality relationship between two variables was not found in France and the USA samples.

Nachane et al. (1988) investigated the relationship between energy consumption and economic growth in the sample of 16 countries under cointegration analysis, Sims and Granger causality analysis. They concluded existence of a unidirectional causality relationship between energy consumption and economic growth, except from Venezuela and Colombia.

Soytaş and Sarı (2003) analyzed the relationship between energy consumption and economic growth in their study for 1950-1992 period in the sample of G-7 countries and ten developing countries (except from China) via cointegration and Granger causality analysis. They reached the conclusion of the existence of a unidirectional causality relationship between energy consumption and economic growth in Argentina sample, unidirectional causality relationship from economic growth to energy consumption in Italy and Korea samples, and a unidirectional causality relationship from energy consumption to economic growth in Turkey, Japan, France and Germany samples.

Wolde-Rufael (2005) analyzed the relationship between energy consumption (Demand) and economic growth for the 1971-2001 period in the sample of 19 African countries. They examined the relationship between energy consumption per capita and real GDP per capita with the help of limit test that Paseran (2001) used in cointegration. In the study, in which Toda-Yamamato type of Granger causality analysis was used, a cointegration relationship between two variables in the sample of eight countries in the long term was reached and the existence of causality relationship was found for 10 countries.

Lee (2005) studied the relationship between energy consumption and economic growth for 1975-2001 period in the sample of 18 developing countries via panel cointegration analysis

and vector error correction analysis. In the study, unidirectional causality relationship was reached from energy consumption to economic growth.

Soytas and Sarı (2006) used multivariate cointegration analysis, error correction model and generalized variance decomposition method in their other studies for 1960-2004 period in the sample of G-7 countries. In the study, a unidirectional causality relationship from economic growth to energy consumption was observed in Germany sample, a unidirectional causality relationship from energy consumption to economic growth was observed in France and the USA samples, and bidirectional causality relationship was observed in Canada, Italy, Japan and England samples.

Lee and Chang (2007) analyzed the relationship between energy consumption and economic growth for 1965-2002 and 1971-2002 periods in the sample of 22 developed and 18 developing countries, under panel VAR analysis. In their study they concluded a unidirectional causality relationship from economic growth to energy consumption in developing countries; while concluding bidirectional causality relationship between two variables in the sample of developed countries.

Mahadevan and Asafu-Adjaye (2007) studied the relationship between energy consumption and economic growth for 1971-2002 period in the sample of 20 energy importer and 20 energy exporter countries, under panel data correction model. In their study, bidirectional causality relationship between energy consumption and economic growth was found in developed countries sample. In the developing countries sample on the other hand, a causality relationship in the short term from energy consumption to economic growth was attained.

Squalli (2007) analyzed the relationship between energy consumption and economic growth in terms of energy consumption in the sample of 11 OPEC member countries for 1980-2003 period. Using Paseran's (2001) bounds test method in cointegration analysis, Squali concluded an existence of a cointegration relationship between electric consumption and economic growth for all of the OPEC countries in the long term. He attracted attention to the finding that dependence of economic growth on electric consumption is high in the sample of five countries, dependence is relatively lower in the sample of three countries and there is no dependence in the sample of three countries. The fact that all OPEC members do not have similar economic structures is mentioned to cause this result.

Akinlo (2008) examined the relationship between energy consumption and economic growth for 1980-2003 period in the sample of 11 countries taking place in Sub-Saharan Africa with ARDL bounds test and Granger causality test. Bounds test demonstrated that economic growth and energy consumption are cointegrated in seven countries (The Ivory Coast, The Gambia, Ghana, Cameroon, Senegal, The Sudan, and Zimbabwean). Within the framework of Granger causality analysis based on vector error correction model, bidirectional causality relationship between energy consumption and economic growth was seen in Gambia, Ghana and Senegal, a unidirectional causality relationship from energy consumption to economic growth was seen in Sudan and Zimbabwean, and while neutrality hypothesis was confirmed for Cameroon and the Ivory Coast, causality was not reached for Nigeria, Kenya and Togo fort he identified period.

Chontanawat et al. (2008) investigated the relationship between energy consumption and economic growth under Granger causality analysis for the sample of 108 countries, of which 30 are OECD countries and 78 are not. They concluded that unidirectional causality relationship from energy consumption to economic growth was more common in OECD countries, when compared to countries that were not OECD members.

Apergis and Payne (2009) analyzed the relationship between energy consumption and economic growth in the sample of six Mid-America countries for the period of 1980-2004 by using panel cointegration and error correction models. When they used heterogeneous panel and multi-regression model that Pedroni (2004) used, they reached the conclusion of a cointegration relationship between real GDP, energy consumption, workforce and real fixed capital, besides causality relationship. They also obtained the result of causality relationship, which confirms the hypothesis of growing from energy consumption to economic growth in the long term.

Ozturk et al. (2010) studied the relationship between energy consumption and economic growth under three groups of low income, lower middle income and upper middle income in a way to include the period of 1971-2005 in the sample of 51 countries. They used panel cointegration analysis, which was used by Pedroni (2001), Granger causality analysis and Pedroni's (2001) method in order to test whether the relationship of cointegration was weak or strong. It was seen in the study that a cointegration relationship between energy consumption and economic growth existed in all samples of three groups of countries; however this relationship was not quite strong. Additionally, within the framework of causality analysis, a

unidirectional causality relationship from economic growth to energy consumption was obtained in countries in the low income group, and a bidirectional causality relationship between energy consumption and economic growth was attained in the middle income countries group countries.

Sadorsky (2011) assessed the relationship between foreign trade and energy consumption in Middle Eastern countries. In the study, whether increase in foreign trade increases energy consumption or not was investigated in the sample of eight Middle Eastern countries for the peroid of 1980-2007, and panel cointegration analysis and short term Granger causality analysis were conducted. As a result of the study, it was concluded that foreign trade increases energy consumption demand. Two variables were mentioned to have cointegration, and besides a unidirectional causality relationship from exportation to energy consumption, bidirectional feedback effect was expressed to exist between exportation and energy consumption.

Belke et al. (2011) analyzed the relationship between energy consumption and economic growth in the sample of 25 OECD countries for 1981-2007 period, considering energy prices. They used panel cointegration and Granger causality analysis. As a result of the study, existence of cointegration and a bidirectional causality relationship between energy consumption and economic growth were concluded within the framework of empirical analysis, in which international factors influencing energy consumption and economic growth were also taken into consideration.

Kahsai et al. (2012), researched the relationship between energy consumption and economic growth in the sample of Sub-Saharan African countries (40 countries in the low and middle income group) for 1980-2007 period, by taking developments in the consumer price index into account. In the study, multivariate panel cointegration analysis that Pedroni (1999) used and dynamic panel error correction model causality relationship were given place. While findings of the study support neutrality hypothesis in the short term in countries other than the ones with middle income; they point to a strong bidirectional causality relationship in the long term. This difference, which appeared from point of low income group and middle income group, was affiliated with the income levels' importance in the causality relationship.

Ouedraogo (2013) tested the relationship of energy consumption, electricity production, energy prices and economic growth in the sample of 15 Economic Community of West African States (ECOWAS) member countries for the period of 1980-2008, within the framework of

panel unit root, panel cointegration analysis and Granger causality analysis. Results that express cointegration of energy consumption and electricity production with economic growth (change in GDP) in the long term were attained. In the causality analysis, a unidirectional causality relationship in the short term from economic growth to energy consumption, and a unidirectional causality relationship in the long term from energy consumption to economic growth were concluded.

In summary, although there is a concencus on the point of energy having contribution to economic growth as an important input; as can be deducted from the above mentioned four different approaches, different relationship are possible to emerge between energy consumption/production and economic growth under different conditions in the samples of different countries. This situation is related to the direct or indirect relationship of energy production and consumption processes and economic growth, relationships of energy production or consumption with other economic variables except from economic growth to be complicated, country samples analyzed in empirical studies and the method used in empirical studies. At this point, richness of the literature, which approaches these complex relationships, confirms this situation. As a matter of fact, Payne (2010) completed a literature review in order to see to what extent the mentioned four different hypotheses are confirmed in empirical studies, which include the framework of electricity consumption-economic growth relationship. As he checked 65 studies conducted on this topic, he concluded that 31.15% of these support neutrality hypothesis, 27.9% favor conservative/environmentalist hypothesis, 22.95% support growth hypothesis and 18.03% favor feedback effect hypothesis.

3. Data Set and Methodology

In the study, the relationship of the change in energy import within the context of energy consumption and economic growth is examined by using annual data belonging to 23 net energy importer developed and developing countries for the period of 1990-2016. In the analysis conducted, GDP (GROWTH) representing economic growth was accepted as depended variable and annual net energy import (NET) representing energy consumption was accepted as the independent variable. Data was obtained from the official website of International Energy Agency. Natural logarithms of the data belonging to variables were used. 23 net energy importer developed and developing countries included in the study for the analyzed period are presented in Table 1 below.

Table 1. Countries Included in the Study

1. USA	7. Holland	13. Thailand	19. Australia
2. Germany	8. Turkey	14. Switzerland	20. Pakistan
3. Japan	9. China- Hong Kong	15. Sweden	21. Philippines
4. Italy	10. India	16. Belgium	22. Greece
5. Spain	11. Brazil	17. Singapore	23. Finland
6. South Korea	12. Peru	18. Poland	

Firstly, unit root analysis was conducted for the panel series obtained in the study. All variables were determined to be stationary at I(1), and then the series were applied Pedroni (1999-2004) Panel Cointegration Test. Pedroni (1999-2004), a panel cointegration test was developed, in which the basic hypothesis of 'there is no cointegration' is tested by seven panel cointregration tests of which four are panel and three are test statistics (Yerdelen Tatoğlu, 2012: 235).

Existence of cointegration between the change in energy import in the context of energy consumption and economic growth shows presence of at least unidirectional causality between variables. From this point of view, causality relationship between variables was analyzed with Granger Causality test.

Finally, in the estimation of long- and short-term relationships, Pooled Mean Group Estimator (PMGE) were used. PMGE estimate long and short-term parameters through forming error correction model.

4. Empirical Results

In order to determine which type of unit root tests will be used before testing the existence of the unit root, cross-section independence test should be performed. Accordingly, first generation unit root tests are used if the cross-section is not dependent, second generation unit root tests are used if it is dependent (Çınar, 2010: 594).

The number of observations (N) and time dimension (t) are taken into account when determining the cross-section independence test. If T>N, the Breusch-Pagan LM Test (1979), if N>T, the Pesaran (2004), Friedman (1937) and Frees (1995) tests are used (De Hoyos and Sarafidis, 2006: 483). In this study, the Breusch-Pagan LM test was used for T>N and the test results are given in Table 2. It was concluded that the use of second generation unit root tests was appropriate, as the hypothesis that cross-section is not dependent was rejected. Pesaran (2003) unit root testing was applied to the series from the second generation unit root tests.

During process operation, intercept and intercept-trend models were estimated. The unit root test results are given in Table 3.

Table 2. Breusch-Pagan LM Test

Test Statistics	Prob.
3798.582	0.0000

Table 3. Pesaran Unit Root Test

Variables	Level					
	t-bar		z (t-bar)		Prob. z	
	Intercept	Intercept – Trend	Intercept	Intercept – Trend	Intercept	Intercept – Trend
LNGDP	-1.877	-2.147	-0.620	0.841	0.268	0.800
LNMTOE	-1.348	-2.513	1.969	-1.048	0.976	0.147
	1st Difference					
	t-bar		z (t-bar)		Prob. z	
	Intercept	Intercept – Trend	Intercept	Intercept – Trend	Intercept	Intercept – Trend
LNGDP	-2.784	-2.928	-5.061	-3.188	0.000	0.001
LNMTOE	-2.782	-2.735	-5.051	-2.191	0.000	0.014
CIPS Critical Values: **Intercept:** %10 =-2.070 %5=-2.150 %1=-2.300 **Intercept-Trend: %**10 =-2.580 %5=-2.660 %1=-2.810						

According to the unit root test results GROWTH and NET variables are stationary at I(1) in both intercept and intercept-trend models. Both series to be stationary at I(1) enables cointegration analysis. Panel cointegration test, which is developed by Pedroni (1999-2004), are presented in Table 4.

Table 4. Pedroni Panel Cointegration Test

Statistic	Test Statistic	Prob.
Panel v-Statistic	19.03933	0.0000
Panel rho-Statistic	-2.123941	0.0168
Panel PP-Statistic	-4.777618	0.0000
Panel ADF-Statistic	-3.867666	0.0001
Group rho-Statistic	0.548427	0.7083
Group PP-Statistic	-2.838179	0.0023
Group ADF-Statistic	-3.743550	0.0001

* Delay length was determined automatically according to Schwarz Information Criteria. α:0.05.

According to panel cointegration test, developed by Pedroni (1999-2004), on the other hand basic hypothesis of 'there is no cointegration' between two variables is rejected according to six statistics other than group rho statistics. In conclusion, the series are concluded to be cointegrated according to Pedroni test. This situation indicates the existence of at least unidirectional causality relationship.

Results of Granger causality test conducted from this point of view take place in Table 5. As seen in the table, bidirectional causality is mentioned both from economic growth to the change in energy importation, and from the change in energy importation to economic growth.

Table 5. Granger Causality Tests

	F-Statistic	Prob.
LNGROWTH → LNET	29.5958	1.E-12
LNET → LNGROWTH	3.20656	0.0412

* Delay length was determined as 2 according to Schwarz Information Criteria. α:0.05.

PMGE model are given in Table 6.

Table 6. Pooled Mean Group Estimator (PMGE)

LNGROWTH	Coefficient	Std. Err.	Z	Prob.
ec				
LNNET	1.171014	0.065455	17.89034	0.0000
SR				
ec	-0.049551	0.020697	-2.394097	0.0170
LNNET	0.112003	0.029560	3.789017	0.0002
Constant	0.086280	0.024972	3.455082	0.0006

According to PMGE results, error correction parameter resulted negative (-0.049551). This indicates the parameter to be significant. In other words, nearly 5% of the deviations caused because the series were not stable will be removed after a period. Moreover, long term (1.171014) and short term (0.112003) coefficients of energy importation variable appeared statistically significant. Both coefficients are positive, as expected in economic terms. 1% increase in energy importation increases economic growth by 1.171% in the long term and by 0.112% in the short term.

Conclusion

In this study, the relationship between the change in energy import within the context of energy consumption and economic growth was researched as part of some net energy importer countries. Within this framework, data in this study, in which panel data set belonging to 23 countries for the period of 1990-2016, was approached with the help of panel cointegration, Granger causality analysis and panel error correction tests.

According to growth and feedback effect hypotheses, which take place among the approaches about the relationship between energy consumption and economic growth, most of

the time there is a directly related relationship between variables. While an increase in energy consumption affects growth positively according to growth hypothesis; a bidirectional causality relationship between variables can be mentioned according to feedback effect hypothesis. In fact, in this study, which addresses the relationship between the change in energy import in the context of energy consumption and economic growth in the sample of 23 net energy importer countries with econometrical methods, the results of both a directly related relationship between variables in a way supporting growth hypothesis, and the existence of bidirectional causality relationship between two variables were obtained.

In this study, whose sample is composed of 23 developed and developing countries, it was concluded a long termed cointegration relationship exists between the change in energy import within the context of energy consumption and economic growth, and that an increase in energy import will increase economic growth. Within this framework, 1% increase in energy import will increase economic growth by 1.171% in the long term and by nearly 0.112% in the short term.

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