International Journal of Energy Economics and Policy
Vol. 4, No. 2, 2014, pp.238-247
ISSN: 2146-4553
www.econjournals.com

Effects of Oil and Natural Gas Prices on Industrial Production in the Eurozone Member Countries

Yılmaz BAYAR
Department of Business Administration,
Faculty of Business Administration, Karabuk University,
Turkey. Email: yilmazbayar@karabuk.edu.tr

Cuneyt KILIC
Department of Economics,
Biga Faculty of Economics and Administrative Sciences,
Canakkale Onsekiz Mart University, Turkey.
Email: c_kilic2006@hotmail.com.tr

ABSTRACT: Industrial production is one of the leading indicators of gross domestic product which reflects the overall economic performance of a country. In other words decreases or increases in industrial production point out a contracting or expanding economy. Therefore, changes in prices of oil and natural gas which are the crucial inputs to the industrial production are also important for the overall economy. This study examines the effects of changes in oil and natural gas prices on the industrial production in the 18 Eurozone member countries during the period January 2001-September 2013 by using panel regression. We found that oil prices and natural gas prices had negative effect on industrial production in the Eurozone member countries.

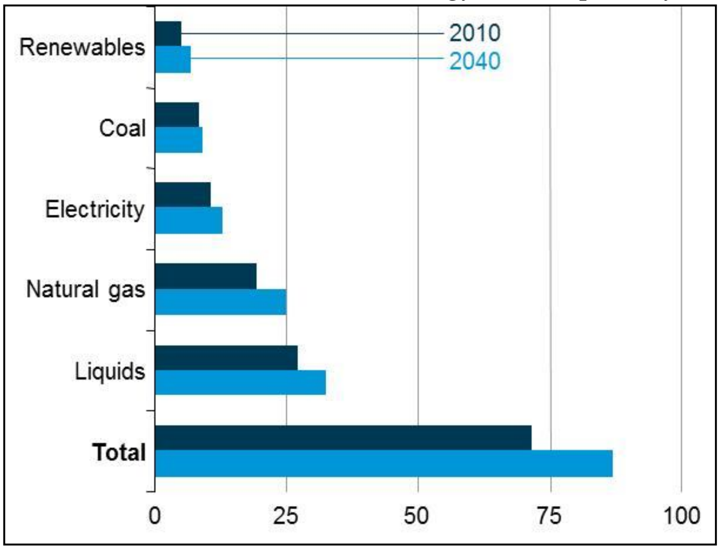
Keywords: Oil Prices; Natural Gas Prices; Industrial Production; Eurozone Member Countries; Panel Data Analysis.
JEL Classifications: C22; E31; L60; Q43.

1. Introduction

Industrial production is the crucial component of gross domestic product of a country and also is a leading indicator of GDP. Increases and decreases in industrial production generally mean increases and decreases in GDP. Therefore industrial production has important for the overall state of the economy. On the other hand energy is one of the main inputs to the industrial production. The industrial sector consumes about one-half of the world's total delivered energy. The share of liquids and natural gas, which are the mostly consumed energy types, in OECD industrial energy consumption respectively was 27,4% and 19,4% in 2010 and it is expected to increase and reach 32,6% and 25,2% in 2040 (Figure 1).

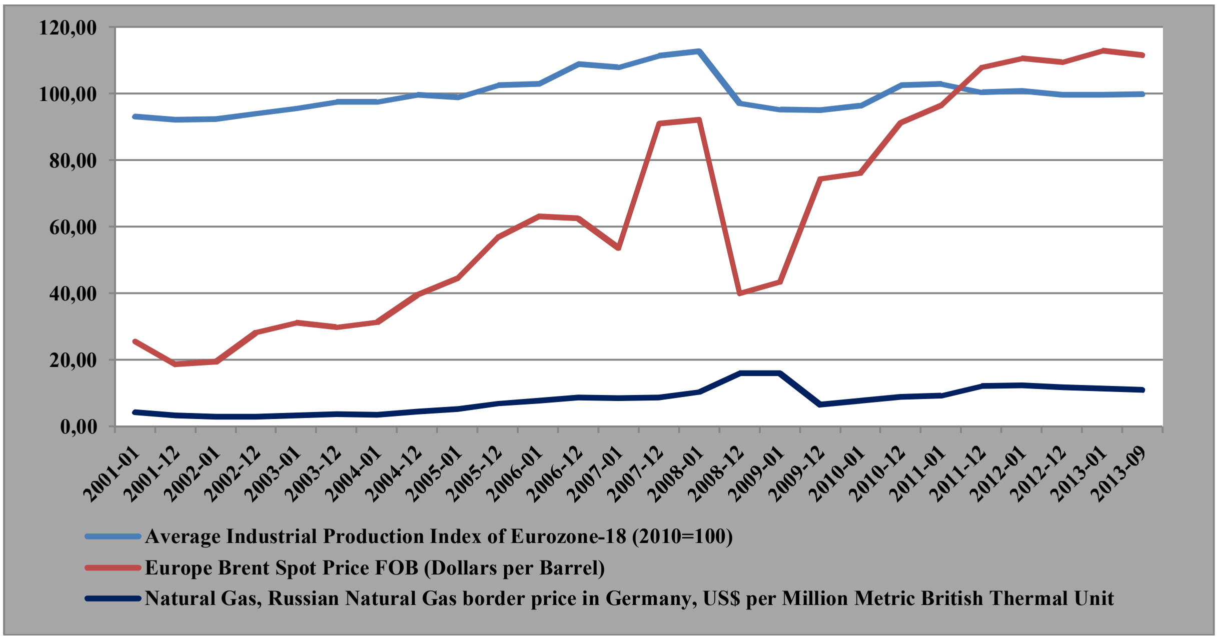
Industrial production heavily has depended on oil and natural gas as seen Figure 1 and projections demonstrated that this trend will not change in the near future. The reserves of oil and natural gas are limited, although oil and natural gas demand has increased. This supply-demand imbalance inevitably causes increases in prices of oil and natural gas. The barrel price of Brent oil reached to 111,6 US dollars September 2013 from 25,62 US dollar in January 2001, while price of natural gas increased 10,66 US dollars September 2013 from 4,22 US dollar in January 2001 (Figure 2). Consequently these increases in prices both oil and natural gas has potential to affect industrial production negatively by increasing the production costs.

Figure 1. OECD Industrial Sector Delivered Energy Consumption by Energy Source



Source: U.S. Energy Information Administration (EIA, 2013).

Figure 2. Industrial Production Index of the Eurozone Member Countries (2010=100-%), Oil and Natural Gas Prices



Source: Eurostat, U.S. Energy Information Administration (EIA) and IMF.

Oil and natural gas has the biggest shares in total energy consumption in EU-27, and the share of oil and natural gas in total energy consumption respectively was 35% and 24% in 2011. But however import dependency of oil and natural gas in EU-27 respectively was %84,9 and 67,0% in 2011 (European Commission, 2013). In other words EU-27 member countries are net energy importers. Therefore the changes in oil price and natural gas price are high likely to affect industrial production. This study examines the effects of changes in oil and natural gas prices on the industrial production in the 18 Eurozone member countries during the period January 2001-September 2013 by using panel data regression.

The remainder of this paper is organized as follows. Section 2 outlines the previous literature, Section 3 discusses the data, and Section 4 considers the empirical methodology and presents the empirical findings. Section 5 concludes the paper.

2. Literature Review

Empirical studies about the effects of changes in oil prices on macroeconomy emerged as of 1973 and 1979 oil shocks. Hamilton (1983) and Hooker (1996) were pioneer studies in this area. The studies generally have been on the relationship between economic growth/stock market performance and oil prices. These studies have generally employed VAR (Vector Autoregression) and SVAR (Structural VAR) models to investigate the effects of oil and natural gas prices on the macroeconomic variables and the studies have been generally focused on the US and OECD countries. However there have been limited studies on the effects of changes in oil prices and natural gas prices on the industrial production. The major studies on the relationship between industrial production/output and oil and natural gas prices were presented in Table 1. Most of the studies such as Lee and Ni (2002), Cobo-Reyes and Quirós (2005), Jiménez-Rodríguez (2007), Lippi and Nobili (2008), Bredin et al. (2008), Kumar (2009) and Tang et al. (2010) found that there was a negative relationship between industrial production and oil prices.

Table 1. Literature Review

Study	Country/Country Group (Period)	Method	Findings
Hamilton (1983)	United States (US) (different periods during the 1948-1980)	Correlation, Granger causality test and regression analysis	He found that there was a negative relationship between changes in oil price and economic growth.
Hooker (1996)	US (different periods during the 1948-1994)	Granger causality test, VAR model	He found that oil prices were Granger cause of various US macroeconomic such as GDP growth, unemployment up to 1973, but this relationship was not robust the period following 1973.
Kim and Willett (2000)	23 OECD countries (1962-1993)	Panel regression	They found that there was a negative relationship between economic growth and oil prices.
Lee and Ni (2002)	US (1959-1997)	Vector Autoregression (VAR) model	They found that oil price shocks mostly decreased the production in the oil-intensive industries by increasing operating costs and uncertainty.
Cobo-Reyes and Quirós (2005)	US (1963-2004)	Markov switching model	They found that increases in oil prices had a negative impact on industrial production
Ayadi (2005)	Nigeria (1980-2004)	VAR model	He found that changes in oil prices have no impact on industrial production.
Kliesen (2006)	US (1979-2006)	Regression analysis	He found that changes in natural gas prices did not predict economic growth, while increases in crude oil prices significantly predicted economic growth.
Jiranyakul (2006)	Thailand (1990-2004)	Johansen cointegration test	He found that oil prices had positive effect on the industrial production in the long run, while oil prices had negative effect on the industrial production in the short run.
Jiménez-Rodríguez (2007)	6 OECD countries (France, Germany, Italy, Spain, the UK and the US) (1975-1998)	VAR model	She found that increases in oil prices lowered aggregate manufacturing output in all the countries.
Bredin et al. (2008)	G-7 countries (1974-2007)	Structural VAR (SVAR) model	They found that oil price uncertainty had a negative impact on industrial production in Canada, France, UK and US.

Study	Country/Country Group (Period)	Method	Findings
Lippi and Nobili (2008)	the US (1973-2007)	SVAR model	They found that industrial production decreased after negative oil-supply shocks, while industrial production increased after oil demand shocks.
Mehrara and Sarem (2009)	Iran, Saudi Arabia and Indonesia (1970-2005)	Gregory and Hansen cointegration and Granger causality tests	They found that there was a unidirectional causality from oil price shocks to economic growth in Iran and Saudi Arabia.
Kumar (2009)	India (1975-2004)	VAR model	He found that oil price shocks had negative effect on the industrial production growth.
Alper and Torul (2009)	Turkey (1990-2007)	VAR model	They found that increases in oil prices did not had significant effect on the whole manufacturing sector, but it affected some sub-sectors adversely.
Guidi (2009)	United Kingdom (UK) (1970-2005)	VAR model	He found that increases in oil price caused decreases in manufacturing output, while decreases in oil prices did not increase manufacturing output as much as in case of increases in oil price.
Tang et al. (2010)	China (1998-2008)	SVAR model	They found that increases in oil prices affected output negatively.
Mordi and Adebiyi (2010)	Nigeria (1999-2008)	SVAR model	They found that the effect of oil price shocks on output was asymmetric, in other words the effect of oil price decrease on output was greater than the effect of oil price increase on output.
Ekşi et al. (2011)	7 OECD countries (1997-2008)	Johansen co-integration and Granger causality tests	They found that there was unidirectional causality from crude oil price to industrial production in all countries except France in the short run.
Farhani (2012)	US (1960-2009)	Simple and dynamic regression model and VAR model	He found that strong weaknesses on the relation between these two factors in what way that the relation has had alow significant effect caused by the existence of breakpoints and the asymmetric effects of the oilprice variations.
Ahmad et al. (2012)	US (1980-2010)	Threshold based CGARCH and VAR model	They firstly decomposed oil price volatility as permanent and transitory components and then they found that negative oil price shock increased the volatility of oil price significantly, while positive oil price shock did not have any significant impact on oil price volatility. However they found that transitory oil price volatility caused the most of the damages to the industrial output, while the permanent component of the oil price volatility had only temporary effect on industrial output.

3. Data

We used the monthly data of industrial production index, oil price and natural gas price from January 2001 to September 2013 to investigate the effects of the changes in oil and natural gas prices on the industrial production of the 18 Eurozone member countries (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia, and Spain). Industrial production index was taken from the Eurostat, oil price was taken from Energy Information Administration (EIA) and the natural gas prices were taken from database of International Monetary Fund (IMF).

The variables used in the econometric analysis and their symbols are presented in Table 2.

Table 2. Variables Used in the Econometric Analysis and Their Symbols

Symbols of Variables	Variables
IP	Index of Industrial Production (2010=100)
PP	Europe Brent Spot Price FOB (Dollars per Barrel)
NGP	Natural Gas, Russian Natural Gas border price in Germany, US$ per Million Metric British Thermal Unit

4. Econometric Application and Main Findings

We used panel data analysis which has important advantages relative to the other techniques. The most important property of panel data analysis enables a data set to have a time and cross section dimension by combining time series and cross-sectional series. Therefore the data set including both data of time series and data of cross sectional series increases the number of observations. Increasing number of observations raises the degree of freedom and decreases the probability of possible high degree of linear relationship among the independent variables. Because of these reasons panel data method enables us to obtain more credible econometric estimations and results (Hsiao 2003).

We firstly test the stationarity of the series by various tests and applied panel regression model to find the direction and strength of the relationship among the variables after determination of integration levels of the series in the study.

4.1. Results of Panel Unit Root Tests

The stationarity of the series is very important for the reliability of estimations and results. The stationarity of the series affects the properties and behavior of the series. If the variables in the regression model are not stationary, standard assumption of asymptotic analysis become invalid and estimation results will be misleading (Vosvrda 2013; Akram, 2011). Therefore we tested the stationarity of the series by unit root tests of Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003) and Augmented Dickey Fuller (ADF) (1979) and the results of panel unit root tests were presented in Table 3.

Table 3. Results of Panel Unit Root Tests

Variables	Levin, Lin & Chu Test Results		Im, Pesaran & Shin Test Results		ADF-Fisher Chi-square	
	Level	First Difference	Level	First Difference	Level	First Difference
	Trend and Constant	Constant	Trend and Constant	Constant	Trend and Constant	Constant
IP	0.1327	0.0022*	0.0886	0.0244*	0.0953	0.0052*
PP	0.2674	0.0138*	0.0831	0.0001*	0.1137	0.0000*
NGP	0.1235	0.0010*	0.0702	0.0027*	0.0992	0.0001*

The series were deseasonalized by tramo/seats and periods of crisis and policy changes were considered with regard to their statistical significance and trend and constant components were included in the model in selection of the model as long as they were significant during the stationarity tests.
* Significant at the 0.05 and 0.01 level, lags for ADF test are selected automatically by based on Schwarz information criterion, Bandwith for Phillips-Perron Test are selected automatically by based on Newey-West Bandwith.
Cusum path lies within the confidence interval bounds at %5, It is not observed structural breakpoint.

The panel unit root tests in Table 3 are called as first generation panel unit root tests. First generation panel unit root tests is based on the assumption which cross-sectional units of the panel are independent and all the cross-sectional units are affected equally from the any shock which one of the panel units is exposed to. Whereas it is more realistic that the other units are affected from the shock which any one of the panel units is exposed to in different levels. The second generation panel unit root tests were developed to eliminate this shortcoming and they test the stationarity by considering the dependency among the cross-sectional units (Göçer, 2013:5094).

It is required to test the cross-sectional dependency in panel data set for determining the existence of unit root. If the cross-sectional dependency in panel data set is rejected, first generation panel unit root test can be used. However if there is cross-sectional dependency in the panel data, use of second generation panel unit root tests yield a more consistent, efficient and powerful estimation (Güloğlu and İspir, 2011:209–210).

We can determine the existence of cross-sectional dependency by Breusch-Pagan (1980) CD_{LM1} test in case of time dimension (T)> cross-sectional dimension (N), Pesaran (2004) CD_{LM2} test in case of T=N, by Pesaran (2004) CD_{LM} test in case of T<N. We used Breusch Pagan (1980) CD_{LM1} to test the cross-sectional dependency because there are 18 countries (N=18) and 153 months (T=153). The hypotheses of the test are as follows:

H_0: There is no cross-sectional dependency

H_1: There is cross-sectional dependency

If the p value is smaller than 0.05, H_0 is rejected at 5% significance level and it is decided there is cross-sectional dependency among the panel units (Pesaran, 2004). The results of CD_{LM1} test were presented in Table 4. The results demonstrated that there was cross-sectional dependency in the series and equation because p value is smaller than 0.05. In this case there is cross-sectional dependency among the countries which formed the panel and all the other countries affected from the shock which any country was exposed to.

Table 4. Results of CD_{LM1} Test

Test	IP		PP		NGF	
	t stat.	**p**	**t stat.**	**p**	**t stat.**	**p**
CD_{LM1}	8.446	0.001	9.221	0.002	7.560	0.002

Since we found that there was cross-sectional dependency among the countries which formed the panel, we tested the stationarity of the series by CADF (Cross-Sectionally Augmented Dickey-Fuller) which is one of the second generation unit root tests. Error term is assumed that it is comprised of a common part for the all the series and a specific part for each series and the cross-sectional dependency is arisen from the existence of unobservable common unit in this model. The hypotheses of the test are as follows:

H_0: There is unit root and

H_1: There is no unit root.

CADF statistics firstly are calculated for each country in this test. Calculated values are compared with the table values obtained from Monte Carlo simulation by Pesaran (2006) and if the calculated CADF statistics is smaller table critical value, H_0 is rejected. In other word there is no unit root in the data of this country and shocks are temporary. CIPS statistics is calculated by taking arithmetic averages of the all CADF statistics to determine whether there is unit root in the overall panel. The calculated CIPS statistics is compared with the table value in Pesaran (2006) and if the calculated CIPS value is smaller than the table critical value, H_0 is rejected. In this case there is no unit root in relevant data of the countries and the shocks are temporary (Göçer, 2013:5094-5095).

CADF and CIPS statistics were calculated and the results were presented in Table 5. Since calculated CIPS statistics is higher than the critical value in the table H_0 is accepted and it was decided there was unit roots in the series which formed the panel. In this case the series were not stationary at the levels. So we made the regression analysis with first differences of the variables, because the series were not stationary at the level.

Table 5. Results of CADF and CIPS Test

Countries	IP		PP		NGF	
	CADF stat.	lag	CADF stat.	lag	CADF stat.	lag
Austria	6.11	1	-5.89	1	-5.28	1
Belgium	5.35	1	-4.12	1	-4.04	1
Cyprus	4.78	1	-4.65	3	-5.61	3
Estonia	5.02	3	-4.09	1	-5.03	3
Finland	5.88	1	-5.42	1	-4.26	2
France	6.15	2	-5.21	2	-4.10	1
Germany	5.01	1	-5.36	2	-5.39	1
Greece	4.87	1	-5.24	1	-5.35	2
Ireland	5.98	1	-4.89	1	-5.16	1
Italy	4.21	2	-4.12	1	-4.87	1
Latvia	3.48	2	-4.90	3	-4.22	2
Luxembourg	3.81	3	-6.02	2	-5.73	2
Malta	4.56	1	-5.87	2	-5.34	1
Netherlands	5.07	1	-6.11	1	-3.88	3
Portugal	3.99	3	-3.72	1	-3.78	1
Slovakia	4.11	3	-4.25	2	-5.67	1
Slovenia	4.25	1	-5.03	1	-4.82	2
Spain	4.28	1	-4.47	1	-4.38	2
CIPS Statistics	**4.82**		**-4.96**		**-4.82**	

Note: lag denotes the optimal lag length. Pesaran (2007) critical value at 1%significance level for CADF is- 4.443; critical value at 1%significance level for CIPS is -2.891.

4.2. Results of Panel Regression

All the variable became stationary in the study after first differencing. Panel data analysis is conducted by both fixed and random effects as specified in Baltagi (2004). We applied some statistical tests to determine which estimation method we use in the analysis. The main issue is whether the data will be pooled among the countries and times because all the variables in the model may be varied among the countries and times. Chow test is used to determine common significance of country specific effects and time specific effects. Here effective estimator under null hypothesis is pooled ordinary least squares, while effective estimator under alternative hypothesis is fixed effect model (Berke, 2009:41).

We used Chow and Breush- Pagan (BP) tests to determine which panel regression model will be used and the results of the tests were presented in Table 6. Null and alternative hypotheses for BP tests respectively pooled regression and random effects model, while null and alternative hypotheses for Chow test respectively are pooled regression and fixed effects model.

Table 6. Results of Estimation Method Selection Test of Panel Regression

Test	p value	Decision
Chow(F test)	0.0022	Accept H_1
BP(χ^2 test)	0.0156	Accept H_1

Later we used Hausman test to decide whether we use random effects model and fixed effects model. The hypotheses of the test are as follows:

H_0: There is random effect.

H_1: There is no random effect. The results of Hausman test were presented in Table 7. So we accepted H_0 hypothesis and decided to use random effects model in the analyis.

Table 7. Results of Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	113.678	2	0.131
Period random	211.772	2	0.250
Cross-section and period random	419.553	2	0.217

We tried different algorithms for the analysis and the model estimation results by Cross section SUR, which gave the minimum value of total error square, were presented in Table 8. We found that oil prices and natural gas prices were statistically significant and had negative effect on industrial production growth. Moreover our explanatory variables explained 65% of variation in dependent variable (industrial production). 1% increase in oil price and natural gas price respectively caused a 19% and a 18% decrease in industrial production.

Table 8. Results of Panel Regression Estimation

Dependent Variable: DIP/**Method:** Panel EGLS (Two-way random effects)				
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
DPP	-0.194800	0.040178	-4.848454	0.0000
DNGF	-0.185314	0.028916	-6.408698	0.0000
C	1.119707	0.168150	6.658964	0.0000
Effects Specification				
		S.D.		**Rho**
Cross-section random		5307.600		0.9704
Period random		384.8171		1.0000
Idiosyncratic random		843.8796		0.0245
Weighted Statistics				
R-squared	0.652353	**Mean dependent var**		6.36E-13
Adjusted R-squared	0.652100	**S.D. dependent var**		3.06E-13
S.E. of regression	1.80E-13	**Sum squared resid**		8.96E-23
F-statistic	2581.101	**Durbin-Watson stat**		2.136905
Prob (F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.651594	**Mean dependent var**		66.71810
Sum squared resid	1031354	**Durbin-Watson stat**		2.146700

Our model must be met heteroscedasticity and autocorrelation assumptions for the reliability of the results. Autocorrelation is an important problem in the panel data analysis as in time series analysis. One of the main assumptions of the regression analysis is that there should not be correlation among the same errors for the different observations. If the error terms are related, this is called as autocorrelation (Kormaz et al., 2010:101). We tested whether there was autocorrelation in the data set by Wooldridge (2002) autocorrelation test and the results were presented in Table 9. The results of the autocorrelation test demonstrated that there was no autocorrelation in the model.

Table 9. Results of Wooldridge Autocorrelation Test

F Value	**Probability**
892.334	0.1145

We tested the heteroskedasticity problem in the model by the test developed by Greene (2003) and the results of the test were presented in Table 10. The results demonstrated that there was no heteroskedasticity problem in the analysis

Table 10. Results of Greene Heteroskedasticity Test

chi2 (18) = 589.97	**Prob>chi2** = 0.214

5. Conclusion

We examined the effects of oil and natural gas prices on the industrial production in the 18 Eurozone member countries during the period January 2001-September 2013 by using panel regression. Empirical findings demonstrated that oil prices and natural gas prices were statistically significant and had negative effect on industrial production growth. Moreover our explanatory variables explained 65% of variation in the industrial production and 1% increase in oil price and natural gas price respectively caused a 19% and a 18% decrease in industrial production. This finding is consistent with the findings by Lee and Ni (2002), Cobo-Reyes and Quirós (2005), Jiménez-

Rodríguez (2007), Lippi and Nobili (2008), Bredin et al. (2008), Kumar (2009) and Tang et al. (2010) found that there was a negative relationship between industrial production and oil prices.

The findings of the study demonstrated that oil and natural gas are main determinants of the industrial production which is one of the primary sources of economic growth. In this context, the abrupt changes in oil and gas prices possibly cause significant changes in industrial production by considering the high import dependency of oil and natural gas of EU countries. The dependence on oil and gas is required to be reduced in order to sustain industrial production in a more stable structure. Therefore Eurozone member countries should take measure to increase the share of renewable energy sources in total energy use.

References

Ahmad, H.J.A., Bashar, O.H.M.N., Wadud, I.K.M.M. (2012), *The Transitory and Permanent Volatility of Oil Prices: What Implications are There for the US Industrial Production?*. Applied Energy, 92, 447–455.

Akram, Muhammad. (2011), *Do Crude Oil Price Changes Affect Economic Growth of India, Pakistan and Bangladesh?*. Högskolan Dalarna, Economics D-Level Thesis.

Alper, C.E., Torul, O. (2009), *Asymmetric Effects of Oil Prices on the Manufacturing Sector in Turkey*.http://www.econ.boun.edu.tr/public_html/repec/pdf/200906.pdf (10.02.2014).

Ayadi, O.F. (2005), *Oil Price Fluctuations and the Nigerian Economy*.OPEC Review, 10, 199-217.

Baltagi, B. (2004), *Econometric Analysis of Panel Data*. Third Edition, New York: John Wiley and Sons.

Berke, B. (2009), *Avrupa Parasal Birliğinde Kamu Borç Stoku ve Enflasyon İlişkisi: Panel Veri Analizi*. İstanbul Üniversitesi İktisat Fakültesi Ekonometri ve İstatistik Dergisi, 9, 30-55.

Bredin, D., Elder, J., Fountas, S. (2008), *The Effects of Uncertainty about Oil Prices in G-7*. UCD Business Schools Working Paper 08/08.

Breusch, T. and Pagan, A. (1980), *The Lagrange Multiplier Test and Its Application to Model Specifications in Econometrics*.Reviews of Economics Studies, 47: 239–253.

Cobo-Reyes, R., Quirós, G.P. (2005), *The Effect of Oil Price on Industrial Production and on Stock Returns*. Teoría e Historia Económica Papers 05/18.

Dickey, D., Fuller, W. (1979), *Distribution of the Estimates for Autoregressive Time Series with a Unit Root*. Journal of the American Statistical Association, 74, 427-431.

Ekşi, İ.H., Izgı, B.B., Şentürk, M. (2011), *Reconsidering the Relationship between Oil Prices and Industrial Production: Testing for Cointegration in some of the OECD Countries*. Eurasian Journal of Business and Economics, 4(8), 1-12.

European Commission (2013), EU Energy in Figures StatisticalPocketbook2013<http://ec.europa.eu/energy/publications/doc/2013_pocketbook.pdf> (15.01.2014).

European Commission (Eurostat) (2014), *Statistics*. http://epp.eurostat.ec.europa.eu/portal/page/portal/statistics/themes (01.01.2014).

Fahrani, S. (2012), *Impact of Oil Price Increases on U.S. Economic Growth: Causality Analysis and Study of the Weakening Effects in Relationship*. International Journal of Energy Economics and Policy, 2(3), 108-122.

Göçer, İ. (2013), *Seçilmiş OECD Ülkelerinde Bütçe Açıklarının Sürdürülebilirliği: Yatay Kesit Bağımlılığı Altında Panel Eş-Bütünleşme Analizi*. Journal of Yasar University, 30(8), 5086-5104.

Greene, W.H. (2003), *Econometric Analysis.* 5th Ed., Chapter 13. Pearson Education Inc.

Guidi, F. (2009), *The Economic Effects of Oil Prices Shocks on the UK Manufacturing and Services Sector*. http://mpra.ub.uni-muenchen.de/16171/ (13.12.2014).

Güloğlu, B., İspir, M. S. (2011), *Doğalİşsizlik Oranımı? İşsizlik Histerisi mi? Türkiye İçin Sektörel Panel Birim Kök Sınaması Analizi*. EgeAkademik Bakış, 11(2), 205–215.

Hamilton, J.D. (1983), *Oil and the Macroeconomy since World War II*.Journal of Political Economy, 91(2), 228-48.

Hooker, M.A. (1996), *What Happened to the Oil Price-Macroeconomy Relationship?*. Journal of Monetary Economics, 38(2), 195-213.

Hsiao, C. (2003), *Analysis of Panel Data*. Cambridge: Cambridge University Press.

Im, K., Pesaran, H., Shin, Y. (2003), *Testing for Unit Roots in Heterogeneous Panels*. Journal of Econometrics, 115(1), 53-74.

International Monetary Fund (IMF) (2014), *Data and Statistics*. http://www.imf.org/external/data.htm #data (01.01.2014).

Jiménez-Rodríguez, R. (2007), *The Industrial Impact of Oil Price Shocks: Evidence from the Industries of Six OECD Countries*. Banco de España Working Paper 0731.

Jiranyakul, K. (2006), *The Impact of International Oil Prices on Industrial Production: The Case of Thailand*. NIDA Economic Review, 1(2), 35-42.

Kim, S., Willett, T. (2000), *Is The Negative Correlation between Inflation and Economic Growth? An Analysis of the Effect of the Oil Supply Shocks*. Applied Economics Letters, 7(3), 141-147.

Kliesen, K.L. (2006), *Rising Natural Gas Prices and Real Economic Activity*.Federal Reserve Bank of St. Louis Review, 88(6), 511-526.

Kormaz, T., Yıldız, B., Gökbulut, R.İ. (2010), *FVFM'nin İMKB Ulusal 100 Endeksindeki Geçerliliğinin Panel Veri Analizi İle Test Edilmesi*. İstanbul Üniversitesi İşletme Fakültesi Dergisi, Cilt/Vol:39, Sayı/No:1, 95–105.

Kumar, S. (2009), *The Macroeconomic Effects of Oil Price Shocks: Empirical Evidence for India*. Economics Bulletin, 29(1), 15-37.

Lee, K., Ni, S. (2002), *On the Dynamic Effects of Oil Price Shocks: A Study Using Industry Level Data*. Journal of Monetary Economics, 49, 823-852.

Levin, A., Lin, C-F., Chu, C-S. J. (2002), *Unit Root Tests in Panel Data: Asymptotic and Finite Sample Properties*. Journal of Econometrics, 108, 1-24.

Lippi, F., Nobili, A. (2008), *Oil and the Macroeconomy: A Structural VAR Analysis with Sign Restrictions*.https://www.bancaditalia.it/studiricerche/seminari/2008/080408/Lippi_Nobili_8_04_08.pdf (10.02.2013).

Mehrara, M., Sarem, M. (2009), *Effects of Oil Price Shocks on Industrial Production: Evidence from Some Oil-Exporting Countries*. OPEC Energy Review, 33(3-4), 170-183.

Mordi, C.N.O. and Adebiyi, M.A. (2010), *The Asymmetric Effects of Oil Price Shocks on Output and Prices in Nigeria using a Structural VAR Model*. Economic and Financial Review, 48(1), 1-32.

Pesaran, M.H. (2004), *General Diagnostic Tests for Cross Section Dependence in Panels*. University of Cambridge Working Paper, 0435.

Pesaran, M.H. (2006), *A Simple Panel Unit Root Test In The Presence of Cross-Section Dependence*. Cambridge Working Papers in Economics, 0346.

Pesaran, M.H. (2007), *A Simple Panel Unit Root Test In The Presence of Cross-Section Dependence*. Journal of Applied Econometrics, 22, 265–312.

Tang, W., Wu, L., Zhang, Z.X. (2010), *Oil Price Shocks and Their Short- and Long-Term Effects on the Chinese Economy*. Energy Economics, 32(1), 3-14.

U.S. Energy Information Administration (2013), *International Energy Outlook 2013*. U.S. Energy Information Administration: Washington.

U.S. Energy Information Administration (2014), http://www.eia.gov/ (02.01.2014).

Vosvrda, M.S. (2013), *Stationarity and Unit Root Testing*.<http://vosvrdaweb.utia.cas.cz/ cykly/Stationarity%20and%20Unit%20Root%20Testing.pdf> (16.01.2013).

Wooldridge, J. (2002), *Econometric Analysis of Cross Section and Panel Data.* The MIT Press, Cambridge, 2002.