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EXTERNAL DETERMINANTS OF ECONOMIC GROWTH IN DEVELOPING COUNTRIES: PANEL DATA ANALYSIS

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Abstract

In this study, the effects of some exogenous determinants on GDP growth in Brasil, India, China, South Africa and Turkey are analysed over the period 1970-2011. In this context, current account, export, foreign direct investments and energy import are chosen as exogenous determinants of GDP growth. Firstly, stationary of variables are tested by using LLC and IPS panel unit root tests. Then, existence of long-term relationship between series is analyzed by using Pedroni, Kao and Jhansen Fisher panel co-integration tests. According to results of both three co-integration tests, variables are co-integrated; hence there is a long-term relationship between them.

Keywords: *Developing countries, foreign direct investment, current account, export, economic growth, panel cointegration.*

JEL Classification: *F14, F43, Q43, R11.*

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GELİŞMEKTE OLAN ÜLKELERDE EKONOMİK BÜYÜMENİN DIŞSAL BELİRLEYİCİLERİ: PANEL VERİ ANALİZİ

Özet

Bu çalışmada, 1970-2011 döneminde Brezilya, Hindistan, Çin, Güney Afrika ve Türkiye'de GSYH büyümesinin bazı dışsal belirleyicilerinin etkileri analiz edilmiştir. Bu bağlamda, cari açık, ihracat, doğrudan yabancı yatırımlar ve enerji ithalatı GSYH büyümesinin dışsal belirleyicileri olarak seçilmiştir. Öncelikle, LLc ve IPS panel birim kök testleri ile değişkenlerin durağanlıkları test edilmiştir. Ardından, Pedroni, Kao ve Jhansen Fisher panel koentegrasyon testleri kullanılarak seriler arasındaki uzun dönemli ilişki incelenmiştir. Her üç koentegrasyon testinin sonuçlarına göre, değişkenler arasında uzun dönemli bir ilişki mevcuttur.

Anahtar Kelimeler: *Gelişmekte olan ülkeler, doğrudan yabancı yatırımlar, cari açık, ihracat, ekonomik büyüme, panel koentegrasyon.*

JEL Sınıflaması: *F14, F43, Q43, R11.*

1. Introduction

Doubtless, there are many variables that affect countries economic performances. Some of them are exogenous variables resulted from countries own dynamics, and some are exogenous variables resulted independently from countries' own dynamics. Surely, these variables related to economic growth differ according to countries' development indicators. For example, growth potential of developed countries and developing countries are not the same. In fact, in this study four countries included in panel are in the category of developing countries.

In this study including Brazil, India, China, South Africa and Turkey for the period of 1970-2011, Gross Domestic Product (GDP) is used as dependent variable. Current account balance (CA) Foreign Direct Investment Inflows (FDI), Export (EXP) and Energy Import (ENR) are chosen as independent variables.

International investment flow which is an important part of economic liberalisation process is the most important point of the study. International investments flows depend on the restrictions. This means, the integration of economies with financial liberalization process. Surely, investment flows is possible n two ways. First of them short run investment flows named as "Hot Money". This kind of flows generally occurs from low interest rate economies to the high interest rate economies. Moreover, the main cause of this kind of flows interest rate volatility in international markets and this kind of flows intensified in stock markets. In the other hand, direct foreign investments are long run; and this provides advantages like economic growth, employment. Of course, these effects more positive and stable than short run investments flow.

Since energy resources are generally restricted in developing countries, foreign direct investments may oblige energy import. To keep these investments, energy is

seen as an important input. In addition to this, foreign direct investments which is fed by energy and causes production activities, enlarges export potential in destination countries. As a result, energy import, foreign direct investments and export variables are very important indicators that affect countries' economic growth performances. Moreover these variables are very important for each other. Not only they affect economic growth but also affect each others. For example, increase in foreign direct investment trigger energy demand and hence energy import. In this way, increase in production leads supply surplus and export. Here firstly, export finances current deficit resulted from energy import and secondly affect balance of payments positively with the foreign direct investments. And this, mentioned in the result part of study effects growth positively. This process started with fall of Bretton Woods system and accelerated with globalisation.

2. Literature Review

In the literature; it is seen in many studies that energy import or consumption, foreign direct investments and export indicators affects countries' economic growth. But the relationship between these three variables and economic growth in countries subject to this study is not researched in any studies. Our study both original and will lead to other similar studies.

Ghosh (2009), researched the effect of import demand of crude oil on economic growth in India for the period 1970-2006 with ARDL method and according to Ghosh, crude oil import granger causes GDP growth. This means, increase in crude oil import resulted from industry development, and this causes increase in export with economic growth. Ghosh (2009) pay attention to the increase in export. Tsani (2010) researched the relationship between energy import and economic growth in Greece with the period of 1960-1970 used unit root test and Granger causality. As a result, energy import increases output and affects economic growth positively. According to Balat (2008), economic and social development causes an increase in energy demand. According to Guvenek and Alptekin (2010) who are analysed the relationship between energy consumption and economic growth for the period 1980-2005. They are using panel cointegration test, economic growth trigger energy consumption. Ozturk et al. (2010) pointed out the existence of cointegration between variables for the period 1971-2005. But in the same study, according to the Granger Causality results, in low-income countries, economic growth affects energy consumption; in high-income countries energy consumption affects economic growth. Adams et al. (2000) researched the relationship between energy demand and economic growth in Thailand; the reason for increase in energy import is the need for industrial development and causes economic growth. This paper verifies the results.

Konya (2006) researched the relationship export and economic growth for the period 1960 and 1997 and found two way causality relationships for each two variables. There are many studies analysing the effect of foreign direct investments flow on GDP growth and mostly the effect is positive. Li and Liu (2005) researched the relationship between foreign direct investments and economic growth for the period 1970-1999 in 84 countries by using panel data analysis. According to them, when

foreign direct investments is supported by human capital especially in emerging economies, its positive effect on economic growth becomes greater.

Bengoa and Robles-Sanchez (2003), researched the relationship between Foreign Direct Investment Inflows, financial liberalisation and economic growth for the period 1970-1979 in 18 Latin American countries. According to them, foreign direct investments increasing with the financial liberalisation accelerate economic growth, especially when supported by human capital. Noy and Vu (2007) researched the foreign investments mobility in 83 developed and developing countries for the period 1984-2000 and resulted constraint and supports has an effect on GDP growth performance. Similarly, Eichengreen et al. (2009), researched financial improvement of the country, industrial growth and control of the financial crisis. They found out that, capital account deficit, meanwhile foreign investments outflow increases the dependency of current industries and effects growth negatively in the industrialized and developing countries sample set. Gourinchas and Jeanne (2007) researched investment flows in developing countries for the period 1980-2000 and they found that investment inflows increase not only capital stock but also increase the marginal productivity of capital. In addition to this, affects financial integration and economic development positively.

3. Data and Methodology

In this study, the effect of current account balance, foreign direct investment inflows, export and energy import on economic growth is investigated for Brazil, India, China, South Africa and Turkey for the period of 1970-2011. These variables are taken as endegenous variables of economic growth and the existence of long-term relationship is tested. In the study, growth rate of Gross Domestic Product (GDP) as percent, current account balance (CA) and Foreign Direct Investment Inflows (FDI) as a percentage of GDP, export index (2000=100) and energy import percentage of total energy consumption are used.

Data for all countries used in the study is taken from World Bank. Data consists of 42 years with the periof of 1970-2011. Firstly panel unit root test and panel cointegration tests are applied. Panel data is provided by using cross section data and time series data together. By using cross section data and time series data together we can explain economic relations both with time dimension and with unit dimension. Moreover, more number of observation increase degree of freedom.

A time series is called stationary if the mean variance and covariance of the time series is constant during time. Test of stationary of a time series is implemented by unit root test. But, when Dickey Fuller (DF), Augmented Dickey Fuller (ADF) and Phillips–Perron tests can be used to test stationary of a unique time series, they are not enough to test the stationary of panel data set.

In recent years, many panel unit root tests improved to test stationary in panel data set. The first improved panel unit root tests are Levin and Lin (1992, 1993) tests; Wu (1996) test, Im, Pesaran and Shin (1997) test, Maddala and Wu (1999) test, Harris and Tzavalis (1999) test, Hadri (1999) test; Breitung (2000) and Choi (2001) tests. By time seasonal properties and different deterministic parts are added to these

tests. Moreover, in the near past, the most important improved tests are Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003), Moon and Perron (2003), Peseran (2003), Breitung and Das (2005), Phillips and Sul (2003) and Bai and N.G. (2004) tests. The characteristic of these tests is to take account properties of each series.

All the tests mentioned above, except Hadri (1999) takes H_0 hypothesis as series is non-stationary and alternative hypothesis as series is stationary. But Hadri (1999) takes H_0 hypothesis as series is stationary (Harris and Sollis, 2003).

In the equation above, while $i=1,\ldots,N$ shows cross section series, $t=1,\ldots,T$ shows time section observations. X_{it} shows exogenous variables in the model. ρ_i *shows* autoregressive coefficients, ε_{it} *shows* error terms if $/\rho_i/ < 1$, y_i is stationary. On the other hand if $/\rho_i/=1$, y_i includes unit root. In panel unit tests there are two different assumptions. The first is, parameters are same for all cross section variables ($\rho_i=\rho$). Levin, Lin and Chu (LLC), Breitung and Hadri used this assumption in their tests. Second assumption is ρ_i values are floating. Im, Pesaran and Shin (IPS) and Fisher-ADF and Fisher-PP tests consider the second assumption.

In this study, , Lin and Chu (LLC) and Im-Pesaran-Shin (IPS) panel unit root tests are used since they have better results than other tests in small samples. LLC test assumes general unit root process in determining stationary of series. But IPS test, differently from LLC, considers unit root test process for each cross section.

3.1. Levin-Lin-Chu (LLC) Panel Unit Root Test

Levin and Lin (1992) tests are the first tests used to search panel unit root problem. Harris and Tzavalis (1999) analyses properties of LLC tests with Monte Carlo simulation. In case time dimension of panel data set is small. The conclusion of the study is LLC test has good results in small samples. This situation is very important for panel data model uses. Moreover, this study introduces that LLC test lead more accurate results if number of cross section data is increased when time dimension of time series is small.

For this, ρ is used commonly, $P_{i,}$ showing maximum lag number, allows different lag numbers for different cross sections. Zero hypothesis of LLC test which claims series has a unit root and alternative hypothesis which is claims series has not unit root is given below.

After determining appropriate lag interval, $\Delta y_{i,t}$ ve $y_{i,t}$ models are estimated in which lagged values of these variables take place and deterministic variables used as explanatory variables. Then, from the said two models and error terms are obtained (Altunkaynak, 2007).

3.2. Im-Pesaran-Shin (IPS) Panel Unit Root Test

When LLC test assume general unit root process in determining stationary of series, IPS test considers unit root process related to each cross section, differently from $\rho_1 = \rho_2 = \ldots = \rho_N = \rho$ *Ho* hypothesis of LLC test. In other words, in IPS test with Ho hypothesis stationary is tested not for ρ but for each ρ_i . Since IPS unit root test

has a structure such a compound of information obtained from a time series belonging N numbered cross section and combined of stationary results of series', it is more effective test for small samples (Harris and Sollis, 2003).

Im, Pesaran and Shin (2003) panel unit root test is used to research the existence of unit root of panel data when powerful tests are needed for the small set of observations. IPS test is starts with the estimation of ADF regression for each cross section data.

In the equation above, $i = 1,\ldots,N$ shows cross section series, $t = 1,\ldots,T$ shows time section observations.

H_0 hypothesis for IPS test;

$H_0 : \rho_i$ (panel unit root access for all i)

Alternative hypothesis;

$H_0 : \rho_i < 0$ (panel unit root reject for all i)

3.3. Panel Cointegration Test

Panel cointegration tests are improved aiming to analyse long-term relationships between panel series after advances in panel unit root tests. In normal time series, linear combination of nonstationary may be stationary also linear combination of panel data may be stationary.

The most important cointegration tests in econometric literature are these: 1995, 1999 and, 2004. McCoskey and Kao (1998), Kao (1999), Larsson, Lyhagen and Löthgren (2001), Mark and Sul (2003), Gutierrez (2005), Westerlund and Edgerton (2005). In this study Pedroni and Kao cointegration tests are used together.

3.4. Pedroni Cointegration Test

Pedroni panel cointegration test suggests zero hypothesis of there is no common integration in panel data models. When Pedroni (1995-1998) used two variables model for cointegration analyze, in Pedroni (1999) multivariable regression models were used. This test allows heterogeneity in cointegration vector. Also not only allows the dynamic and stable effects to be different between panel's sections, but also allows cointegrated vector to be different between sections. In all the tests Pedroni offered are formed on the residuals obtained from like an equation given below (Pedroni, 1999).

In equation 6, T is number of observations, N is the number of cross sections and M is the number of variables in the regression. Because there are N different sections, there are N different equations including M variables each. slope coefficients may variety between cross sections in panel. α_i *parameter* is a constant peculiar to sections in panel or constant effect parameter different between individual sections.

Pedroni panel cointegration tests improved in 1995 and 1999, the panel cointegration test improved in 2004 suggests a test process based on heterogeneous dynamics for cointegration. In analyze, it is focused on residual based statistics. Each of tests is the statistics commuting different short run dynamics, different time effects and different deterministic trends. Tests accept that error parameters are not related

and have standard normal distribution. Pedroni (1998), investigated seven different statistic' small sample prosperities and derived asymptotic distributions. Four of these seven statistics described as within dimension and these statistics based on gathering the data along the groups. Within dimension statistics are formed by adding denominator and numerator separately over N units. Other 3 statistics are described as between dimensions statistics is obtained by division of numerator by sum of denominator over n groups. Within dimension statistics for a model testing "H_0: *There is no cointegration*".

Table 1. Panel Cointegration Statistics

Panel ν – *statistics (non-parametric)*	$T^2N^{3/2}Z_{\hat{V}_{N,T}} = T^2N^{3/2}\left(\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\hat{\varepsilon}_{i,t-1}^2\right)^{-1}$
Panel ρ – *statistics (non-parametric)*	$T\sqrt{N}Z_{\hat{\rho}_{N,Y(1}} = T\sqrt{N}\left(\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\hat{\varepsilon}_{i,t-1}^2\right)^{-1}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\left(\hat{\varepsilon}_{i,t-1}\Delta\hat{\varepsilon}_{i,t}-\hat{\lambda}_i\right)$
Panel t – statistics (non-parametric)	$Z_{t_{N,T}} = \left(\tilde{\sigma}_{N,T}^2\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\varepsilon_{i,t-1}^2\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\left(\hat{\varepsilon}_{i,t-1}\Delta\hat{\varepsilon}_{i,t}-\hat{\lambda}_i\right)$
Panel t – statistics (parametric)	$Z_{t_{N,T}}^{*} = \left(\tilde{S}_{N,T}^{*2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\varepsilon_{i,t-1}^2\right)^{-1/2}\sum_{i=1}^{N}\sum_{t=1}^{T}\hat{L}_{11i}^{-2}\hat{\varepsilon}_{i,t-1}^{*}\Delta\hat{\varepsilon}_{i,t}^{*}$
Group ρ – *statistics (non-parametric)*	$TN^{-1/2}Z_{\rho_{N,Y^{-1}}} = TN^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\varepsilon_{i,t-1}^2\right)^{-1}\sum_{t=1}^{T}\left(\varepsilon_{i,t-1}\Delta\varepsilon_{i,t}-\hat{\lambda}_i\right)$
Group t – statistics (non-parametric)	$N^{-1/2}\tilde{Z}_{t_{N,T}} = N^{-1/2}\sum_{i=1}^{N}\left(\hat{\sigma}_i^2\sum_{t=1}^{T}\hat{\varepsilon}_{i,t-1}^2\right)^{-1/2}\sum_{t=1}^{T}\left(\hat{\varepsilon}_{i,t-1}\Delta\hat{\varepsilon}_{i,t}-\hat{\lambda}_i\right)$
Group t – statistics (parametric)	$N^{-1/2}\tilde{Z}_{t_{N,T}}^{*} = N^{-1/2}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}\hat{S}_i^{*2}\hat{\varepsilon}_{i,t-1}^{*2}\right)\sum_{t=1}^{T}\hat{\varepsilon}_{i,t-1}^{*}\Delta\hat{\varepsilon}_{i,t}^{*}$

Pedroni also introduced which test statistic to consider among statistics given above. According to the results of Monte Carlo studies when cross section unit numbers is greater than 100, all statistics, hence means of statistics gives impact results. But when the sample gets smaller, non-parametric t statistic becomes to have most positive results, after than within dimension *v* statistic and within dimension ρ statistic comes (Sunal and Aykac, 2005).

4. Emprical Results

Existence of unit root of variables (GDP, CA, FDI, EXP and ENR) is tested in I(0) level and then I(1) level. and the results presented in Table 2. According to both IPS test and LLC test results GDP is stationary at level and CA, FDI, EXP and ENR variables are stationary at first difference.

Table 2. Panel Unit Root Test Results for Selected Countries

Variables	Test Level	Test Equation	LLC		IPS	
			Statistic	Prob.*	Statistic	Prob.*
ENR	Level	Intercept	-0.20088 (1)	0.4204	1.90588 (1)	0.9717
		Trend-Intercept	-1.38802 (3)	0.0826	-0.33438 (3)	0.3690
	1st difference	Intercept	-8.37971 (0)	0.0000***	-5.69586(0)	0.0000***
		Trend-Intercept	-7.03743 (1)	0.0000***	-10.6113 (1)	0.0000***
EXP	Level	Intercept	5.15579 (7)	1.0000	7.9218 (7)	1.0000
		Trend-Intercept	0.78018 (0)	0.7824	2.93248 (0)	0.9983
	1st difference	Intercept	-6.32558 (5)	0.0000***	-4.7958 (5)	0.0000***
		Trend-Intercept	-7.5395 (6)	0.0000****	-5.91229 (6)	0.0000***
CA	Level	Intercept	-1.28902 (1)	0,0987	-1.9585 (1)	0.0251**
		Trend-Intercept	-1,89314 (1)	0,0292**	-1.86085 (1)	0.0314**
	1st difference	Intercept	-10.0313 (3)	0.0000***	-10.9366 (3)	0.0000***
		Trend-Intercept	-9.15586 (3)	0.0000***	-10.2304 (3)	0.0000***
FDI	Level	Intercept	-0.36706 (4)	0.3568	-0.11786 (4)	0.4531
		Trend-Intercept	-3.14954 (1)	0.0008***	-2.69641 (1)	0.0035***
	1st difference	Intercept	-7.3172 (3)	0.0000***	-10.2675 (3)	0.0000***
		Trend-Intercept	-6.02402 (3)	0.0000***	-10.0476 (3)	0.0000***
GDP	Level	Intercept	-6.95114 (1)	0.0000***	-8.36868 (1)	0.0000***
		Trend-Intercept	-6.75141 (1)	0.0000***	-8.84145 (1)	0.0000***
	1st difference	Intercept	-11.2309 (1)	0.0000***	-15.4742 (1)	0.0000***
		Trend-Intercept	-9.84546 (1)	0.0000***	-14.6749 (1)	0.0000***

*The Şgures in the parentheses indicate the number lags of selected is based on the SIC; *** and ** denote statistical signiŞcance at the 1% and 5% level of signiŞcance, respectively; Bandwidth selected is based on Newey–West using Bartlett Kernel estimation; * Probabilities are computed assuming asymptotic normality.*

Cointegration analyses results of the variables are given in Table 3. As it is seen, Pedroni cointegration test gives 7 different results four of them within dimension and 3 of them are between dimensions. We mentioned before that since in data set, dimension of time section series is small, *t* statistic (parametric) has more accurate results than the others. According to the table H_0 hypothesis implying there is no cointegration between variables is rejected. This situation implies that for Brazil, India, China, South Africa and Turkey there is a long run relationship between variables.

When the Pedroni cointegration test is considered generally, in 6 of 7 statistics with weighted test statistics results Ho hypothesis asserting there is no cointegration between CA, EXP, FDI, ENR and GDP growth is rejected. This case implies that there is a long term relationship between all of the variables over the Brazil, India, China, South Africa and Turkey, during the period of 1970-2011.

Table 3. Pedroni Residual Cointegration Test Results for Selected Countries

GDP=f(CA, FDI, ENR, EXP)		Test Statistic		Weighted Value	
		Statistic	**Prob.****	**Statistic**	**Prob.****
Within Dimension	Panel v Statistic	0.121698	0.4516	-0.93096	0.8241
	Panel rho Statistic	-2.31420	**0.0103**	-0.67422	0.2501
	Panel PP Statistic	-6.29706	**0.0000**	-4.24382	**0.0000**
	Panel ADF Statistic	-6.39886	**0.0000**	-4.34684	**0.0000**
Between Dimensions	Group rho Statistic	-0.70725	0.2397		
	Group PP Statistic	-6.47190	**0.0000**		
	Group ADF Statistic	-6.59292	**0.0000**		

** AIC information criteria and taking into account the length of the delay is automatically selected.*

Kao residual cointegration test results are given in Table 4. Accordingly, p-value 0.0000, and the panel which emerged between countries GDP, CA, FDI, EXP and ENR variables expressed in terms of the null hypothesis is rejected if the cointegration. Cointegration was defending the alternative hypothesis is accepted. As a result, all variables are cointegrated in panel.

Table 4. Kao Residual Cointegration Test Results for Selected Countries

Test	Test Statistic	P Value
ADF	-4.678217 (7)	**0.0000*****

*The Şgures in the parentheses indicate the number lags of selected is based on the SIC; *** denote statistical signiŞcance at the 1% level of signiŞcance, respectively; Bandwidth selected is based on Newey–West using Bartlett Kernel estimation;*

Fisher Johansen Cointegration Test Results for the panel are given in Table 5. These results confirm the results of Pedroni and Kao Residual Cointegration Test. Here, the p-value 0.0000 and the panel, which emerged among the countries GDP, CA, FDI, EXP and ENR variables expressed in terms of the null hypothesis is rejected if the co-integration, co-integration was defending the alternative hypothesis is accepted. As a result, all variables are cointegrated in panel.

Table 5. Johansen Fisher Panel Cointegration Test Results for Selected Countries

Test		Test Statistic	P Value
Fisher Stats (Trace)*	None	64.10	0.0000***
At most 1		27.74	0.0020***
Fisher Stats (Max Eigen)*	None	47.40	0.0000***
At most 1		14.07	0.1699

** Probabilities are computed using asymptotic Chi-square distribution; *** denote statistical signi$cance at the 1% level of signi$cance, respectively*

Cointegration relationship between variables is tested by Fisher panel cointegration test and results are shown in Table 5. According to Trace statistics there are two cointegration, while there is one cointegration according to eigenvalue statistics.

4. Conclusion

With the acceleration of financial globalisation and internationalization of competition, diversifies the effects on economic growth. Herein, some international dynamics play a part independent from countries' own economic dynamics. Foreign direct investments, export, current account balance and energy import are only some of these. As a matter of fact, developing countries offer important investment oppurtunities for the firms that efforts to provide competitive advantage in international platform and to come into prominence in global competitive. Foreign direct investments for these countries are important growth potentials for Brazil, India, China, South Africa and Turkey which are included in the model in this study. That is, global capital flowing from developed countries to developing countries both is an opportunity for its own progress and also driving force for development in the host economy.

In the other hand, foreign direct investments lead energy import potentials for the countries included in this study. Capital inflows, increased energy demand dramatically. Developing economies with the lack of energy resources face with trade deficit because of the increase in demand. Because of, important part of imported energy is used for industry in the country. But, boom in the industry leads a supply surplus; finally, this surplus leads more export. So, foreign deficit caused from energy import falls and balance of payments is positively effected form foreign direct investments.

Finally, all of the parameters are affecting GNP growth in Brazil, India, China, South Africa and Turkey for the period 1970-2011. In this context, the affects of

current account balance, foreign direct investments, and export and energy import variables on GNP growth are analyzed by using panel data analysis. First, LLC and IPS panel unit root tests are applied and it is seen that GNP is stationary at level; other variables are stationart at first level. After unit root tests, Pedroni, Kao ve Johansen Fisher panel cointegration tests are applied and it is found that for each 3 test variables are co-integrated in the long run.

References

ADAMS, Gerard F., Yasukazu Ichino, and Peter A. Prazmowski, "Economic Growth and Energy Import Requirements: An Energy Balance Model of Thailand", **Journal of Policy Modelling**, Vol: 22, Issue: 2, 2000, s. 219-254.

ALTUNKAYNAK, Bulent, "Sektörel Panel Veri Analizi Yaklaşımıyla Türkiye'nin AB Ülkelerine İmalat Sanayi Bakımından İhracatının Belirlenmesi", **Gazi University Unpublished Doctorate Thesis**, 2007, Ankara.

BAI, Jushan, and Serena, N.G, "A Panic Attack on Unit Roots and Cointegration", **Econometrica**, Vol: 72, Issue: 4, 2004, s. 1127-1277.

BALAT, Mustafa, "Energy Consumption and Economic Growth in Turkey During the Past Two Decades", **Energy Policy**, Vol: 36, 2008, s. 118-127.

BENGOA, Marta, and Blanca, Robles-Sanchez, "Foreign Direct Investment Economic Freedom and Growth: New Evidence from Latin America", **European Journal of Political Economy**, Vol: 19, 2003, s. 529-545.

BREITUNG, Jörg, "The Local Power of Some Unit Root Tests for Panel Data", **Advances in Econometrics**, Vol: 15, *Nonstationary Panels, Panel Cointegration, and Dynamic Panels*, ed. B. H. Baltagi, 2000, s. 161–178. Amsterdam: JAY Press.

BREITUNG, Jörg, and Samarjit, Das, "Panel Unit Root Tests Under Cross Sectional Dependence", **Statistica Neerlandica**, Vol: 59(4), 2005, s. 414-433.

CHOI, In, "Unit Roots Tests for Panel Data", **Journal of International Money and Finance**, Vol: 20, 2001, s. 249–272.

EICHENGREEN, Barry, Rachita, Gullapalli, and Ugo, Panizza, "Capital Account Liberalization", **Development and Industry Growth: A Synthetic View**, 2009,

http://polis.unipmn.it/pubbl/RePEc/uca/ucapdv/panizza144.pdf. (Access Date: 05.05.2011).

GHOSH, Sajal, "Electricity Supply, Employment and Real GDP in India: Evidence from Cointegration and Granger-Causality Tests", **Energy Policy**, Vol: 37, Issue: 8, 2009, s. 2926-2929.

GOURINCHAS, Pierre Olivier, and Jeanne, Olivier, "Capital Flows to Devoloping Countries: The Allocation Puzzle", **NBER Working Paper Series**, No. 13602, 2007.

GUTIERREZ, Luciano, "Tests for Cointegration in Panels with Regime Shifts", **Econometrics**, No: 0505007, 2005.

GUVENEK, Burcu, and Volkan, Alptekin, "Enerji Tüketimi ve Büyüme İlişkisi: OECD Ülkelerine İlişkin Bir Panel Veri Analizi", **Enerji, Piyasa ve Düzenleme**, Cilt: 1, Sayı: 2, 2010, s. 172-193.

HADRI, Kaddour, "Estimation of a Doubly Heteroscedastic Stochastic Frontier Cost Function", **Journal of Business and Economic Statistics**, Vol: 17, 1999, s. 359-363.

HARRIS, Richard D. F., and Ellias, Tzavalis, "Inference for Unit Roots in Dynamic Panels Where the Time Dimension is Fixed", **Journal of Econometrics**, Vol: 91, 1999, s. 201–226.

HARRIS, Richard, and Robert, Sollis, "Applied Time Series Modelling and Forecasting", **Wiley**, 2003, England.

PESERAN, M. Hashem, Im, Kyung So, and Shin, Yongcheol, "Testing for Unit Roots in Heterogenous Panels", **Cambridge Working Papers in Economics**, No: 9526, University of Cambridge, Department of Applied Economics, 1997.

PESERAN, M. Hashem, Im, Kyung So, and Shin, Yongcheol, "Testing for Unit Roots in Heterogeneous Panels", **Journal of Econometrics**, Vol: 115, 2003, s. 53–74.

KAO, Chihwa, "Spurious Regression and Residual-Based Tests for Cointegration in Panel Data", **Journal of Econometrics**, Vol: 90, 1999, s. 1–44.

KONYA, Laszlo, "Exports and Growth: Granger Causality Analysis on OECD Countries with a Panel Data Approach", **Economic Modelling**, Vol: 23, 2006, s. 978-992.

LARSSON, Rolf, Johan, Lyhagen, and Mickael, Lothgren, "Likelihood-Based Cointegration Tests in Heterogeneous Panels", **Econometrics Journal**, Vol: 4, 2001, s. 109–142.

LEVIN, Andrew, Chien Fu, Lin, "Unit Root Tests in Panel Data: Asymptotic and Finite Sample Properties", **University of California,** Discussion Paper No. 92-23, 1992, San Diego.

LEVIN, Andrew, Chien Fu, Lin, "Unit Root Tests in Panel Data: New Results", **University of California,** Discussion Paper No. 93-56, 1993, San Diego.

LEVIN, Andrew, Chien Fu Lin, and Chia Shang James Chu, "Unit Root in Panel Data: Asymptotic and Finite-Sample Properties", **Journal of Econometrics**, Vol: 108, 2002, s. 1-24.

LI, Xiaoying, and Xiaming, Liu, "Foreign Direct Investment and Economic Growth: An Increasingly Endogenous Relationship", **World Development**, Vol: 33, No: 3, 2005, s. 393-407.

MADDALA, G.S., and Wu, Shaowen, "A Comparative Study of Unit Root Tests with Panel Data and a New Simple Test", **Oxford Bulletin of Economics and Statistics**, Vol: 61, No: 1, 1999, s. 631-652.

MARK, Nelson C., and Donggyu, Sul, "Cointegration Vector Estimation by Panel DOLS and Long-Run Money Demand", **Oxford Bulletin of Economics and Statistics**, Vol: 65, No: 5, 2003, s. 655-680.

MCCOSKEY, Suzanne K., and Chihwa, Kao, "A Residual-Based Test of the Null of Cointegration in Panel Data", **Econometric Reviews,** Vol: 17, Issue: 1, 1998, s. 57-84.

MOON, Roger Hyungsik, and Benoit, Perron, "Omitted Proofs of Testing for a Unit Root in Panels with Dynamic Factors", **USC Centre for Law Economics and Organization Research Paper**, No. C03-10, 2003.

NOY, Ilan., and Tam, B. Vu, "Capital Account Liberalization and Foreign Direct Investment", **The North American Journal of Economics and Finance**, Vol: 18, 2007, s.175-194.

OZTURK, Ilhan, Alper, Aslan, and Huseyin, Kalyoncu, "Energy Consumption and Economic Growth Relationship: Evidence from Panel Data for Low and Middle Income Countries", **Energy Policy**, Vol: 38, 2010, s. 4422-4428.

PEDRONI, Peter, "Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an Application to the PPP Hypothesis", **Indiana University Working Paper Series in Economics,** Vol: 95, Issue: 013, 1995.

PEDRONI, Peter, "On the Role of Cross Sectional Dependency in Panel Unit Root and Panel Cointegration Exchange Rate Studies", **Indiana University Working Paper Series in Economics,** 1998.

PEDRONI, Peter, "Critical Values for Cointegration Tests in Heterogeneous Panels with Multiple Regressors", **Oxford Bulletin of Economics and Statistics**, Vol: 61, 1999, s. 653–670.

PEDRONI, Peter, "Panel Cointegration; Asymptotic and Finite Sample Properties of Pooled Time Series Tests, with an Application to the PPP Hypothesis", **Econometric Theory**, Vol: 20, 2004, s. 575–625.

PESARAN, M. Hashem, "A Simple Panel Unit Root Test in the Presence of Cross Section Dependence", **Cambridge Working Papers in Economics**, No: 0346, 2003, s. 1-24.

PHILIPS, Peter C.B., and Donggyu, Sul, "Dynamic Panel Estimation and Homogeneity Testing Under Cross Section Dependence", **Econometric Journal**, Vol: 6, 2003, s. 217-259.

SUNAL, Seckin and Elcin, Aykac, "Türk İmalat Sanayiinde İstihdam, İhracat ve Kapasite Kullanım Oranı İlişkisi: Panel Koentegrasyon", **7. Ekonometri ve İstatistik Sempozyumu**, 2005, Istanbul.

TSANI, Stela, Z., "Energy Consumption and Economic Growth: A Causal Analysis for Greece", **Energy Economics**, Vol: 32, 2010, s. 582-590.

WESTERLUND, Joakim, and David, Edgerton, "Panel Cointegration Tests with Deterministic Trends and Structural Breaks", **Lund University Working Papers,** No.42, 2005.

WORLD DATABANK, databank.worldbank.org, (Access Date: 01.05.2011).

WU, Yangru, "Are Real Exchange Rates Stationary? Evidence from a Panel Data Test", **Journal of Money Credit and Banking**, Vol. 28, 1996, s. 54-63.