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## THE ECONOMIC GROWTH EFFECTS OF THE EUROMED FTA

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**ABSTRACT**

This paper analyzes the economic growth effect of Euro-Mediterranean Free Trade Agreement on European Union and Middle East and North Africa countries with using panel cointegration analysis for the period 1996-2011. In the first step, heterogeneity and cross-section dependence among countries were tested and found that all series have cross-section dependence. For that reason, second generation panel unit root and panel cointegration tests were used. This paper also gives country-specific results at the long-run model via using Common Correlated Effect Model. This contribution provides crucial information about the European Union countries and Middle East and North Africa countries.

## 1. INTRODUCTION

Economic integration means that increasing international economic collaboration (Tinbergen, 1965). According to another definition, economic integration is of combination of political and economical issues (Balassa, 1987). Stages of economic integration starts with preferential trade area, and then goes by respectively free trade area, customs union, monetary union, fiscal union and political union. In this paper, we tried to investigate the economic growth effects of Euro-Mediterranean (EUROMED) Free Trade Agreement (FTA).

In a FTA, tariffs between members are abolish or significantly reduced. But relationship with the other countries is not arranged. Each member keeps its own tariffs to third countries. The expected economic effects of FTA are concerned with foreign direct investments, economic growth, increasing trade relationship and reducing trading costs.

During the second quarter of the 21$^{th}$ century, it is observed that global and regional economic integrations have increased. Especially in the 1960s, the member states of the European Economic Community and European Free Trade Area (EFTA) reached at high level of growth rates. This situation caused a belief that economic integrations have a significant role on the economic growth.

Many researchers believe that increasing economic integration among the developed countries increase the long term economic growth rates. Henrekson et al. (1997) found that membership of Economic Comity and EFTA had considerably increased the economic growth rates. According to their results, regional integration in Europe increases economic growth in the long-run. Brada and Mendez (1988) argued that faster technological development raises competition among the firms of the member states. National monopolies and oligopolies confront with foreign rivals. Therefore, increasing competition stimulates research and development activities and better management practices are emerged. The size of the firms grows larger and it leads to better production specialization, higher research costs and scale economies. Consequently, resources are allocated to advancing sectors at a higher speed. Consequently, total factor efficiency and growth increase occurs as a result of integration. According to Grossman and Helpman (1995), it was highly difficult to reach a universal conclusion about the growth effect of economic integration. Some researchers believe that restrictions in trade slow down the speed of growth around the world while others do not accept this idea. Romer (1993) showed that the growth rate increases if economic integration in Endogenous Growth Model provides two economies with the opportunity of benefiting from increasing scale economies. With respect to this model, integration ensures trade of goods, flow of ideas or both. Baldwin (1989) argued that trade deficiency, removal of non-tariff barriers and the enlargement of market increase the net profits. If more countries become a member of the union, higher growth rates are achieved. Dollar (1992) examined the sources of economic growth in 95 developing countries and finds a strong positive correlation between a measure of outward orientation and per capita Gross Domestic Product (GDP) growth.

Frankel and Romer (1996) used cross-country regressions, and found that trade has a quantitatively large, significant and robust positive effect on income. Baldwin and Seghezza (1996) put emphasis on the effect of the European integration on the economic growth. They developed two models first one was the per capita GDP growth model. This model included the population growth rate, human capital investments, initial level human capital and the ratio of investments to GDP. In the second model, investment equality was estimated by adding the investment rate and domestic and foreign trade barriers. It was found that domestic and foreign trade barriers tend to reduce the investments and consequently have a negative impact on the growth. Wacziarg (1998) investigated the links between trade policy and economic growth using panel data of 57 countries for the period 1979-1989. The results suggested that trade openness had a strong positive impact on economic growth. Vanhoudt (1999) tested the hypothesis of Neo-classical Model that regional integration did not have an impact on long-term growth rates against Endogenous Growth Model. He used panel data method for 23 countries of Organization for Economic Cooperation and Development (OECD). But he could not find a positive correlation between either EU membership or the number of members and growth. Bhagwati and Srinivasan (2002) pointed out that practically none of the countries which close to autarky had managed to sustain a high growth performance over a long period. Borota and Kutan (2008) found that physical capital accumulation does not have a significant impact on the growth of per capita GDP.

Willem (2011) examined how regional integration leads to convergence and growth among 100 developing countries for the period 1970-2004. He couldn't find robust growth effect of regional integration. The organization of the paper is as follows. The second section investigate special features of the EUROMED FTA. The following part put forward theoretical model of economic growth effect of this free trade agreement. The empirical analysis showed economic growth effect of EUROMED FTA both for Mean Group and for majority of individual countries through Common Correlated Effect Model. Summary and concluding remarks are provided in the last section.

## 2. EUROMED FTA'S SPECIAL FEATURES

Perfect competition and free trade gives the first best condition, so economic integration is the second best condition when compare with the free trade (Lipsey and Lancester, 1956-1957). The starting point of this paper is concerned with ensuring free trade. In addition to this, it is specifically in EUROMED FTA.

EUROMED FTA envisaged by the Barcelona Declaration of November 1995. Twelve North African and Middle Eastern countries and fifteen European Union (EU) countries gathered at Barcelona. The aim of this declaration was to create free trade area in the Mediterranean Region and the Middle East, and deepening South-South economic integration. Now it has 27 EU countries, and 16 partner countries (Albania, Algeria, Bosnia and Herzegovina, Croatia, Egypt, Israel, Jordan, Lebanon, Mauritania, Monaco, Montenegro, Morocco, Palestine, Syria, Tunisia and Turkey).

On account of Barcelona Declaration, there is an asymmetry problem in the EUROMED FTA between industrial sector and agricultural sector. Because it emphasizes that competition is good but shouldn't be same in the all sectors. Therefore the countries in question try to increase liberalization in the industrial sector, but on the other hand they protect agricultural sector. It causes asymmetry problem in the EUROMED FTA. It may be causes some important economical and political problems in the countries at issue. Whereas even under these unavailable conditions an economic integration provides positive economic growth effect. For this reason, this paper estimates the economic growth effect of EUROMED FTA both for the whole group, and the individual countries via using Common Correlated Effect Model.

## 3. THEORETICAL MODEL OF ECONOMIC GROWTH

From the 1950s up until the mid-1980s, the literature concerned with long run growth was dominated by the Neoclassical Growth Model- a la Solow (Solow, 1956). According to this theory, the economy - due to diminishing returns on investment in physical capital, converges towards a steady state conditioned upon the behavioral and technological parameters in the model.

Neoclassical Growth Model shows that, with the assumption that technological level is the same for all countries and does not change the long-term reel growth rate of developing and developed economies come closer to the value of the same long-term period and that rate is "zero". This hypothesis is called *convergence hypothesis* and the process during which developing countries catch up with the economies of the developed countries is called *convergence process*.

Here, the basic assumptions that causes the differentiation of the growth rates of the countries on different development levels, concern the factor equipment of countries are different and that the marginal productivity of the capital is decreasing.

Theoretical model of convergence can be expanded with using the Solow (1956) model[1]. With the assumption of exogenous technology, main growth equation is:

(1) $$\dot{K} = s \cdot K^{\alpha} \cdot (A \cdot L)^{1-\alpha} - \delta \cdot K$$

when identify it with per capita terms:

(2) $$\dot{\tilde{k}} = s \cdot \tilde{k}^{\alpha} - (n + \delta + x) \cdot \tilde{k}$$

At the equation $\tilde{y} = \tilde{k}^{\alpha}$. Taking the log-differential of production function, it is found $\hat{\tilde{y}} = \alpha \cdot \hat{\tilde{k}}$ and ($\hat{\tilde{y}} = \frac{\dot{\tilde{y}}}{\tilde{y}}$ and $\hat{\tilde{k}} = \frac{\dot{\tilde{k}}}{\tilde{k}}$). Main growth equation can be written with using $\tilde{y}$ ($\tilde{y} = \tilde{k}^{\alpha} \Rightarrow \tilde{k} = \tilde{y}^{\frac{1}{\alpha}}$):

$$\frac{\dot{\tilde{k}}}{\tilde{k}} = s \cdot \tilde{y}^{\alpha-1} - (n + \delta + x) \Rightarrow$$

$$\frac{1}{\alpha}\frac{\dot{\tilde{y}}}{\tilde{y}} = s \cdot \tilde{y}^{\frac{\alpha-1}{\alpha}} - (n + \delta + x) \Rightarrow$$

$$\frac{\dot{\tilde{y}}}{\tilde{y}} = \alpha\left[s \cdot \tilde{y}^{\frac{\alpha-1}{\alpha}} - (n + \delta + x)\right] \Rightarrow$$

(3) $$\frac{dLn[\tilde{y}]}{dt} = \alpha\left[s \cdot e^{\left(\frac{\alpha-1}{\alpha}\right)Ln[\tilde{y}]} - (n + \delta + x)\right] \equiv \phi(Ln[\tilde{y}])$$

$$\frac{dLn[\tilde{y}]}{dt} = \hat{\tilde{y}} \text{ and } e^{\left(\frac{\alpha-1}{\alpha}\right)Ln[\tilde{y}]} = \tilde{y}^{\frac{\alpha-1}{\alpha}}.$$

This differential equation is not linear, so it should be linear. Using Taylor theorem:

(4) $$\frac{dLn[\tilde{y}]}{dt} \approx \phi(Ln[\tilde{y}_{ss}]) + \phi'(Ln[\tilde{y}_{ss}])\ [Ln[\tilde{y}] - Ln[\tilde{y}_{ss}]]$$

[1] I'm grateful for all the comments and mathematical derivations of Prof.Dr. Hakan Yetkiner.

Steady state value for Cobb-Douglas production function is $\tilde{y}_{ss} = \left(\frac{s}{n+\delta+x}\right)^{\frac{\alpha}{1-\alpha}}$ :

$$\phi(Ln[\tilde{y}_{ss}]) = \alpha\left[s \cdot e^{\left(\frac{\alpha-1}{\alpha}\right)\left(\frac{\alpha}{\alpha-1}\right)Ln\left[\frac{s}{n+\delta+x}\right]} - (n+\delta+x)\right] \Rightarrow$$

$$\phi(Ln[\tilde{y}_{ss}]) = \alpha\left[s \cdot e^{-Ln\left[\frac{s}{n+\delta+x}\right]} - (n+\delta+x)\right] \Rightarrow$$

$$\phi(Ln[\tilde{y}_{ss}]) = \alpha\left[s \cdot \left(\frac{n+\delta+x}{s}\right) - (n+\delta+x)\right] \Rightarrow$$

(5) $$\phi(Ln[\tilde{y}_{ss}]) = 0$$

Then $\phi'(Ln[\tilde{y}_{ss}])$ is determined:

$$\phi'(Ln[\tilde{y}]) = \alpha \cdot \left[s \cdot \left(\frac{\alpha-1}{\alpha}\right) \cdot e^{\left(\frac{\alpha-1}{\alpha}\right)Ln[\tilde{y}]}\right] \Rightarrow$$

$$\phi'(Ln[\tilde{y}]) = \alpha \cdot \left[s \cdot \left(\frac{\alpha-1}{\alpha}\right) \cdot \tilde{y}^{\frac{\alpha-1}{\alpha}}\right]$$

(6)

for steady state:

$$\phi'(Ln[\tilde{y}_{ss}]) = \alpha \cdot \left[s \cdot \left(\frac{\alpha-1}{\alpha}\right) \cdot \left(\left(\frac{s}{n+\delta+x}\right)^{\frac{\alpha}{\alpha-1}}\right)^{\left(\frac{\alpha-1}{\alpha}\right)}\right] \Rightarrow$$

$$\phi'(Ln[\tilde{y}_{ss}]) = \alpha \cdot \left[s \cdot \left(\frac{\alpha-1}{\alpha}\right) \cdot \left(\frac{n+\delta+x}{s}\right)\right] \Rightarrow$$

(7) $$\phi'(Ln[\tilde{y}_{ss}]) = -(1-\alpha)\cdot(n+\delta+x)$$

When the values which are found before are used at the equation (8):

(8) $$\frac{dLn[\tilde{y}]}{dt} \approx -(1-\alpha)\cdot(n+\delta+x)[Ln[\tilde{y}] - Ln[\tilde{y}_{ss}]]$$

This equation is linear. When define $v = (1-\alpha)\cdot(n+\delta+x)$ and assume $Ln[\tilde{y}] < Ln[\tilde{y}_{ss}]$, economy converge to the steady state income. Following equation shows the convergence rate (CR):

(9) $$CR = \frac{\frac{d\hat{\tilde{y}}}{dt}}{\frac{dLn[\tilde{y}]}{dt}} = \frac{d\hat{\tilde{y}}}{dLn[\tilde{y}]} \approx -v$$

$z = Ln[\tilde{y}]$, $b = v \cdot Ln[\tilde{y}_{ss}]$ and these are constant, so equation (8) is written:

(10) $$\dot{z} = -v \cdot z + b$$

Two side of the equation multiply with $e^{v\cdot t}$:

$$\{\dot{z} + v \cdot z\}\cdot e^{v\cdot t} = b \cdot e^{v\cdot t} \Rightarrow$$

$$\dot{z}\cdot e^{v\cdot t} + v\cdot z\cdot e^{v\cdot t} = b\cdot e^{v\cdot t} \Rightarrow$$

$$\frac{d}{dt}\left[z\cdot e^{v\cdot t}\right] = b\cdot e^{v\cdot t} \Rightarrow$$

$$\int d\left[z\cdot e^{v\cdot t}\right] = \int b\cdot e^{v\cdot t}dt \Rightarrow$$

$$z\cdot e^{v\cdot t} = \frac{b}{v}\cdot e^{v\cdot t} + sbt \Rightarrow$$

$$z_t = \frac{b}{v} + sbt\cdot e^{-v\cdot t} \Rightarrow$$

$$Ln[\tilde{y}_t] = \frac{v\cdot Ln[\tilde{y}_{ss}]}{v} + sbt\cdot e^{-v\cdot t} \Rightarrow$$

(11) $$Ln[\tilde{y}_t] = Ln[\tilde{y}_{ss}] + sbt\cdot e^{-v\cdot t}$$

for $t=0$ equation becomes:

$$Ln[\tilde{y}_t]=Ln[\tilde{y}_{ss}]+[Ln[\tilde{y}_0]-Ln[\tilde{y}_{ss}]]\cdot e^{-v\cdot t}\Rightarrow$$

$$Ln[\tilde{y}_t]=Ln[\tilde{y}_0]\cdot e^{-v\cdot t}+\left(1-e^{-v\cdot t}\right)\cdot Ln[\tilde{y}_{ss}]\Rightarrow$$

(12)

$$Ln[\tilde{y}_t]-Ln[\tilde{y}_0]=-\left(1-e^{-v\cdot t}\right)\cdot Ln[\tilde{y}_0]+\left(1-e^{-v\cdot t}\right)\cdot Ln[\tilde{y}_{ss}]$$

It should be defined with per capita terms:

$$Ln\left[\frac{Y_t}{A_t\cdot L_t}\right]-Ln\left[\frac{Y_0}{A_0\cdot L_0}\right]=-\left(1-e^{-v\cdot t}\right)\cdot Ln\left[\frac{Y_0}{A_0\cdot L_0}\right]+\left(1-e^{-v\cdot t}\right)\cdot Ln\left[\left(\frac{s}{n+\delta+x}\right)^{\frac{\alpha}{\alpha-1}}\right]\Rightarrow$$

$$Ln\left[\frac{Y_t}{L_t}\right]-Ln\left[\frac{Y_0}{L_0}\right]-Ln[A_t]+Ln[A_0]=-\left(1-e^{-v\cdot t}\right)\cdot Ln\left[\frac{Y_0}{L_0}\right]+\left(1-e^{-v\cdot t}\right)\cdot Ln[A_0]+$$

$$\left(1-e^{-v\cdot t}\right)\cdot Ln\left[\left(\frac{s}{n+\delta+x}\right)^{\frac{\alpha}{\alpha-1}}\right]\Rightarrow$$

$$A_t=A_0\cdot e^{x\cdot t}$$

$$Ln\left[\frac{Y_t}{L_t}\right]-Ln\left[\frac{Y_0}{L_0}\right]-x\cdot t=-\left(1-e^{-v\cdot t}\right)\cdot Ln\left[\frac{Y_0}{L_0}\right]+\left(1-e^{-v\cdot t}\right)\cdot Ln[A_0]+$$

$$\left(1-e^{-v\cdot t}\right)\cdot Ln\left[\left(\frac{s}{n+\delta+x}\right)^{\frac{\alpha}{\alpha-1}}\right]\Rightarrow$$

$$Ln[y_t]-Ln[y_0]=x\cdot t-\left(1-e^{-v\cdot t}\right)\cdot Ln[y_0]+\left(1-e^{-v\cdot t}\right)\cdot Ln[A_0]+$$

$$\left(1-e^{-v\cdot t}\right)\cdot Ln\left[\left(\frac{s}{n+\delta+x}\right)^{\frac{\alpha}{\alpha-1}}\right]\Rightarrow$$

and

(13) $Ln[y_t]-Ln[y_0]=\beta_0-\beta_1\cdot Ln[y_0]+\beta_2\cdot Ln[s]-\beta_2\cdot Ln[n+\delta+x]$

(13) is convergence equation which is used at empirical studies. Left side of the equation shows the growth rate with taking into consideration of initial point. Right hand side shows the exogenous variables.

$\beta_0=x\cdot t+\left(1-e^{-v\cdot t}\right)\cdot Ln[A_0]$ has two constant variables:

$x\cdot t$ : Total growth rate from the initial point

$\left(1-e^{-v\cdot t}\right)\cdot Ln[A_0]\cdot \beta_1=\left(1-e^{-v\cdot t}\right)$: Initial per capita income. The coefficient of this is negative, and it is consistent with the convergence theory.

$\beta_2=\frac{\alpha}{1-\alpha}\cdot\left(1-e^{-v\cdot t}\right)$ shows the investment rate's growth effect, and it is expected to be positive.

(14) $y_{ss}=A_0\cdot\left(\frac{s}{n+\delta+x}\right)^{\frac{\alpha}{1-\alpha}}\cdot e^{x\cdot t}$

taking the logarithm of both sides:

(15)

$$Ln[y_t]=Ln[A_0]+x\cdot t+\frac{\alpha}{1-\alpha}\cdot Ln[s]-\frac{\alpha}{1-\alpha}\cdot Ln[n+\delta+x]$$

$A=A(V)$

$V$ defines variables which are related with the policy. These variables are final consumption expenditure of government and export openness.

## 4. ECONOMETRIC METHODOLOGY AND EMPIRICAL FINDINGS

In this paper panel data method is employed. When we use panel data technique, we will face with the same problems as time series. It has to be examined whether variables include unit root or not. Before applying unit root tests for the series, heterogeneity and cross sectional dependence tests are used. We found that all series have cross sectional dependence. For that reason, second generation panel unit root and panel cointegration tests were used. For all tests, the period covered is 1996-2011, and panel data set is a balanced one, and we used Gauss codes for econometric tests. The data was obtained from World Economic Outlook Database.

Equation (16) shows unconditional convergence, and (17) shows conditional convergence.

(16) $$Y_{i,t}-Y_{i,t0}=a+b_0Y_{i,t0}+v_{it}$$

(17) $Y_{i,t}-Y_{i,t0}=a+b_0Y_{i,t0}+b_1TRADE_{it}+b_2GC_{it}+b_3D+v_{it}$

$T$ : number of years in the period from 1996 to 2011

$i$ : 1, 2, ..., and 27 EU countries, Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Tunisia and Turkey

*a ,* $b_0, b_1, b_2$ are the parameters to be estimated

$v_{it}$ : residual term

*D*: trend dummy

$Y_{i,t} - Y_{i,t0}$ is the natural logarithm of real GDP per capita in country *I* at time *t*, relative to the initial GDP per capita. This specification investigates convergence between countries.

The model (17) considers three other explanatory variables; these are open trade policy, government consumption and integration's effect. We assume that trade could be the engine of economic growth; although some argue that causality could be bi-directional (Ghatak and Wheatley-Price, 1996). Trade is also important, because a higher degree of integration with the world market means higher level of technology. Some researchers believe that limitations in trade slow down the speed of growth[2]. It is expected that coefficient of government consumption will be negative[3]. Trend dummy shows the economic growth effect of integration.

In this part, we test whether theoretically suggested economic integration effects economic growth positively for the countries at issue. In the first step, we run heterogeneity test. Pesaran and Yamagata (2008) developed Delta test to examine the heterogeneity between cross section units. Under the assumption of fixed effect and heterogeneous slopes (Pesaran and Yamagata, 2008: 52):

(18) $$y_{it} = \alpha_i \tau_T + X_i \beta_i + \varepsilon_{1,i}, \qquad \forall i = 1,2,..., N$$

where $\tau_T$ indicates $T \times 1$ vector of ones, $\beta_i$ is $k \times 1$ vector of unknown slope coefficient, $y_i = (y_{i1},..., y_{iT})'$, $x_i = (x_{i1},..., x_{iT})'$, and $\varepsilon_{1,i} = (\varepsilon_{1,i1},..., \varepsilon_{1,iT})'$. According to the Delta test, null and alternative hypotheses are as follows:

(19) $$H_0 : \beta_i = \beta$$
$$H_1 : \beta_i \neq \beta_j$$

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[2] Baldwin (1989); Edwards (1992); Dolar (1992); Levine and Renelt(1992); Frankel and Romer (1996); Baldwin and Seghezza (1996); Henrekson et al. (1997); Wacziarg (1998); Vamvakidis (1998); Frankel and Romer (1999); Bhagwati and Srinivasan (2002); Nguyen and Ezaki (2005) and Borata and Kutan (2008).

[3] Barro and Sala-i-Martin (1995); Fölser and Henrekson (2001) and Borata and Kutan (2008).

If null hypothesis is failed to reject, then series are homogeneous. Otherwise, at least one series is different from the others and hence the series are heterogeneous. Our Delta test results are shown in table 1 below.

**Table 1: Delta Test Results**

| Test | Test Statistics | Probability |
|---|---|---|
| $\tilde{\Delta}$ | 3.942*** | 0,001 |
| $\tilde{\Delta}_{adj}$ | 4.962*** | 0,001 |

Note: *** indicates that the coefficient is significant at 1%.

As $H_0$ is rejected, slope coefficients in the cointegration equation are heterogeneous for all income groups. It is important to determine the Cross-section dependence (CD) before implementing unit root tests. To this end, we used $CD$ test of Pesaran (2004). Standard panel data model (Pesaran, 2004: 3):

(20) $$y_{it} = \alpha_i + \beta_i^{'} x_{it} + \varepsilon_{2,it}, \qquad \text{for} \quad i = 1,2,..., N$$
and $t = 1,2,..., T$

where $i$ indicates the cross section dimension, $t$ the time series dimension, $x_{it}$ is $k \times 1$ vector of observed time-varying regressors, $\alpha_i$ are individual intercepts, $\beta_i$ are slope coefficients. To test cross section dependence, test statistics is computed as follows (Pesaran, 2004: 5):

(21) $$CD = \sqrt{\frac{2T}{N(N-1)}} \left( \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \hat{\rho}_{ij} \right)$$

$CD$ statistic of Pesaran has mean zero for fixed values of $T$ and $N$, where $N$ indicates cross section dimension, $T$ is time dimension of panel, $\hat{\rho}_{ij}$ represents the sample estimate of the cross sectional correlations among residuals. The hypothesis for the computed test statistics are:

(22) $$H_0 : \rho_{ij} = \rho_{ji} = cor(\varepsilon_{2,it}, \varepsilon_{2,jt}) = 0$$
$$H_1 : \rho_{ij} = \rho_{ji} \neq 0$$

The CD test results are shown in table 2 below.

**Table 2: Cross Sectional Dependence Test ( $CD_{LM}$ Test)**

| Variable | Test Statistics | Probability |
|---|---|---|
| Y | 30.763*** | 0.0001 |
| trade | 17.311*** | 0.0001 |
| Gc | 12.963*** | 0.0001 |

Note: *** indicates that the coefficient is significant at 1%.

There is a cross sectional dependence between series in the case of the null hypothesis is rejected. Therefore, it requires to use the unit root tests which take into consideration of the cross section dependence. Otherwise, the results will be biased. The appropriate unit root test in that case is Cross-Sectionally Augmented *Dickey-Fuller (CADF)* test of Pesaran (2007). In the CADF test, standard Dickey Fuller regressions with the cross-section averages of lagged levels and first-differences of the individual series are augmented, and then standard panel unit root tests are based on the simple averages of the individual cross-sectionally augmented ADF statistics (Pesaran 2007: 265). Pesaran's asymptotic results are obtained both for the individual CADF statistics[4] and their simple averages, which are called Cross-Sectionally Augmented Im, Pesaran, Shin (CIPS) Test. The null and alternative hypotheses of the CADF test are shown below:

(23)

$$H_0 : \beta_j = 0$$
$$H_1 : \beta_j < 0 \quad j = 1,2,.., N_1; \;\; \beta_j = 0, \;\; j = N_1 + 1, \;\; N_1 + 2,..., N$$

where $N$ indicates number of cross sections. CADF regression is shown below (Pesaran, 2007: 269):

(24) $$\Delta y_{it} = a_i + b_i y_{i,t-1} + c_i \bar{y}_{t-1} + d_i \Delta \bar{y}_t + e_{1,it}$$

where $\Delta y_{it} = y_{it} - y_{i,t-1}$; $y_{i,t-1}$ is the first lag of $y_{it}$ ; $\Delta \bar{y}_t$ is cross-section mean of $\Delta y_t$ and $e_{1,it}$ is residuals. CIPS test is based on Pesaran (2007: 276):

(25) $$CIPS(N,T) = N^{-1} \sum_{i=1}^{N} t_i(N,T)$$

[4] CADF test results show that series for individual countries have unit root problem. Given that our methodology ignores whether series are I(0) or I(1), we refrained to present these results. They are available from the authors on demand.

where $t_i(N,T)$ is the CADF statistics for i[th] cross-section unit given by the t-ratio of the coefficient of $y_{i,t-1}$ in the CADF regression defined by (25). CIPS test gives only one value. CIPS test results are shown in table 3 below.

**Table 3: CIPS Test Results**

| Variable | Test Statistics |
|---|---|
| Y | -2.4554** |
| trade | -3.008*** |
| Gc | -1.933 |

Note: *** and ** indicates that the coefficient is significant at 1% and 5% respectively.

According to Table 3, null hypothesis of non-stationary is rejected for income and trade series at 1% and 5% level of significance except government consumption series. Given the cross section dependence of our series, we run/employ second generation panel cointegration tests. Westerlund (2008) proposed the Durbin–H panel and group cointegration test, which gives more powerful results than any other panel cointegration test if there exists cross section dependence. The following equation is proposed by Westerlund (2007: 715):

(26) $$\Delta y_{it} = \delta_i' d_t + \alpha_i (y_{it-1} - \beta_i' x_{it-1}) + \sum_{j=1}^{pt} \alpha_{ij} \Delta y_{it-j} + e_{2,it}$$

where $\alpha_i$ is error correction term, $d_t$ shows deterministic trend, $e_{2,it}$ is residuals. Durbin-H group and Durbin-H panel statistics are computed as follows (Westerlund, 2008: 203):

(27) $$DH_g = \hat{S}_i (\tilde{\phi}_i + \hat{\phi}_i)^2 \sum_{t=2}^{T} \hat{e}_{it-1}^2$$

(28)

$$DH_p = \hat{S}_n (\tilde{\phi} + \hat{\phi})^2 \sum_{i=1}^{n} \sum_{t=2}^{T} \hat{e}_{it-1}^2$$

$\hat{S}_i$ and $\hat{S}_n$ are the variance ratios, and $\hat{e}_{it-1}$ is a consistent estimate of $e_{it-1}$. Panel statistics, $DH_p$ is constructed by summing the $n$ individual terms before multiplying them together. Group mean statistics, $DH_g$, is constructed by first multiplying the terms and then summing them up. The distinction lies in the formulation of the alternative hypothesis. The null and alternative hypotheses of Durbin–H panel and group cointegration tests are as follows:

(29)
$$H_0 : \phi_i = 1 \quad for \ all \ i = 1,...,n$$
$$H_1^p : \phi_i = \phi \ \ and \ \ \phi < 1 \quad for \ all \ i$$
$$H_1^g : \phi_i < 1 \quad for \ at \ least \ some \ i$$

The Durbin-H panel cointegration results are compared with the critical value, 1.645. Our results indicate that there is cointegration for all income groups. Table 4 represents Durbin-H panel and group cointegration test results.

**Table 4: Durbin-H Panel Cointegration Test for Unconditional Convergence Model**

| | Test Statistics | Probability |
|---|---|---|
| Durbin-H group | 25.577*** | 0.0001 |
| Durbin-H panel | 25.564*** | 0.0001 |

Note: *** indicates that the coefficient is significant at 1%.

To test for the null hypothesis of no-cointegration in the panel, Durbin-H group and panel cointegration tests are employed. Test results strongly support cointegration relationship. It means that deviations from equilibrium value of the variable in the short run are corrected in the long run. Table 5 represents Durbin-H (2008) group and panel cointegration test results for conditional convergence model.

**Table 5: Durbin-H Panel Cointegration Test for Conditional Convergence Model**

| | Test Statistics | Probability |
|---|---|---|
| Durbin-H group | 18.264*** | 0.0001 |
| Durbin-H panel | 10.937*** | 0.0001 |

Note: *** indicates that the coefficient is significant at 1%.

Test results show that there is a cointegration relationship. It means that deviations from equilibrium value of the variable in the short run are corrected in the long run. Given that there is cross-sectional dependence in our series, we use Common Correlated Effects Mean Group (CCE-MG) estimators developed by Pesaran (2006). Next, we estimate the long-run model. For the $i$ th cross section unit at time $t$ for $i = 1,..., N$ and $t = 1,...,T$ , the linear heterogeneous panel data model is shown below (Pesaran, 2006: 971):

(30)
$$y_{it} = \alpha_i^{'} d_t + \beta_i^{'} x_{it} + e_{3,it}$$

In (30), $d_t$ is a $n \times 1$ vector of observed common effects which includes deterministic components such as intercepts and seasonal dummies, $x_{it}$ is a $k \times 1$ vector of observed individual-specific regressors on $i^{th}$ cross section unit at time $t$, and errors $e_{3,it}$ are:

(31) $$e_{3,it} = \gamma_i^{'} f_t + \varepsilon_{3,it}$$

In (31), $f_t$ is the vector of observed common effects which includes deterministic components such as intercepts and seasonal dummies, $\varepsilon_{3,it}$ are the individual specific errors. Below, we present CCE-MG and fixed effect estimates.

**Table 6: CCE-MG Estimates for Unconditional Convergence Model**

| | Coefficient | Se(NW) | t-statistics |
|---|---|---|---|
| $ly_0$ | -0.2969 | 0.0491 | -6.0425 |

Table 6 shows CCE-MG estimation results of unconditional convergence model. The investigation of unconditional convergence requires a restrictive assumption that there is no difference in preference, technology and steady state across countries. There is an absolute unconditional convergence observed because the coefficient of the initial level of real GDP per capita is negative and statistically significant. Countries with lower initial levels of relative GDP per capita tend to grow 0.29 per cent faster than rich ones.

The half life condition is given by $e^{\lambda t} = 1/2 \Rightarrow t = \ln(2)/\lambda$. It shows that how an economy fills the gap between others. Table 6 shows that countries with lower initial levels of relative GDP per capita will move halfway in 29 years. Implied $\lambda$ is 0.023. It implies that 2.3 percent of the gap of initial levels of real relative GDP per capita between the rich and the poor vanishes in a year if their steady states are identical. Table 7 shows CCE MG estimates for conditional convergence model.

**Table 7: CCE MG Estimates for Conditional Convergence Model**

| | Coefficient | Se(NW) | t-statistics |
|---|---|---|---|
| $\ln y_0$ | -0.55067 | 0.063906 | -8.61694 |
| Trade | 0.000552 | 0.000557 | 2.160216 |
| GC | -0.00753 | 0.002479 | -3.03768 |
| $D$ | 0.004468 | 0.002645 | 1.689319 |

CCE-MG estimates show that there is a strong relationship. An absolute conditional convergence is observed because the coefficient on the initial level of real GDP per capita is negative and statistically significant. Countries with lower initial levels of relative GDP per capita tend to grow 0.55 percent faster than rich ones. According to the halflife formula of conditional convergence model, countries with lower initial levels of relative GDP per capita will halfway in 10 years. And implied $\lambda$ is 0.066.

It implies that 6.6 percent of the gap of initial levels of real relative GDP per capita between the rich and the poor vanishes in a year if their steady states are identical. This is faster than the unconditional convergence model. It means that the explanatory variables at the conditional convergence model have good explanatory power for GDP per capita convergence. And the other explanatory variables have expected signs. These means that trade openness effects economic growth positively, government consumption effects negatively, and integration dummy effects positively as theory points out. The methodology also allows identifying individual effects of independent variables on the dependent variable as well[5].

The methodology also allows us to identify individual effects of independent variables on the dependent variable as well. When we look at the tables at the Appendix 1 and 2, we see country-specific unconditional and conditional convergence models. Due to unconditional convergence model,

Bulgaria, Malta and Slovenia have fastest; Slovak Republic, Latvia and Hungary have lowest unconditional convergence speed. Another table shows country-specific conditional convergence results. From the table we see that Egypt, Lebanon, Israel and Algeria have fastest; Italy, Greece and Lithuania have lowest conditional convergence speed.

## 5. CONCLUSION

EUROMED FTA promotes economic integration and democratic reform across 16 neighbors to the EU's south in North Africa and the Middle East. The aim of EUROMED is to remove the trade barriers and deepen South-South economic integration. EUROMED aims to increase the export volumes of Middle East and North Africa countries to the EU. This paper analyzed the economic growth effect of EUROMED with using second generation panel unit root and panel cointegration tests. According to the CCE-MG estimation results there is a positive economic growth effect of EUROMED. And also, it is seen that conditional convergence speed is higher than unconditional convergence speed. It means that additional explanatory variables explain the economic growth effect strongly.

This paper gives country-specific conditional and unconditional convergence results at the long-run model via using Common Correlated Effect Model. This contribution provides crucial information about the European Union countries and Middle East and North Africa countries. These tests enable to see which countries have high, and which countries have low unconditional and conditional convergence. And also we can see the country-specific effects of explanatory variables, especially for integration effect.

[5] You can see the individual effects of independent variables at the annex.

**REFERENCES**


- Balassa, B. A. (1961), The Theory of Economic Integration, Richard D. Irwin Inc. Homewood,Illinois.
- Baldwin, R. E. (1989), The Growth Effect of 1992, Economic Policy: a European Forum, Vol. 9, pp.247-281.
- Baldwin, R.E. and Seghezza E. (1996), Testing for Trade-Induced Investment-Led Growth, NBER Working Paper Series, 5416.
- Barro, R. J. and Sala-i-Martin, X. (1995), Economic Growth, United States of Amerika: McGraw Hill.
- Bhagwati, J. and Srinivasan, T. N. (2002), Trade and Poverty in the Poor Countries, The American Economic Review, Vol. 92, No. 2, pp.180-183.
- Borota, T. and Kutan, A. M. (2008), Regional Integration and Economic Growth: The Case of the European Union, The Journal of International Trade and Diplomacy 2, Vol. 1, pp.93-113.
- Brada, J. C. and Mendez, J. A. (1988), An Estimate of the Dynamic Effects of Economic Integration. The Review of Economics and Statistics, Vol. 70, No. 1, pp.163-168.
- Dolar, D. (1992), Outward-oriented Developing Countries Really Do Growth More Rapidly: Evidence from 95 LDCs 1976-1985, Economic Development and Cultural Change, Vol. 39, No. 1, pp.523-544.
- Edwards, S. (1992), Trade Orientation, Distortions, and Growth in Developing Countries, Journal of Development Economics, Vol. 39, No. 1, pp.31-57.
- Fölster S. and Henrekson M. (2001), Growth Effect of Government Expenditure and Taxation in Rich Countries, European Economic Review, Vol. 45, pp.1501-1520.
- Frankel, J. A. and Romer, D. (1999), Does Trade Cause Growth?, American Economic Review, Vol. 89, pp.379-399.
- Ghatak, S. and Wheatley Price, S. (1996), Export Composition and Economic Growth: Cointegration and Causality Analysis Evidence for India, Review of World Economics, Vol. 133, No. 3, pp.538-52.
- Grossman, G.N. and Helpman, E. (1995), Technology and Trade, Centre for Economic Policy Research (CEPR) Discussion Papers, Vol. 1134, pp.1-73.

- Henrekson, M, Torstensson, J. and Torstensson, R. (1997), Growth Effects of European Integration, European Economic Review, Vol. 41, pp.1537-1557.

- Levine, R. and Renelt, D. (1992), A Sensitivity Analysis of Cross-Country Growth Regressions, The American Economic Review, Vol. 82 No. 4, pp.942-963.

- Lipsey, R. G. and Lancester, K. (1956-1957), The General Theory of Second Best, Review of Economic Studies, Vol. 24, No. 1, pp.11-32.

- Nguyen, T. D. and Ezaki, M. (2005), Regional Economic Integration and its Impacts on Growth, Poverty and Income Distribution: The Case of Vietnam, The Applied Regional Science Conference (ARSC), Blackwell Publishing Asia Pty.Ltd.

- Pesaran, M. H. (2004), General Diagnostic Tests for Cross Section Dependence in Panels, IZA Discussion Paper, Vol. 1240, pp.1-39.

- Pesaran, M. H. (2006), Estimation and Inference in Large Heterogeneous Panels with a Multifactor Error Structure, Econometrica, Vol. 74, No.4, pp.967-1012.

- Pesaran, M. H. (2007), A Simple Panel Unit Root Test in the Presence of Cross-Section Dependence, Journal of Applied Econometrics, Vol. 22, pp.265-312.

- Pesaran, M. H. and Yamagata, T. (2008), Testing Slope Homogeneity in Large Panels, Journal of Econometrics, Vol. 142, pp.50-93.

- Romer, D. (1993), Openness and Inflation: Theory and Evidence, The Quarterly Journal of Economics, Vol. 108, No. 4, pp.869-903.

- Solow, R. M. (1956), A Contribution to the Theory of Economic Growth. The Quarterly Journal of Economics, Vol. 70, No.1, pp.65-94.

- Tinbergen, J. (1965), International Economic Integration, Amsterdam: Elsevier.

- Vamvakidis, Athanasios (1998), Regional Integration and Economic Growth, The World Bank Economic Review, Vol. 12, No. 2, pp.251-270.

- Vanhoudt, P. (1999), Did the European Unification Induce Economic Growth?, Review of World Economics, Vol. 135 No. 2, pp.193-220.

- Wacziarg, R. (2001), Measuring the dynamic gains from trade, Policy Research Working Paper Series, The World Bank, pp.1-57.

- Westerlund, J. (2008), Panel Cointegration Tests of the Fisher Effect. Journal of Applied Econometrics, Vol. 23, pp.193-233.

- Willem, D. (2011), Regional Integration, Growth and Convergence, Journal of Economic Integration, Vol. 26, pp.1-28.

- World Bank (2011), World Economic Indicators, http://databank.worldbank.org/ddp/editReport?REQUEST_SOURCE=search&CNO=2&country=&series=NY.GNP.PCAP.CD&period=, (10.12.2011).


**Appendix 1: CCE Estimation Results for Each Country (Unconditional Conv. Model)**

| Countries | Y | Lambda | Half Life |
|---|---|---|---|
| Bulgaria | -0.585 | 0.0586 | 11.82204 |
| Cyprus | -0.326 | 0.0263 | 26.35372 |
| Czech Republic | -0.195 | 0.0145 | 47.93262 |
| Estonia | -0.299 | 0.0237 | 29.26751 |
| Hungary | -0.129 | 0.0092 | 75.28028 |
| Latvia | -0.092 | 0.0064 | 107.7309 |
| Lithuania | -0.369 | 0.0307 | 22.58056 |
| Malta | -0.402 | 0.0343 | 20.22156 |
| Poland | -0.163 | 0.0119 | 58.43386 |
| Romania | -0.224 | 0.0169 | 40.99801 |
| Slovak Republic | -0.027 | 0.0018 | 379.8594 |
| Slovenia | -0.36 | 0.0298 | 23.29713 |
| Belgium | -0.288 | 0.0226 | 30.60907 |
| France | -0.152 | 0.0110 | 63.06129 |
| Netherlands | -0.269 | 0.0209 | 33.18168 |
| Luxembourg | -0.143 | 0.0103 | 67.37549 |

**Appendix 2: CCE Estimation Results for Each Country (Conditional Convergence Model)**

| Countries | y | TRADE | GC | D | Lambda | Half Life |
|---|---|---|---|---|---|---|
| Bulgaria | -0.577 | 0.000 | -0.002 | -0.001 | 0.0574 | 12.08439 |
| Cyprus | -1.245 | 0.009 | -0.011 | -0.009 | - | - |
| Czech Republic | -0.381 | -0.002 | 0.001 | 0.005 | 0.0320 | 21.67666 |
| Estonia | -0.564 | 0.000 | -0.027 | -0.005 | 0.0553 | 12.52505 |
| Hungary | -0.518 | 0.000 | -0.007 | 0.016 | 0.0487 | 14.24644 |
| Latvia | -0.27 | 0.002 | -0.018 | 0.001 | 0.0210 | 33.03735 |
| Lithuania | -0.182 | 0.007 | 0.003 | -0.005 | 0.0134 | 51.75497 |
| Malta | -0.657 | 0.003 | -0.024 | 0.002 | 0.0713 | 9.716791 |
| Poland | -0.587 | 0.001 | -0.025 | -0.009 | 0.0590 | 11.75745 |
| Romania | -1.075 | 0.001 | 0.025 | -0.001 | - | - |
| Slovak Republic | -0.288 | -0.006 | 0.024 | -0.007 | 0.0226 | 30.60907 |
| Slovenia | -1.473 | -0.003 | -0.014 | 0.003 | - | - |
| Belgium | -0.762 | 0.001 | -0.014 | 0.015 | 0.0957 | 7.242995 |
| France | -0.286 | 0.005 | -0.008 | 0.011 | 0.0225 | 30.86394 |
| Netherlands | -0.277 | 0.006 | 0.002 | -0.002 | 0.0216 | 32.05591 |
| Luxembourg | -0.599 | 0.002 | 0.009 | 0.036 | 0.0609 | 11.37807 |
| Italy | -0.093 | -0.002 | -0.002 | 0.017 | 0.0065 | 106.5148 |
| Denmark | -0.247 | 0.000 | -0.014 | 0.017 | 0.0189 | 36.64988 |
| Ireland | -0.301 | -0.001 | -0.019 | 0.03 | 0.0239 | 29.034 |
| United Kingdom | -0.501 | -0.004 | 0.007 | 0.01 | 0.0463 | 14.9568 |
| Greece | -0.103 | 0.002 | 0.002 | -0.023 | 0.0072 | 95.651 |
| Spain | -0.445 | 0.001 | -0.017 | 0.016 | 0.0393 | 17.65869 |
| Portugal | 0.206 | 0.004 | -0.007 | 0.01 | -0.0125 | -55.5083 |
| Austria | -0.687 | 0.001 | 0.017 | 0.016 | 0.0774 | 8.951133 |
| Finland | -0.731 | -0.001 | -0.017 | 0.002 | 0.0875 | 7.918401 |
| Sweden | -0.258 | 0.005 | 0.001 | 0.034 | 0.0199 | 34.84248 |
| Turkey | -0.657 | -0.004 | -0.005 | -0.048 | 0.0713 | 9.716791 |
| Germany | -0.102 | 0.003 | -0.036 | 0.025 | 0.0072 | 96.64161 |
| Algeria | -0.686 | 0.000 | -0.003 | 0 | 0.0772 | 8.975782 |
| Egypt | -0.922 | -0.004 | -0.013 | 0.001 | 0.1701 | 4.075664 |
| Israel | -0.771 | -0.002 | -0.021 | 0.001 | 0.0983 | 7.053577 |
| Jordan | -0.501 | 0.001 | 0 | 0.003 | 0.0463 | 14.9568 |
| Lebanon | -0.794 | -0.001 | -0.006 | 0.001 | 0.1053 | 6.581015 |
| Morocco | -1.524 | 0.001 | -0.007 | -0.003 | - | - |
| Tunisia | -0.417 | -0.004 | -0.04 | -0.001 | 0.0360 | 19.2695 |