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FDI and Economic Growth in European Transition Economies: Panel Data Analysis

Avrupa Dönüşüm Ekonomilerinde DYY ve Ekonomik Büyüme: Panel Veri Analizi

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Abstract: The main purpose of this paper is to investigate relationship between foreign direct investment and economic growth based on 14 European Transition Economies for the period 1995 to 2014. Empirical model includes GDP per capita growth (% annual), foreign direct investment, net inflows (% GDP) and composite index which is developed with PCA to see the effect of determinants of FDI on GDP as an independent variable. Firstly homogeneity and cross sectional dependence among units are examined with Delta and CD_{LM} tests and it is found that all series have heterogeneity and cross sectional dependency. For that reason, second generation Multifactor error structure (Pesaran et al, 2013) panel unit root test is used and it is also taken into account effect of unobserved common factors as a prerequisite of CCE Model just after proving the co-integration relationship and causality between variables via of Durbin-Hausmann (Westerlund, 2008) co-integration and Dumetriscu-Hurlin (2012) causality tests. Obtained results strongly support one-way causality from foreign direct investments and composite index to economic growth. Unfortunately, there is no causality between foreign direct investments and composite index. The findings indicate that foreign direct investments contribute negatively to economic growth in contrast to theory points out but determinants of FDI contribute positively at European transition countries. The results show that in Albania, Latvia, Romania and Slovenia foreign direct investments and composite index have positive contributions to economic growth in contrast to Bulgaria, Bosnia and Herzegovina, Macedonia, Slovak Republic. Some countries have special and opposite situation. For example; in Croatia, Czech Republic, Hungary, Estonia and Lithuania FDI has negative coefficients but composite index has positive coefficients. Poland is the only exception for composite index has negative but FDI has positive contribution to the economic growth.

Keywords: FDI, Economic Growth, Panel Data Analysis, Transition, EU

Özet: Bu çalışmanın amacı doğrudan yabancı yatırımlar ve ekonomik büyüme atasındaki ilişkiyi 1995-2014 yıllarını kapsayan bir dönemde on dört Avrupa dönüşüm ekonomisi için incelemektir. Ampirik model; kişi başına düşen GSYH oranı (% yıllık), doğrudan yabancı yatırımlar, net sermaye akışları (% GSYH) ve DYY'ın, GSYH üzerine etkisini görmek için temel bileşenler analizi (TBA) ile oluşturulan bileşik endeksi içermektedir. Değişkenlerin homojenlik ve yatay kesit bağımlılığı Delta ve CD_{LM} testleri ile yapılmıştır. Tüm değişkenler heterojendir ve yatay kesit bağımlılığı mevcuttur. Bu nedenle CCE modelinin ön koşulu olarak kabul edilen ve ikinci nesil birim kök testi olarak adlandırılan, (Pesaran vd. 2013)tarafından geliştirilen çok-faktörlü hata yapısı birim kök testi tercih edilmiştir. Böylece gözlemlenemeyen faktörlerin etkisi de dikkate alınmıştır. Değişkenler arasındaki eş-bütünleşme Durbin-Hausman (Westerlınd, 2008) ve nedensellik ilişkisi Dumetriscu-Hurlin (2012) testleri ile ispatlanmıştır. Elde edilen sonuçlar; DYY ve bileşik endeksten ekonomik büyümeye doğru tek yönlü nedensellik ilişkisi olduğumu güçlü bir şekilde desteklemektedir. Ancak DYY ve bileşik endeks arasında herhangi bir nedensellik ilişkisi yoktur. Teorinin iddia ettiğinin aksine DYY, ekonomik büyümeyi negatif olarak etkilerken; DYY'ın belirleyenleri Avrupa dönüşüm ekonomilerinde ekonomik büyümeye pozitif katkı yapmaktadır. Bulgaristan, Makedonya, Slovakya, Bosna-Hersek'in aksine Arnavutluk, Letonya, Romanya, Slovenya'da DYY ve bileşik endeks ekonomik büyümeye olumlu katkıda bulunmaktadır. Bazı ülkelerde özel ve tersi bir durum mevcuttur. Örneğin; Hırvatistan, Çek Cumhuriyeti, Estonya, Litvanya ve Macaristan'da DYY negatif uzun dönem katsayılarına sahipken bileşik endeks pozitif katsayılara sahiptir. Polonya ise bileşik endeksin negatif ama DYY'ın ekonomik büyümeye pozitif katkıda bulunduğu tek ülkedir.

Anahtar Kelimeler: DYY, Ekonomik Büyüme, Panel Veri Analizi, Dönüşüm Ekonomileri, AB.

1. Introduction

Foreign direct investments (FDI) and its determinants have been studied many times in the literature to understand what kind of benefits or disadvantages FDI can have for the host country. Also FDI regarded as a key of economic growth directly or indirectly for decades. In economics, economic growth refers basically an increase of potential output and mostly measured by real gross domestic product (annual, % GDP) and economic growth per capita is driven by productivity which is also called efficiency. It means that producing more goods and services with same amount of input (such as; labor, capital, energy etc.). In this study GDP per capita is chosen as an indicator of economic growth. FDI, comprises capital provided by foreigner investors directly or indirectly via of enterprises in another country with the expectation of profits which comes from the capital investment. Ray (2012), the definition below is accepted by many countries just to distinguish FDI from short term portfolio flows so foreign investor is still the owner of assets (shares) and can participate the management in the host country. According to Abdouli and Hammami (2015), foreign investors buy local inputs to produce intermediate goods and they sell these manufactured products to the local enterprises and firms again. So it means that FDI is a domestic investment in the host country. Thanks to FDI inflows the host country can develop export capacity and innovation earnings via of foreign exchange earnings, technology spillovers and with the creation of new jobs.

According to Navaretti and Venables (2004); the determinants of FDI can be divided in three groups; [1. trade costs (taking into account distance), 2. market size, 3. production cost differentials] and types of FDI can be divided in two groups; (Horizontal and Vertical). Horizontal FDI (HFDI) is market-seeking investment, focused mainly penetrating the domestic market in the host economy and attracted trade costs and market size. In addition this HFDI replicates the whole production process of the home country in a foreign country. Vertical FDI (VFDI) is about cost-minimizing and based on relative endowments such as; market magnitude, minimize production cost with cheap labor force, trade limitations and transport expenditures (Dimitri et al. 2007, 370).

Neo-classic theory says that there are two different impacts of FDI on economic growth (output rate); direct (FDI increases investment rate) and indirect (FDI is the reason of technological positive spillovers, labor and capital) but Kamaly (2002) describes these impacts as a pull and push stories. Push stories are mostly based on external factors. Such as; capital flows and international interest rate as a main driving force. Brahim and Rachdi (2014), supports indirect impact of FDI, according to them FDI is one of most important and stable component of capital stocks and can be described as a key of technology transfer which multiplies total factor productivity (TFP). On the other hand pull stories demonstrate that domestic factors are more attractive for capital flows than external ones. Another group of researchers (Breuss and Egger 1999; Feenstra et al. 2001) called them also gravity variables which are mostly exogenous (domestic) such as; market size, proximity of the sources etc. are the most important ones. Because of they believed that 60 % of the FDI flows or stocks are able to explain by gravity model.

This paper discusses the effect of FDI on economic growth and vice versa in European transition economies. In general transition economies includes the countries of Central and Eastern Europe and the Former Soviet Union. This term can be wider with World Bank's 2002 definition which adds Bosnia and Herzegovina, the Federal Republic of Yugoslavia (later Serbia and Montenegro) as transition economies and in 2009, Kosovo is listed as a transition economy. Essentially, all countries which attempt to change their basic constitutional structures and elements from closed central structured economy to free market economy can be named as transition economies. It is a special branch of economics and has become popular after the collapse of Communism in Central and Eastern Europe. The reason why those countries chosen is that there are not many studies in the literature about that countries so there is a gap to fulfill and FDI is one of the most important macroeconomic indicator which exhibits that how transition economies had improved their economic growth and how their economy could transform structurally thanks to foreign investments and trade. Only European Transition Economies' indicators used to create panel data series. It is important to work with similar countries when you study with balance panel data analysis to have not only unbiased and effective long term coefficients but also according to WB 2009 classification's Commonwealth Independent States and Central Asia countries are not included to European transition economies and The European transition economies are geopolitically relevant partners but not the others.

The paper differs from already existing literature on this topic and empirically in many aspects. First, different combination of variables is included in the exploration of the causality. In the relevant literature, the most common method to examine the correlation or causality between international capital flows and economic growth of the host country is; VAR and OLS method, unit root tests, Granger Causality test and GMM methods. Nowadays panel data analysis is very popular. Because of it is possible to study on group of countries at the same time. But the point is; homogeneity and the cross sectional independence of the data should be considered for suggestive and confidential results and policy implications. Second; for that reason, recent developed econometric tools (second generation unit root and causality tests, econometrics programs, coefficient estimators) used and considered for a larger period of time, from 1995 to 2014 which are the years that are significant socially and economically for selected countries. Also it is really difficult to keep time period longer because the central authorities of transition economies did not enlist economic indicators properly before transformation. Third, the determinants of FDI in transition economies are considered and the given empirical literature examined carefully to create and estimates the model followed in the methodology part. The chosen variables are as follows; Y denotes output level (GDP per capita), FDI_{inf} denotes foreign direct investment net inflows (% GDP), I_{cv} denotes the index composed by determinants of FDI via Principal Component Analysis (PCA). The Principal Component Analysis used here to create a new independent variable which includes the determinants of FDI and to consider their effect on GDP.

The rest of the paper is organized as follows. In Section 2, the determinants of FDI are discussed in European transition economies (Southeastern, Central and Eastern Europe and Balkan Countries). In Section 3 current empirical literature is given about the relationship between FDI and economic growth. Section 4 describes the data and the methodology that has been used. Results and their comments are also reported in Section 4 as empirical evidence. Finally, in Section 5, the conclusions and possible policies come out from the estimated model are discussed.

2. Determinants of FDI in European Transition Economies

Doucouliagos et al. (2010), according to Neo-classical theory, FDI is an input in production function and this is why FDI affects economic growth in the long term is neutral. Although it does not affect the level of national income only amount of output. The growth rate converges in the long run as the marginal product of capital diminishes its returns after a while.

Even if an exogenous increase in capital thanks to capital inflows from foreign countries only temporarily expand production. On the other hand, endogenous growth theory pays attention FDI as a vehicle which functions to transfer technology, knowledge, know-how from developed economies to less developed ones in a positive way. FDI is considered to be important for the less developed countries, and especially, for the countries in transition. It is argued that FDI may not only provide them with direct capital financing, but it may also create positive externalities. FDI brings improvements in technology systems or human capital to recipient countries, establishes multinational enterprises, brings management skills to local firms (competition, imitation, training so on) (Grossman and Helpman 1991; Aghion and Howitt 1997; Iwasaki and Tokunaga 2013, 1). Via of these channels, the FDI inflows are able to increase the productivity of the countries in transition, develop their openness to the global economy, fosters their economic integration to developed countries (Angelopoulou and Liargovas 2014, 471).

The second and subsequent paragraphs in sections are indented by .25 inches (0.63 cm). The EU countries have no trade barriers because they are the members of same trade union. Moreover, they follow a number of common policies such as; trade policy, monetary policy which is directed by European Central Bank (euro zone), agricultural policy etc. Transition countries are mainly small and developing countries that they have small domestic markets, low and cheap labor skills with poor infrastructure. Also these countries suffer from post-conflict. Because of the war recovery, they are lack of foreign investments and investors, well-structured commercial and developed justice system or political stability. The common characteristics of transition economies are; low cost inputs, low level of technology, insufficient market size and same consumer preferences. The national differences among the countries also determine the type of investment for both home and host countries (FDI inflows and outflows). After the fall of Berlin Wall the transition economies began their transformation from communistic-planned economies to market economies with better developed skills, sufficient infrastructure and low sovereign debt (Angelopoulou and Liargovas 2014, 471).

Many transition economies took on immense economic and political changes with a rapid privatization process. Radical economic and political reforms caused almost all countries to experience economic recession at different levels at the beginning of the transition. The nations who had the advantage of hasty privatization could attract more FDI (Popescu 2014, 8152). But sometimes FDI might affect economic growth negatively in the recipient countries if it binds domestic investments. In fact, Mišun and Tomšík (2002) reported that Poland experienced the crowding out of domestic investment by FDI during 1990-2002. However they also reported that Hungary (1990-200) and Czech Republic (1993-2000) had both experienced the crowding-in effect of FDI to induce domestic investment. In addition to these Kosová (2010), has also found that in the Czech Republic, the new entry of foreign firms pushed up the ex-post exit rate of domestic firms during the period between 1994 and 2001.

Estrin and Uvalic (2014), FDI had a significant role in firms about restructuring in the transition area during privatizations. FDI is not the reason of advance exporting, industrial diversity or improvement. More encouraging institutions of the market attracted more FDI into their economies. Declaration of EU membership generates a relevant degree of FDI because the process of joining the EU requires nations to better in their institutional quality.

Tintin (2013), the European transition economies are geopolitically relevant partners. International trade and FDI are good companions in these countries. The degree of openness may clarify the role of trade in FDI inflows, as a proxy of globalization. The positive impacts of FDI on trade are more than the negative ones. Openness and the total amount of GDP have positive and significant effects on total FDI inflows in transition economies. To enhance political right and improvements of civil liberties can help to increase the amount of total FDI inflows.

Macroeconomic environment, productivity of labor, improved infrastructure are very crucial and prerequisites of future FD inflows. If the trade policy of the host country is liberal it means that there is tendency to export via of multinational companies. EU accession gives a chance to corporations which have situated already as an EU member, can produce more with low labor expenditures (Popescu 2014, 8154). According to Boudier-Bensebaa (2008), the macroeconomic situation of Eurozone is so important for FDI flows to transition economies. Both FDI flows (net inflows or outflows) in transition economies are connected with integration process to EU via of trade and financial regulations. Nowadays regional integration (RTAs) is the determinant of more regional investments but they are not assisting FDI in each individual member. Because of the economies does not have the same strength to attract FDI. Poorer nations in a regional organization may attract less FDI. So the establishment of RTA may not promise a fair allocation across economies (Popescu 2014, 8155).

Economic growth in transition countries mostly depended on net private capital inflows because of EU influence and huge capital flows through these economies. European countries assured a relevant level of liberalization in external and internal economic policies. The key factor was the pace of technology transfer to consolidate the EU pre-accession and accession agreements. Before the global economic crisis, one of the determinants of growth was total factor productivity (Becker et al. 2010). After the starts of global and economic financial crisis in 2007 many transition economies had losses in output. Thus, they were vulnerable to external financial shocks. The impacts of crisis on transition economies during the years between 2010-2011 can written as follows; inequalities in balance of payments, Eurozone foreign debt crisis, FDI replaced with portfolio flows in short term, catching-up process slowed down and etc. It is always better to determine FDI with domestic aspects because it is better to manage it by policymakers (Jimborean and Kelber 2014).

3. Emprical Literature

The empirical studies about FDI-growth nexus for transition countries find mixed results. For example; Campos and Kinoshita (2002) show that FDI has a positive impact on GDP growth, they examined 25 Central and Eastern European and former Soviet Union Transition countries for the period 1990-1998. But Lyroudi et al. (2004) could not find any significant relationship when they investigate the FDI-growth relationship with a Bayesian analysis on panel data between 1995 and 1998 for transition economies.

Bevan and Estrin (2004), they use panel data on bilateral flows from source to host countries for the period 1994-200. Analysis the determinants of inward FDI to Central Eastern Europe economies by focusing on factor costs, proximity, trade, risk etc. Source countries (EU-14) chosen according to major suppliers (87 %) of FDI. After Hausmann test random effects were used. Their analysis suggests that the integration with the EU is important because it accelerates FDI to transition economies and FDI generates more growth with development in the economy. But potential membership may also create virtious or vicious circles of growth.

Asteriou et al. (2005), choose net inflows of foreign investments and net portfolio investments as a proxy of FDI. They make an analysis for a sample of 10 transition countries for 14 years. They show that planned foreign investments have a positive and significant effect on the economic growth but portfolio investments have a negative and insignificant effect on GDP. These results indicate that even if cheap labor makes transition economies attractive for FDI the stock markets are not fully developed.

Çetin ve Altıntaş (2006), made a literature review with empirical studies about foreign direct investment and trade. Mostly they focus the long run impacts of FDI inflows in Japan and United States (US) and the relationship between FDI and economic growth in general. There is a difference between the US and Japan subsidiaries; changes in trade structure of Japanese firms comes from geographical and industrial locations, Japanese firms have shifted their investments from labor-intensive to capital-intensive and from Asian economies to Europe. FDI increases economic growth in host countries. Also the changes in export competitiveness of developed and developing countries are positively and significantly found related with the level of FDI inflows.

Değer and Emsen (2006), they worked on 27 transition economies which became independent after the collapse of the Soviet Union. The purpose of this study to examine the relationship between FDI and economic growth. The data belongs to period between 1990 and 2002 and examined by panel data analysis. According to empirical results; FDI is a key factor in developing economies for their economic growth. The hypothesis which claims that sustainable FDI inflows is one the dynamic reasons of economic growth in developed countries, is accepted.

Dimitri et al. (2007), this paper focused on impact of policies. Because of this, their study distinguishes between privatization-related (very large amounts and mostly seen in CEE countries) and non-privatization-related (focus of policy makers) FDI. Data is bilateral and includes 16 transition host countries and 24 source countries for the period 2000-2002. Equations estimated by GMM (Generalized Method of Moments). The variables used by specification are; lagged of FDI stock, population, log GDP, distance, cultural ties, foreign exchange rate, income tax rate, unit labor cost, infrastructure reform (ERDB index) and dummies. They find that high unit labor costs, high corporate tax burden, high level of import tariffs discourage non-privatization-related FDI, while a liberal foreign exchange, trade regime and advanced reforms in the infrastructure sector encourage it.

Alagöz et al. (2008), there is no relationship between FDI and economic growth in Turkey for the period between 1992 and 2007. The elasticity coefficient shows that the effect of FDI on growth is moderate. The method has been used is ADF unit root test and Granger Causality test. The empirical results gained from the application is matching with Carkovic and Levine (2002) and Mencinger (2003).

Altıntaş (2009), examined the relationship between FDI and international trade for the perioed between 1996-2007 in Turkey. The unit root test has been used in order is Dicky-Fuller and Phillips Perron. After that Pacheo-Lopez error correction mechanism showed that in single variabled equations there is a relationship between FDI and import, multi variabled equations showed that there is a relationship between FDI and export in the long term. Import increases FDI and FDI increases export in Turkey not only separately but also together. The seasonal data has been collected from Central Bank of Turkey, electronic data system (EVDS).

Ağayev (2010), the relationship between FDI and economic growth has been examined by panel data analysis for 25 transition economies. It is found that there is a high positive correlation between variables. According to applied causality test; there is a strong causality from FDI to GDP in the long term but it is relatively week from GDP to FDI. Therefore, foreign direct investments (FDI flows) are one of the determinants of economic growth in transition economies and also an increase in growth can accelerate FDI.

Teker et al. (2013), examined foreign direct investments in Asian (8 countries) and European transition (7countries) economies for the period between 1992 and 2011. The data collected for GDP, population, export, import, FDI stock and flows, flows per capita. They developed two different models; Model 1 is estimated for European transition economies and Model 2 is estimated for Asian transition economies which is more flexible because it is a Panel-VAR regression and does not need causality among variables. After unit root and autocorrelation tests it is found out Asian countries have fixed and European countries have random effect for all sampling. According to test results; there is a strong feedback relationship between FDI per capita and GDP per capita. In contrast, the effects of export on FDI are insignificant and naturally Asian part of transition economies is more successful to accumulate foreign direct investment than European part.

In the study of Angelopolou and Liargovas (2014), the results gained from the panel data analysis show that there is no robust causality between FDI inflows and economic growth in three different regions for 20 years (1989-2008). They used two staged least square method with Fixed Effects Model and also they created a random error term to consider geographical, institutional, politics and market characteristics of the considered countries (EMU-16, Transition-18, EU-27 in Table 1, page number 475). The chosen indicators; FDI net inflows, GDP growth (annual %), initial GDP, gross capital formation (% of GDP) as an investment share, Trade (% of GDP) as an openness proxy, government final consumption expenditure (% of GDP) and CPI as an inflation indicator, R&D expenditures, tariffs, government spending on education (% of GDP).

4. Methodology and Data: Emprical Evidence

In the relevant literature, the most common method to examine the correlation or causality between international capital flows and economic growth of the host country is; VAR and OLS method, unit root tests, Granger Causality test and GMM methods. Nowadays panel data analysis is very popular. Because of it is possible to study on group of countries at the same time. But the point is; homogeneity and the cross sectional independence of the data should be considered for suggestive and confidential results and policy implications. For this reason in this study I preferred to use second generation unit root and co-integration tests which consider cross sectional dependence and heterogeneity of the units.

In this study, the effects of FDI net inflows on economic growth vice versa in European transition economies were examined. To test this, I started with the production function framework. The production function can be written as follow;

$$Y = f\left(FDI_{inf}, I_{cv}\ \right) \quad (1)$$

Y denotes output level (GDP per capita), FDI_{inf} denotes foreign direct investment, net inflows (% GDP), I_{cv} denotes the index composed by some variables which are chosen as determinants if FDI according to current literature readings such as; Gross capital formation (% of GDP, General government final consumption expenditure (annual % growth), Trade (% of GDP), Foreign direct investment, net outflows (% of GDP) and Consumer price index (2010 = 100). The purpose of developing a composite index here with PCA is not only to control the effect of determinants of FDI on GDP but also to have them as an independent single variable. To use a lot of independent variables at the regression or econometric model causes autocorrelation between cross sections and unit roots. The available data only allowed me to choose these variables that they are more effective on FDI for transition countries as well. The PCA transforms the original set of variables into smaller set without information and size loss. Joliffe (2002), the PCA is a linear function of the original variables and it is converted apposite and independent variables into a new data set, this conversion is also linear. I assume that technology is included in gross capital formation. Also any increase/decrease in FDI or variables included in the index will cause an increase/decrease in the output level of the country or vice versa.

An econometric form of the dependent and independent variables can be written as a regression as follow:

$$Y_{it} = \beta_0 + \beta_1\left(FDI_{inf_{it}}\right) + \beta_2\left(I_{cv_{it}}\right) + \varepsilon_{it} \quad (2)$$

t denotes time, *i* denotes country, and ε_{it} is the error term. The degree of the linkage between FDI and economic growth will be tested for European transition economies (Albania, Bulgaria, Bosnia and Herzegovina, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Macedonia, Slovak Republic, Slovenia) during the period 1995-2014. The data is collected from World Bank Development Indicators with their logarithmic form. I had to exclude before 1995s due to lack of data. As a first step the Delta test is ran between cross section units for heterogeneity which is developed by (Pesaran and Yamagata 2008, 52).

$$y_{it} = a_i\tau_T + X_i\beta_i + \varepsilon_{1,i}, \quad (3)$$

where τ_T indicates $Tx1$ vector of ones, β_i is $kx1$ vector of unknown slope coefficient, $(y_i = y_{i1}, \dots, y_{iT})'$, $(x_i = x_{i1}, \dots, x_{iT})'$ and $(\varepsilon_{1,i} = \varepsilon_{1,i1}, \dots, \varepsilon_{1,iT})'$. According to the Delta test, null and alternative hypotheses are as follows:

$$H_0: \beta_i = \beta$$
$$H_1: \beta_i \neq \beta_j \quad (4)$$

If null hypothesis is rejected, then series are heterogeneous. Our Delta test results are shown in table 1 below.

Table 1. Delta Test Results

Delta Test	*Test Stat.*	*Prob.*
$\hat{\Delta}$	1.461	0.072*
$\hat{\Delta}_{adj}$	1.624	0.052*

(*) Symbols the significance of probability at 5 % level. According to table 1 our variables are homogeneous because the given probability value (*) is over 0.05 for both (Δ represents small samples and Δ_{adj} represents big samples) so null hypothesis has accepted.

Before implementing unit root tests, it is important to determine the cross-section dependency (CD) so I preferred CD test of (Pesaran 2004, 3);

$$y_{it} = \alpha_i + \beta_i x_{it} + \varepsilon_{2,it} \;\; for\; i = 1,2,\dots,N \;\; and\; t = 1,2,\dots,T \tag{5}$$

where i indicates the cross section dimension, t denotes the time series dimension, x_{it} is $kx1$ vector of observed time-varying regressors, α_i are individual intercepts, $\beta_i$are slope coefficients. The hypotheses are written as follows:

$H_0: \rho_i = \rho_{ji} = cor(\varepsilon_{2,it}, \varepsilon_{2,jt}) = 0$

$H_1: \rho_{ij} = \rho_{ji} \neq 0$ (6)

The CD test results are shown in table 2 below.

Table 2. Cross Section Dependency Test

Test	*GDP*		FDI_{inf}		I_{cv}	
	Test Stat.	*Prob.*	*Test Stat.*	*Prob.*	*Test Stat.*	*Prob.*
CD_{LM} (BP, 1980)	167.113	0.000*	131.967	0.000*	124.706	0.011*
CD_{LM} (Pesaran, 2004)	-2.573	0.000*	-2.116	0.017*	-0.403	0.344

(*) Symbols the significance of probability at 5 % level. According to table 2, probability values of variables are significant except ($CD_{LM}\ Pesaran\ 2004, Icv\ 0.344$) so the null hypothesis which claims that there is no cross section dependency is rejected. Cross sectional dependency exists for cross section units.

Before co-integration test one of the second-generation unit root tests were applied for panel data. Multifactor unit root test which is developed by Pesaran et al. (2013) takes into account the cross sectional dependency. Multifactor Error Structure is a prerequisite for CCE (Common Correlated Effects) Model. There are two different test statistics are estimated; CIPS (cross-sectional augmented panel unit root test) which has developed from Pesaran's (2007) paper and later expanded with a new CSB (simple average of cross-sectional augmented Sargan-Bhargava) statistics. Basically, the purpose of this unit root test is to eliminate the error structure of common factors (autocorrelation) for empirical studies in macroeconomic theory with the context of (output, unemployment, interest rates, investment rates etc.).

Test statistics are estimated as follows (Pesaran et al. 2013, 96);

$$CIPS^*_{NT} = N^{-1} \sum_{i-1}^{N} t_i^*(N,T) \tag{7}$$

$$CSB_{NT} = N^{-1} \sum_{i-1}^{N} CSB_i\,(N,T) \tag{8}$$

N refers the number of cross-sectional unit and T refers time. $t_i^*(N,T)$ is the distribution of sample. Null hypothesis claims that for all i's $(1,2,3,\dots,N)$ $H_0: \beta_i$ cross section units have unit root or not co-integrated (Pesaran et al. 2013, 99). CSB test statistic has been calculated with stochastic simulation method. Therefore, series whether or not linear, or even in the existence of autocorrelation, the calculated test statistics are reliable and superior then CIPS statistics in this respect.

Table 3. Multifactor Error Structure Unit Root Test Results

		Constant		Constant and Trend	
	Lags	Stat.	Critical Value (k=2)(%10)	Stat.	Critical Value (k=2) (%10)
$CIPSm$	0	-3.199	-2.53	-3.004	-2.79
GDP	1	-2.076*	-2.42	-1.302*	-2.73
	2	-	-2.21	-	-2.57
	3	-	-2.07	-	-2.48
	4	-	-1.85	-	-2.54
$CSBm$	0	0.259	0.320	0.101	0.114
GDP	1	0.336*	0.258	0.116*	0.097
	2	0.258*	0.207	0.085*	0.079
	3	0.180*	0.151	0.042	0.058
	4	0.092	0.102	0.072*	0.038
$CIPSm$	0	-3.030	-2.53	-2.831	-2.79
FDI_{inf}	1	-2.302*	-2.42	-2.366*	-2.73
	2	-	-2.21	-	-2.57
	3	-	-2.07	-	-2.48

	4	-	-1.85	-	-2.54
$CSBm$	0	0.136	0.320	0.060	0.114
FDI_{inf}	1	0.182	0.258	0.086	0.097
	2	0.243*	0.207	0.070	0.079
	3	0.217*	0.151	0.045	0.058
	4	0.155*	0.102	-	0.038
$CIPSm$	0	-2.553	-2.53	-2.775*	-2.79
I_{cv}	1	-1.778*	-2.42	-2.863	-2.73
	2	-	-2.21	-	-2.57
	3	-	-2.07	-	-2.48
	4	-	-1.85	-	-2.54
$CSBm$	0	0.412*	0.320	0.157*	0.114
I_{cv}	1	0.169	0.258	0.122*	0.097
	2	0.097	0.207	0.082*	0.079
	3	0.065	0.151	0.050	0.058
	4	0.013	0.102	0.069*	0.038

CIPS and CSB statistic's critical values are taken from Pesaran et al. (2013)'s study. Vide CIPS; constant model in page 108 table B1; constant and trend model in page 110 table B2. Vide CSB; constant model in page 112 table B3; constant and trend model in page 114 table B4. * indicates calculated statistical value is greater than the table critical value which is 10 % and k symbols the number of independent variables of the regression. So variables contain unit roots at level and but their first difference I (1) is stationary.

The results obtained from the panel unit root tests indicate that it is necessary to use second generation co-integration test which takes into account cross sectional dependency. So I preferred to use Durbin Hausmann test which has developed by Westerlund in 2008. This test takes into account the cross section dependence through common factors. Moreover, it gives effective results when the number of observations (N) and the time dimension (T) is small.

The common factor is expressed as follows using the following equations (Westerlund 2008, 199);

$$z_{it} = \acute{\lambda}_i F_t + e_{it} \quad (9)$$

$$F_{jt} = \rho_j F_{jt-1} + u_{jt-1} \quad (10)$$

$$e_{it} = \phi_i e_{it-1} + v_{it} \quad (11)$$

F_t denotes common factor and F_{jt} is the k size form of common factor. While $j = (1,2,\dots,k)$ and ρ_j<1 (for all j's) are in equation number (10), F_t is stationary. The assumptions of error process for DH co-integration test as follows (Westerlund 2008, 200);

- The avarage of v_{it} is zero for all cross section units.
-for all cross section units E (v_{it} v_{kj}) = 0; (j ≠ k, t ve j).
-var (v_{it}) = $w_i{}^2 < \infty$ and var (w_{it}) > 0 positive.
-E (u_t) = 0 and var(u_t) < ∞ dir.
-$Y_{it} \sim I(1)$.
-$X_{it} \sim I(0)$, $X_{it} \sim I(1)$, $i \neq j$.

There are two different test statistics are calculated for DH test. DH_g (when cross sections are heterogeneous) and DH_p (when cross sections are homogeneous). The null hypothesis asserts that there is no co-integration for all cross section units The results obtained are as follows.

Table 4. DH Co-integration Test Results

DH Test	*Test Stat.*	*Prob.*
DH_g *(group)*	2.146	0.016*
DH_p*(panel)*	1.985	0.024*

(*) Symbols the significance of probability at 5 % level. Table 4 shows that probability (because of the homogeneity, I considered (DH_pboostrap values) is less than 0.05 and statistically significant. The existence of a co-integrated relationship between cross section units has been proved and the null hypothesis is rejected.

Dumitrescu and Hurlin (2012) test which can be used not only to estimate homogeneous or heterogeneous cross section units but also whether or not co-integration among variables (Dumitrescu and Hurlin 2012,1). This test has similarities to Granger causality test but it refers to the mean of Wald test statistics calculated for Granger causality test (Dumitrescu and Hurlin 2012, 1).

There are three different test statistics which are calculated in Dumitrescu and Hurlin (2012) panel causality test are written as follow (Dumitrescu and Hurlin 2012, 4-5):

$$W_{N,T}^{Hnc} = \frac{1}{N}\sum_{i=1}^{N} W_{i,T} \tag{12}$$

$$Z_{N,T}^{Hnc} = \sqrt{\frac{N}{2K}}\left(W_{N,T}^{Hnc} - K\right) \xrightarrow[N,T\to\infty]{d} N(0,1) \tag{13}$$

$$Z_{N,T}^{Hnc} = \frac{\sqrt{N}\left[W_{N,T}^{Hnc} - N^{-1}\sum_{i=1}^{N} E(W_{i,T})\right]}{\sqrt{N^{-1}\sum_{i=1}^{N} Var(W_{i,T})}} \xrightarrow[N,T\to\infty]{d} N(0,1) \tag{14}$$

Null and alternative hypotheses are below (Dumitrescu and Hurlin 2012, 4):

$H_0: \beta_i = 0\ \forall_i = 1,2,\dots,N$

$H_1: \beta_i = 0\ \forall_i = 1,2,\dots,N_1$ and $\beta_i \neq 0\ \forall_i = N_1+1, N_1+2,\dots,N$

When the H_0 hypothesis is rejected, it shows that there is a causality relationship between the variables.

Test results are shown in tables below:

Table 5. Dumetriscu-Hurlin Causality Test Results for FDI and GDP

Null Hypothesis	*Test*	*Statistics*	*Prob.*
GDP does not Granger cause FDI	*Whnc*	1.507	0.128075
	Zhnc	1.342	0.161993
	Ztild	0.754	0.300022
FDI does not Granger cause GDP	*Whnc*	3.003	0.004392*
	Zhnc	5.299	3.13E-07
	Ztild	3.851	0.000239

(*) Symbols the significance of probability at 5 % level. According to the findings presented at table 5, it is possible to say that there is one-way causality from foreign direct investments to economic growth during the period of 1995-2014 for selected transition countries as expected. Because only FDI's Whnc probability (0.004) is smaller than 0.05 and significant, the rest of test statistics and probabilities are insignificant.

Table 6. Dumetriscu-Hurlin Causality Test Results for I_{cv} and GDP

Null Hypothesis	*Test*	*Statistics*	*Prob.*
GDP does not Granger cause Icv	*Whnc*	0.653	0.322187
	Zhnc	-0.916	0.262216
	Ztild	-1.102	0.238876
Icv does not Granger cause GDP	*Whnc*	2.161	0.038567*

	Zhnc	3.073	0.003545*
	Ztild	2.109	0.043105*

(*) Symbols the significance of probability at 5 % level. Given results in table 6 show that there is one-way causality from composite index to economic growth. Because only Icv's Whnc, Zhnc and Ztild test's probability values are smaller than 0.05 and significant.

Table 7. Dumetriscu-Hurlin Causality Test Results for I_{cv} and FDI

Null Hypothesis	*Test*	*Statistics*	*Prob.*
FDI does not Granger cause Icv	*Whnc*	1.024	0.235977
	Zhnc	0.065	0.398409
	Ztild	-0.244	0.386150
Icv does not Granger cause FDI	*Whnc*	1.019	0.237239
	Zhnc	0.051	0.398409
	Ztild	-0.255	0.386150

Table 7 shows that, there is no causality between foreign direct investments and composite index. Because all the test's probability values are over 0.01, 0.05, 0.10 and they are insignificant.

Determining the direction of the causality between variables is the basis of the empirical part. However, it is not sufficient alone, to see which variables are contributing more to the economic growth in the long term, coefficients must be estimated. Common Correlated Effect (CCE) Model which has developed as a new prediction approach by Pesaran (2006), because of panel data models include unobserved common factors so it is necessary to consider this multifactorial error structure of given external individual regressors. The main idea is to filter the individual-specific regressors by means of cross-section averages such that asymptotically as the cross-section dimension tends to infinity, the differential effects of unobserved common factors are eliminated (Pesaran 2006, 967).

CCE approach, which consists of approximating the linear combinations of the infeasible factors by cross section averages of the dependent and explanatory variables, and then running standard panel regressions augmented with these cross section averages. Both pooled and mean group estimators of CCE are proposed, depending on the assumption regarding the slope homogeneity (Pesaran 2013, 24). The CCE mean group estimator is a simple average of the estimators of the individual slope coefficients (Pesaran 2006, 982):

$$\hat{b}_{MG} = N^{-1} \sum_{i=1}^{N} \hat{b}_i \tag{15}$$

The CCE pooled estimator is below (Pesaran, 2006: 986):

$$\hat{b}_P = (\sum_{i=1}^{N} \theta_i X_i' \bar{M}_w X_i)^{-1} \sum_{i=1}^{N} \theta_i X_i' \bar{M}_w y_i \tag{16}$$

After Monte Carlo experiments (1a, 1b, 2a and 2b) it has seen that CCEMG and CCEP estimators are giving effective results even in small samples and CCEP estimator superior than the CCEMG in the condition of homogeneity vice versa (Pesaran 2006, 992). One of the advantages of this method is long-term coefficients for each cross section unit can be individually calculated. Thanks to this, it is possible to see and evaluate results for each country separately. The following tables (9-10) give the long-term regression coefficients of the cross section units.

Table 8. CCEP Test Results

Dependent Variable: GDP

Independent Variables	*SE(NW)*	*T(NW)*
FDI_{inf}	0.071209	-1.62012
I_{cv}	0.715445	0.67401

I reported pooled CCE coefficients because the data is homogeneous. The significance of standard deviation (SE) and Newey west (NW) type t-statistic (for N x T = 14 x 20, bias: -0.11, RMSE: 9.55, size: 6.90, power: 10.95 with rank deficiency) can be seen from table 4, experiment 2b in Pesaran (2006) page 997. According to the results presented on table 8, it's seen that in contrast to the theory, in the long term there is a negative relationship between economic growth and foreign direct investments. When the FDI increases % 1, economic growth rate decreases % 0.0162. But the composite index has positive (0.67) effect on GDP as expected.

Table 9. CCE Estimates for All Cross Section Units

Cross Sections	FDI_{inf}	SE.	I_{cv}	SE.	T	From	To
Albania	0.458	0.646	2.303	2.547	20	1995	2014
Bulgaria	-0.065	0.166	-0.049	2.010	20	1995	2014
Bosnia H.	-0.531	1.285	-4.728	11.479	20	1995	2014
Croatia	-0.151	0.092	1.611	1.691	20	1995	2014
Czech R.	-0.023	0.149	0.053	0.622	20	1995	2014
Estonia	-0.208	0.081	1.521	2.061	20	1995	2014
Hungary	-0.478	0.254	3.630	1.316	20	1995	2014
Latvia	0.902	0.373	1.165	3.117	20	1995	2014
Lithuania	-0.858	0.346	4.924	2.430	20	1995	2014
Poland	0.269	0.130	-1.070	0.768	20	1995	2014
Romania	0.298	0.202	5.126	1.761	20	1995	2014
Macedonia	-0.392	0.178	-0.458	0.615	20	1995	2014
Slovak R.	-0.087	0.070	-0.398	1.623	20	1995	2014
Slovenia	0.348	0.227	3.397	1.967	20	1995	2014

SE represents Newey west type standard deviation and T represents length of time period from 1995 to 2014. The results show that in Albania, Latvia, Romania and Slovenia foreign direct investments and composite index have positive contributions to economic growth in contrast to Bulgaria, Bosnia and Herzegovina, Macedonia, Slovak Republic. Some countries have special and opposite situation. For example; in Croatia, Czech Republic, Hungary, Estonia and Lithuania FDI has negative coefficients but composite index has positive coefficients. Poland is the only exception for composite index has negative but FDI has positive contribution to the economic growth.

5. Conclusion

In general transition economies includes the countries of Central and Eastern Europe and the Former Soviet Union. This term can be wider with World Bank's 2002 definition which adds Bosnia and Herzegovina, the Federal Republic of Yugoslavia (later Serbia and Montenegro) as transition economies and in 2009, Kosovo is listed as a transition economy. Essentially, all countries which attempt to change their basic constitutional structures and elements from closed central structured economy to free market economy can be named as transition economies. It is a special branch of economics and has become popular after the collapse of Communism in Central and Eastern Europe.

This paper examined the causality between foreign direct investment net inflows and economic growth per capita for 14 European transition economies during the period 1995-2014 with panel causality analysis and long term coefficients are estimated with CCE Model. The time period before 1995s couldn't add to the time series due to lack of data. A composite index has been developed with principal component analysis to see the effect of determinants of FDI on FDI and on GDP per capita as well. The empirical results demonstrate the presence of one-way causality from financial development and composite index to economic growth. Unfortunately, there is no causality between foreign direct investments and composite index. In contrast to the theory, in the long term foreign direct investment contributes negatively to economic growth when the FDI increases % 1, economic growth rate decreases % 0.0162. But the composite index; determinants of FDI contribute positively as expected (0.67) on GDP.

The long term coefficient estimations show for each country that; in Albania, Latvia, Romania and Slovenia foreign direct investments and composite index have positive contributions to economic growth in contrast to Bulgaria, Bosnia and Herzegovina, Macedonia, Slovak Republic. Transition ways have varied quite a lot in practice. Some economies have been trying to adapt market reforms for several decades, while the rest is proportionally recent adopters (such as; Republic of Macedonia, Serbia and Montenegro). So in conclusion it can be normal to see that result in those late comer transition economies.

In some countries special and opposite situation has observed. For example; in Croatia, Czech Republic, Hungary, Estonia and Lithuania FDI has negative coefficients but composite index has positive coefficients. Also Poland is the only exception for composite index has negative but FDI has positive contribution to the economic growth because the transition has started in 1991 with their attempt. According the EBRD's measure the transition indicators of the transition economies had stack in transition. Price liberalization, privatization (especially with foreign banking and small scale) and liberalization of trade and foreign exchange markets almost completed at the end of the 1990s. However structural transition slowed down such as; economic reforms, governance, foreign competition policy and remained under the developed European countries.

The recent transition studies suggest that the gap in income per person between 1994 and 2004 could been driven by sustainable growth in productivity and foreign capital stock which came with FDI. Also weak political institutions and interest groups had hindered economic reform during the transition. This suggests that FDI cannot be used as a policy implication alone to support economic growth in selected countries. Because the composite index cannot attract (no causality) FDI as pointed out in the present literature. FDI does not answer all the problems of transition economies came from their weak politic and economic structures, but still guides as a good tool.

REFERENCES

Abdouli, Mohamed and Hammami, Sami, 2015. "The Impact of FDI Inflows and Environmental Quality on Economic Growth: An Empirical Study for The MENA Countries." *Journal of Knowledge Economy*, 2:1-25.

Alagöz, Mehmet; Erdoğan, Savaş; Topallı, Nuran, 2008. "Doğrudan Yabancı Sermaye Yatırımları ve Ekonomik Büyüme: Türkiye Deneyimi 1992-2007". *Gaziantep Üniversitesi Sosyal Bilimler Dergisi*, 7(1): 79-89.

Altıntaş, Halil, 2009. "Türkiyede Doğrudan Yabancı Sermaye Girişi ve Dış Ticaret Arasındaki İlişkinin Ekonometrik Analizi: 1996-2007". *Ankara Siyasal Bilgiler Fakültesi*, 64(2): 1-30.

Ağayev, Seymur, 2010. "Doğrudan Yabancı Sermaye Yatırımları ve Ekonomik Büyüme İlişkisi: Geçiş Ekonomileri Örneğinde Panel Eştümleşme ve Panel Nedensellik Analizleri." *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 12(1):159-184.

Angelopolou, Anastasia and Liargovas, Panagiotis, 2014. "Foreign Direct Investment and Growth: EU, EMU and Transition Economies." *Journal of Economic Integration*, 29(3):470-495.

Asteriou Dimitrio; Xeni, Dassiou; Dionysius Glycopantis, 2005. "FDI and Growth: Evidence from A Panel of European Transition Countries", *Spoudai*, 55(1): 9-30.

Becker, Torbjörn; Daianu, D.; Darvas, Zsolt.; Gligorov, Vladimir.; Landesmann, Micheal; Petrovic, Pavle; Pisani-Ferry, Jean; Rosati, Dariusz; Sapir, A.; Di Mauro, Beatrice, Weder, 2010. *Whither Growth in Central and Eastern Europe? Policy Lessons for An Integrated Europe*. Bruegel: Brussels, Belgium, Volume XI.

Bevan, Alan, A. and Estrin, Saul, 2004. "The Determinants of Foreign Direct Investment Into European Transition Economies." *Journal of Comparative Economics*, 32:775-787.

Bhandari, Rabindra; Dhakal, Darhmendra; Pradhan, Gyan; Upadhyaya, Kamal, 2007. "Foreign Aid, FDI, and Economic Growth in East European Countries." *Economics Bulletin*, 6(13):1-9.

Boudier-Bensebaa, Fabienne, 2008. "FDI-assisted Development in the Light of the Investment Development Path Paradigm: Evidence from Central and Eastern European Countries." *Trans. Corp*. 17:37–67, http://unctad.org/en/Docs/iteiit20081a3_en.pdf 15.05.2016.

Breuss, Fritz and Egger, Peter, 1999. "How Reliable Are Estimations of East–West Trade Potentials Based on Cross Section Gravity Analysis?" *Empirica*, 26 (2):81-94.

Campos, Nauro F. and Kinoshita, Yuko, 2002. "Foreign Direct Investment as Technology Transferred: Some Panel Data Evidence from the Transition Economies." *William Davidson Working Paper*, 70(3):659-763.

Çetin, Rahmi and Altıntaş, Halil, 2006. "The Review of Empirical Studies on Foreign Direct Investment and Trade". *Erciyes Üniversitesi IIBF Dergisi*, 27: 71-99.

Değer, Kemal, M.; Emsen, Selçuk, Ö, 2006. "Geçiş Ekonomilerinde Doğrudan Yabancı Sermaye Yatırımları ve Ekonomik Büyüme İlişkileri: Panel Veri Analizleri (1990-2002)". *C.Ü. İktisadi ve İdari Bilimler Fakültesi Dergisi*, 7(2): 121-136.

Dimitri, Dimitri G.; Horvath, Balasz; Ribakova, Elina, Wu, Yi, 2007. "Foreign Direct Investment in European Transition Economies - The Role of policies." *Journal of Comparative Economics*, 35:369-386.

Dumetriscu, Elena-Ivona and Christophe, Hurlin, 2012. "Testing for Granger Non-causality in Heterogeneous Panels." *Economic Modelling*. 29(4):1450-1460.

Estrin, Saul and Uvalic, Milica, 2014. "FDI into Transition Economies: Are the Balkans Different?" *Econ Transit*, 22:281–312, http://www.lse.ac.uk/europeanInstitute/LEQS%20Discussion%20Paper%20Series/LEQSPaper64.pdf, 16.05.2016.

Feenstra, Robert C.; Markusen, James R.; Rose, Andrew K. 2001. "Using the Gravity Equation to Differentiate Among Alternative Theories of Trade." *Canadian Journal of Economics*, 34(2):430–447.

Iwasaki, Ichiro and Tokunaga, Masahiro, 2013. "Macroeconomic Impacts of FDI in Transition Economies: A Meta Study." *7th MAYER-Net Colloquim, University of Greenwich*, http://www.gre.ac.uk/__data/assets/pdf_file/0007/822706/Ichiro-Iwasaki-and-Masahiro-Tokunaga Macroeconomic-Impacts-of-FDI-in-Transition-Economies-A-Meta-Study.pdf, 16.05.2016..

Jimborean, Ramona and Kelber, Anna, 2014. "Foreign Direct Investment Drivers and Growth in Central and Eastern Europe in the Aftermath of the 2007 Global Financial Crisis." *Working Paper 488; Banque de France: Paris, France*, 1-31.

Jollife, Ian T. 2002. *Principal Component Analysis*. Second ed. Springer Series in Statistics. New York: Springer-Verlag New York.

Kalamy, Ahmed, 2002. "Evaluation of FDI Flows into The MENA Region." Presented paper in the Ninth Annual Conference on Regional Trade, Finance and Labor, organized by the Economic Research Forum, https://www.researchgate.net/publication/264839474_Evaluation_of_FDI_flows_into_the_MENA_Region, 27.05.2016.

Kosová, Renáta, 2010. "Do Foreign Firms Crowd Out Domestic Firms? Evidence from The Czech Republic." *Review of Economics and Statistics*, 92(44):861-881.

Lyroudi Katerina; Papanastasiou, John; Vamvakidis, Athanasios, 2004. "Foreign Direct Investment and Economic Growth in Transition Economies, South Eastern Europe" *Journal of Economics*, 2(1):97-110.

Mišun, Jan and Vladimír, Tomšík, 2002. "Does Foreign Direct Investment Crowd In or Crowd Out Domestic Investment*?" Eastern European Economics*, 40(2):38-56.

Navaretti, Giorgio Barba and Venables, Anthony J., 2004. *Multinational Firms in the World Economy*. Princeton Univ. Press, Princeton and Oxford. With Frank G. Barry, Karolina Ekholm, Anna M. Falzoni, Jan I. Haaland, Karen Helene Midelfart, and Alessandro Turrini.

Pesaran, Hasem, M. 2004. "General Diagnostic Tests for Cross Section Dependence in Panels." *Working Paper No:0435*, University of Cambridge.

Pesaran, Hashem, M. 2006. "Estimation and Inference in Large Heterogeneous Panels with A Multifactor Error Structure." *Econometrica*, 74(4):967-1012.

Pesaran, Hashem, M. 2007. "A Simple Panel Unit Root Test in the Presence of Cross Section Dependence." *Journal of Applied Econometrics*, 22(2): 265-312.

Pesaran, Hashem, M. 2013. "Large Panel Data Models with Cross-sectional Dependence: A Survey." A Course on Panel Data Models, *University of Cambridge*, 1-67.

Pesaran, Hasem, M., and Takashi, Yamagata (2008). Testing slope homogeneity in large panels. Journal of Econometrics. 142:50–93.

Popescu, Gheorge, H. 2014. "FDI and Economic Growth in Central and Eastern Europe." *Sustainability*, 6:8149-8163.

Ray, Sarpabriya, 2012. "Impact of Foreign Investment on Economic Growth in India: A Co-integration Analysis." *Advances in Information Technology and Management*, 2(1):187-201.

Teker, Suat; Tuzla, Hayri; Pala, Aynur, (2014). "Foreign Direct Investments: Asian and European Transition Economies." *International Journal of Economics and Financial Issues*, 4(1):71-82.

Tintin, Cem, 2013. "The Determinants of Foreign Direct Investment Inflows in the Central and Eastern European Countries: The Importance of Institutions." *Communist and Post-Communist Studies*, 46(2):287–298.

Westerlund, Joakim, 2008. "Panel Co-integration Tests of The Fisher Effect." *Journal of Applied Econometrics*, 23:193-233