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Abstract

This study examines the impacts of foreign remittances, foreign direct investment (FDI) and some other external sources along with exports and investment variables on economic growth in 12 countries from Europe and Central Asia (ECA). We have employed panel unit-root tests, cointegration tests, Panel Ordinary Least Squares, Fully Modified OLS and Dynamic OLS methods as analytical techniques for empirical investigation. We utilized annual panel data over the period of 1993-2013. The study finds that foreign remittances and FDI inflows have positive effects on economic growth in ECA. Moreover, the empirical results reveals that exports and investment also accelerate economic growth. The main points emerging from this study are that both foreign remittances and FDI inflows are vital sources of economic growth in ECA. Furthermore, the findings are expected to guide management authorities with regards to the impacts of foreign remittances and incoming FDI on ECA economic growth and development.

Keywords: Foreign remittances, FDI, foreign aid, external debt, exports, growth, ECA
JEL classification: F21, F24, F35, F4, O40

1. Introduction

Foreign capital inflows (FCIs) have many potential benefits for capital scarce low income developing economies. Evidently, the importance of FCIs as a source of funds to finance investment in developing economies is well documented. While, regarding the various forms of FCIs, Papanek (1973) classified it into private foreign investment, foreign aid and other foreign inflows. However, this study deals with the four forms of international capital inflows or external sources includes foreign remittances, FDI, Official Development Assistance (ODA) or foreign aid, and external debt. The followers of FCIs are of the view, that it is significant for economic growth and development in developing countries. Besides, from filling these gaps, it also offers access to modern technology, managerial skills and global markets (Chenery and Strout, 1966). Prasad et al. (2007) argued that FCI do not attenuate growth in poor countries, but they do not help either. Poor countries are characteristically constrained not by resources, but by the investment opportunities that they can lucratively exploit using arm's-length finance. Therefore, FCIs is not directly malign; it basically cannot be used well, particularly in investment intensive, low-initial-cash flow and long-gestation projects. Rajan (2006) disclosed that foreign capital is no panacea for capital-poor countries, though specific forms of foreign capital such as FDI may be worthwhile. Kyophilavong and Toyoda (2009) explicated that FCIs are a strong source of investment finance for developing countries like Laos.

Similarly, Arndt et al. (2010) argud that foreign aid remains a key tool for enhancing the development prospects of poor countries. Though, Rajan and Subramanian (2008) concluded that at the macro-level "it is difficult to discern and identify any systematic effect of foreign aid on growth". Afterward this seeming non-existence of effect was used extensively in the public debate to arouse aid criticism. The fact that the linkages does not seem to be statistically significant may have several causes, including problems with the length of time, the dataset covers or care with the use of econometric analysis is done. A negative cross-country correlation between the ratio of capital inflows to GDP and growth has also confirmed by Prasad et al. (2007). However, regarding the effect of external debt on overall economic growth, Pattillo et al. (2004) have shown that in severely indebted countries, investors hold back, given the uncertainties about what portion of the debt will actually be serviced with the countries' own resources. Both arguments suggest that nonlinear effects of debt on growth are likely to occur through lower investments and thus capital accumulation. Exports can enlarge intra-industry trade, benefit the country to take part in the world economy and trim down the effect of external shocks on domestic economy. Even several economists emphasizes on the fundamental role of exports as an engine of economic growth (Abou-Stait, 2005). Similarly, gross fixed capital formation plays an important role in the process of economic growth and development (Dritsakis et al. 2006).

Usually, FDI is considered an important vehicle of technology transfer from developed to developing countries. It is believed that FDI is relatively less prone to crisis because foreign investors, usually, have a longer-term perception when undertake investment in a host country. Moreover, it is extensively believed that FDI offers a stronger impetus to economic growth in host countries than other types of FCIs. Nunnenkamp, (2002) noted that in relative terms, FDI performs a more vital role in developing countries than in developed countries. United Nations, (2014) reported that largely FDI can play paramount role in development, particularly when it contributes to encouraging employment, new sectors, linkages, technology transmission and skills accumulation. However, Fu et al. (2011) unveiled that the impact of FDI on the host economy remains mixed.

Generally, there are two aspects of migration which are gains and losses; possibly, gains are relatively more than losses. Usually, losses are studied costly and therefore, brain drain is normally considered detrimental to national economic development to the country of origin. Apart from brain drain, Markova (2010) also expounded that the social effects of migration amongst others comprises of change in family composition, family separations and the relinquishment of old people, child outcomes in terms of labour, health and education. Though, some previous studies have shown that remittances might not be beneficial because they were used for consumption purposes not for investment; they also increase dependency problem and inflation (Looney, 1990). However, it has also been observed that most immigrants are semi and unskilled workers while intellectuals are few in numbers. The international labour market is dominated by unskilled and semi-skilled workers (Wickramasekera, 2002). On other hand, Gupta et al. (2007) noted that larger amount of remittances are welcomed by migrant workers to send it to their home countries as it represent streams of income which can be used for consumption and investment. Remittances play a positive role in enhancing the social and economic conditions of the recipient families and consequently, it contributes much to GDP (Barai, 2012). World Bank, (2013) reported that remittances progressively contributing to foreign exchange earnings, economic growth and poverty alleviation throughout ECA.

The purpose of this paper is to investigate whether the role of external sources helpful, benign, or malign in the process of economic growth of 12 countries from ECA- Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Tajikistan, Turkey and Ukraine, using annual panel data between 1993 and 2013. Regarding the role of foreign remittances, which is a form of external sources and a focal concerned of the study, some studies support the positive relationship between remittances and economic growth (Leon-Ledesma and Piracha, 2004; Gupta et al. 2007; Nsiah and Fayissa, 2013; Elseoud, 2014), while, the other did not yet reach to the conclusion based on their theoretical and empirical consideration or affirms negative relationship (Rahman and Shabnam, 2007; Markova, 2010). It is pertinent to mention that in a study Barajas et al. (2009) argued that *"the lack of empirical or anecdotal evidence linking remittances to economic growth should lead policymakers to reconsider their optimistic views of remittances and move toward a more realistic understanding of their effects"*. Therefore, the broad aim of this study is to explore empirically the impact of foreign remittances on economic growth alongside with the some other forms of external sources or FCIs. All of the sampled countries are low, lower middle and upper middle income countries, however, it is hereby assumed that all included countries possess the same economic, social and political characteristics. The present paper would constructively contribute to literature on the role of external sources in the context of ECA.

This paper is organized into sections, they include: Section-1 succinctly states the introduction of the study and a brief overview of foreign resource inflows to ECA. Section-2 discusses review of relevant literature. Section-3 presents empirical methodology. Section-4 interprets estimation and empirical results. Finally, Section-5 concludes the study.

2. Existing Literature

In economic development literature, the significance of FCIs on economic growth is highly imperative. Apparently, a vast body of literature available on the impact of FCIs and economic growth but it is not clear and yet is a debatable issue. Some relevant existing studies are given below.

2.1 Foreign remittances and economic growth

Prior empirical studies indicate mixed result on the relationship between remittances and growth. Some earlier studies, for example, Leon-Ledesma and Piracha (2004) found that return of migrants has had a positive and significant impact on the source country productivity level in 11 Central and East European countries during 1990-1999. Moreover, the findings also revealed that remittances notably contribute in increasing investment level in the source country. Mansoor and Quillin, (2006) observed that remittances have a positive though mild impact on long-term growth. Benmamoun and Lehnert, (2013) showed that international remittances, FDI, and ODA are positively and significantly linked with economic growth of low income countries during 1990-2006, whereas, remittances proved to be a larger contributor of economic growth. The positive significant effect of remittances on economic growth for 64 countries consisting of 29 from Africa, 14 from Asia, and 21 from Latin America and the Caribbean region during 1985-2007 also confirmed by Nsiah and Fayissa (2013). Azam, (2015) documents the positive correlation between workers remittances and economic growth in developing Asian countries.

On the other hand, Rahman and Shabnam (2007) found an inverse relationship between remittances and real GDP in the perspective of Thailand, Sri Lanka, India and Indonesia during 1987-2004. Barajas et al. (2009) have shown that the reason why remittances have not encouraged economic growth is that they are normally not intended to serve as investments but rather as social insurance to support family members finance the purchase of life's requirements. The findings indicated that remittances contributed minimal to economic growth in remittance-receiving economies and may have even hindered growth anyhow.

2.2 FDI and economic growth

Theoretically, there are many of ways in which FDI can affect economic growth. Several erstwhile empirical studies have shown that FDI has a positive effect on economic growth because FDI through transfer of technology improves the host firms' performance, which contributes to the host countries' growth of GDP. Campos and Kinoshita, (2002) assessed empirically the effects of FDI on economic growth in the 25 Central and Eastern European and former Soviet Union transition countries. Their findings portrayed that FDI has a positive and significant impact on economic growth as theory predicts. Campbell, (2012) showed that FDI has a positive impact on economic growth in Barbados.

On the other hand, Mencinger (2003) found a negative relationship between incoming FDI and economic growth. Carkovic and Levine, (2005) found that FDI do not exert an independent effect on economic growth, while sound economic policies may enhance both economic growth and FDI. The study further revealed that the results are varying with the view that FDI exercises a positive impact on economic growth that is independent of other growth determinants. In the similar vein, Alfaro et al. (2005) found that FDI alone plays a vague role in contributing to economic growth. However, countries with well-developed financial markets gain drastically from FDI inflows. Similarly, Forte (2013) suggested that the effects of FDI on economic growth depend on the domestic conditions of the host country include: human capital, economic and technological conditions and degree of openness of its economy.

2.3 Foreign aid and economic growth

The foreign aid-growth literature has been investigated using an eclectic range of econometric both traditional and sophisticated methodologies. The evidence of the effectiveness of foreign aid to foster economic growth is varied, indicating that the relation between foreign

aid and economic growth is complex. Moreover, numerous prior econometric studies failed to detect a significant and robust linkage between international aid and economic growth in the recipient countries. Burnside and Dollar, (2000) found that foreign aid has a positive impact on economic growth in developing countries but with good fiscal, monetary and trade policies, however, in the presence of poor policies aid has no positive impact on economic growth. Alvi et al. (2008) have been favoured Burnside and Dollar results where foreign aid has positive impact on economic growth but conditional on healthy economic policies, good governance, and strong institutions. Chowdhury and Das (2011) found a positive and significant relationship foreign aid and real GDP per capita growth in Bangladesh, Nepal, Pakistan and Sri Lanka. Qayyum et al. (2014) found that foreign aid boosts the economic growth but external debt generates a burden on the economy.

Though, many other studies have been provided evidences of negative and some prior studies shown mixed impact of foreign aid on economic growth, for example, Brautigam and Knack (2004) presented results showing that foreign aid has a negative impact on economic growth. However, some other studies for example, Bhandari et al. (2007) found that foreign aid did not seem to have any significant effect on real GDP of Czech Republic, Estonia, Hungary, Latvia, Lithuania and Poland.

2.4 External debt and economic growth

Some studies in the past expounded effect of external debt, it is a burden for next generations, which comes in the form of a reduced flow of income from a lower stock of private capital. Even many prior studies quantitatively tested the impact of external debt on economic growth and found mixed results. For example, Geiger (1990) assessed empirically the impact of external debt on economic growth for 9 South American countries and found a statistically significant inverse relationship between debt burden and economic growth. Pattillo et al. (2002) used a panel dataset of 93 developing countries and found the impact of external debt on per-capita GDP growth is negative for net present value of debt levels above 35-40 percent of GDP. Sichula, (2012) found the significant inverse relationship between external debt and GDP. The empirical findings of Ramzan and Ahmad, (2014) revealed that external debt has a negative impact on economic growth, but this negative effect can be decreased or even reversed in the presence of sound macroeconomic policies in Pakistan.

2.5 Investment and economic growth

Several erstwhile studies found that investment in the form of gross fixed capital formation (measure for investment) and economic growth has a close positive relationship. For example, Dritsakis et al. (2006) found that exports and gross fixed capital formation have significantly positive impacts on economic growth for Greece. Hussin and Saidin, (2012) examined the impact of FDI inflows, trade openness and gross fixed capital formation on economic growth for four countries from ASEAN. Their empirical results reported that gross fixed capital formation has significantly positive impact on economic growth in each ASEAN-4 countries namely Indonesia, Malaysia, Thailand and the Philippines.

2.6 Exports and economic growth

The association between exports and economic growth has been of long-lasting interest both in theoretical and empirical literature. For example, Emery (1968) indicated that higher level of economic growth tend to be related with higher level of export growth and vice versa. Balassa,

(1978) found the significantly positive impact of exports growth on economic growth. Ram, (1985) examined the relationship between exports and economic growth 1960-1970 and 1970-1977 separately for 73 developing countries. The empirical results reveal that exports performance does appear significant for growth performance. Furthermore, the significance of exports seems to have improved during the 1970s. Whereas, the impact of export growth on economic growth does seem little in the low-income group, while large in the middle-income developing countries during 1960-1970. Using panel data estimation to 23 of the 27 EU members during 1995-2010, Santos Silva et al. (2014) reported that economic growth promotes through exports specialization in high value-added products. The empirical findings of Gokmenoglu et al. (2015) revealed that international trade stimulates economic growth in Pakistan over the period of 1967-2013.

3. Empirical Methodology

3.1 The data sources and model construction

The present study aims to investigate empirically the relationship between foreign capital inflows and economic growth in 12 countries from ECA between 1993 and 2013. Researchers have examined the linkage between foreign capital inflows and economic growth in 36 countries from African countries during 1980-2004 (Fayissa and Nsiah, 2010); Pakistan during 1971-2011 (Shahbaz, 2012); 64 countries consisting of 29 from Africa, 14 from Asia, and 21 from Latin America and the Caribbean region during 1985-2007 (Nsiah and Fayissa, 2013); five countries South Asian States and China during 1976-2011(Bashir et al. 2014); and Pacific Island countries (Feeny et al. 2014). Therefore, following these prior studies, for empirical investigation a modified regression model based on growth theory uses in this study and can be symbolically written as follows.

$$Y_{it} = \alpha_1 + \alpha_2 RM_{it} + \alpha_3 FDI_{it} + \alpha_4 ED_{it} + \alpha_5 AID_{it} + \alpha_5 EXP_{it} + \alpha_5 INV_{it} + \mu_i \qquad (1)$$

We have used real GDP per capita (USD) as an indicator of economic growth (Y_{it}). RM_{it} is foreign remmitances per capita (USD), FDI_{it} is foirgn direct invetsmnet per capita (USD), ED_{it} is extern debt per capita (USD), AID_{it} indicates foreign aid per capita (USD), EXP_{it} represents exports per capita (USD) and INV_{it} is for investment per capita (USD). All the sries are transformed into log-form. The log-linear specification provides efficient and reliable empirical evidence compared to simple specification. Secondary annual data over the period of 1993-2013 are used. The data on all included variables namely gross domestic product (GDP) per capita, foreign remittances, FDI, external debt, ODA or foreign aid, exports and gross fixed capital formation (measure of investment) are in constant USD (2005) and mostly the data have gleaned from the World Development Indicators, the World Bank database (http://data.worldbank.org). We have used population series to transform the variables into per capita terms. Equation-1 postulates that the expected signs of foreign aid and external debt would be negative, the expected sign of incoming FDI, exports and gross fixed capital formation (investment) would be positive, while in case of foreign remittances it would be determined in this study.

4. Estimation Procedure

4.1 Panel unit root and cross-sectional dependence tests

Initially, we apply Im, Pesaran and Shin (2003) panel unit root test to test panel unit root properties of the variables. In order to solve the issue of cross-dependnece, we chose Pesaran (2007) CIPS test which is the modified IPS test based on the average of individual Augmented Dickey-Fuller (CADF) test.

4.2 Panel cointegration tests

Advance panel cointegration tests can be expected to have high power than the traditional tests. The tests applied for long-run examination are developed by Pedroni, (2004) and Maddala and Wu, (1999). The procedures proposed by Pedroni make use of estimated residual from the hypothesized long-run regression of the following form:

$$x_{i,t} = \alpha_i + \rho_i t + \beta_{1i} Z_{1i,t} + ... + \beta_{mi} Z_{mi,t} + \mu_{it} \qquad (2)$$

Where x and Z are assumed to be integrated of order one. The specific intercept term α_i and slope coefficients $\beta_{1i}, \beta_{2i}, ..., \beta_{mi}$ vary across individual member of the panel. Pedroni, (2004) proposes the heterogeneous panel and heterogeneous group mean panel test statistics to test for panel cointegration. He defines two sets of statistics. The first set of four statistics is based on pooling the residuals along the within dimension of the panel. The statistics are as follows:

1. Panel v-Statistic: $Z_v \equiv T^2 N^{3/2} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\kappa}_{11,i}^{-2} \hat{\mu}_{it-1}^2 \right)^{-1}$
2. Panel ρ -statistic: $Z_p \equiv T\sqrt{N} \left(\sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\kappa}_{11,i}^{-2} \hat{\mu}_{it-1}^2 \right)^{-1} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\kappa}_{11,i}^{-2} \left(\hat{\mu}_{it-1} \Delta \hat{\mu}_{it} - \hat{\lambda}_i \right)$
3. Panel t-statistic (non-parametric): $Z_t \equiv \left(\tilde{\sigma}^2 \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\kappa}_{11,i}^{-2} \hat{\mu}_{it-1}^2 \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\kappa}_{11,i}^{-2} \left(\hat{\mu}_{it-1} \Delta \hat{\mu}_{it} - \hat{\lambda}_i \right)$
4. Panel t-statistic (parametric): $Z^*_t \equiv \left(\tilde{s}^{*2}_{N,T} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\kappa}_{11,i}^{-2} \hat{\mu}_{it-1}^2 \right)^{-1/2} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{\kappa}_{11,i}^{-2} \hat{\mu}^*_{it-1} \Delta \hat{\mu}^*_{it}$

The second set of statistics is based on pooling the residuals along the between dimension of the panel. It allows for a heterogeneous autocorrelation parameter across members. The statistics are as follows:

5. Group ρ-statistic: $\tilde{Z}_p \equiv TN^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \hat{\mu}_{it-1}^2 \right)^{-1} \sum_{t=1}^{T} \left(\hat{\mu}_{it-1} \Delta \hat{\mu}_{it} - \hat{\lambda}_i \right)$
6. Group t-statistic (non-parametric): $\tilde{Z}_t \equiv N^{-1/2} \sum_{i=1}^{N} \left(\hat{\sigma}_i^2 \sum_{t=1}^{T} \hat{\mu}_{it-1}^2 \right)^{-1/2} \sum_{t=1}^{T} \left(\hat{\mu}_{it-1} \Delta \hat{\mu}_{it} - \hat{\lambda}_i \right)$
7. Group t-statistic (parametric): $\tilde{Z}^*_t \equiv N^{-1/2} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} \tilde{s}^{*2} \hat{\mu}^{2*}_{it-1} \right)^{-1/2} \sum_{t=1}^{N} \hat{\mu}^*_{it-1} \Delta \hat{\mu}^{*}_{it}$

These statistics compute the group mean of the individual conventional time series statistics. The asymptotic distribution of each of those five statistics can be expressed in the following form:

$$\frac{X_{N,T} \quad \mu\sqrt{N}}{\sqrt{v}} \Rightarrow N(0,1) \tag{3}$$

Where $X_{N,T}$ is the corresponding from of the test statistics while μ and v are the mean and variance of each test respectively. Under the alternative hypothesis, Panel *v* statistics diverges to positive infinity. Therefore, it is a one sided test were large positive values reject the null of no cointegration. Maddala and Wu, (1999) proposed a Fisher cointegration test based on the multivariate framework of Johansen, (1988). Johansen, (1988) proposed two different approaches, one of them is the likelihood ratio trace statistics and the other one is the maximum eigenvalue statistics, to determine the presence of cointegrating vectors in the non-stationary time-series. The trace statistics and maximum eigenvalue statistics are following:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1-\hat{\lambda}_i) \tag{4}$$

$$\lambda_{\max}(r, r+1) = -T \ln(1-\hat{\lambda}_{r+1}) \tag{5}$$

Here T = sample size, n = 5 variables real GDP per capita, foreign remmitances, foreign direct invesmnet, externl debt, foreign aid, exports and investment. Trace test statistics tests the null hypothesis of at most r cointegrating vector against the alternative hypothesis of full rank r = n cointegrating vector. The null and alternative hypothesis of maximum eigenvalue statistics is to check *r* cointegrating vectors against the alternative hypothesis of *r + 1* of cointegrating vectors. If π_i is the P-value from an individual cointegration test for cross-section *i*, under the null hypothesis, the test statistics for whole panel is given as following:

$$-2\sum_{i=1}^{n} \log(\pi)\chi^2_{2n} \tag{6}$$

The advantage of this test is that it can be applicable for both balanced and unbalanced panels.

4.3 Estimation of panel cointegration regression

If all the variables are cointegrated, the next step is to estimate the associated long-run cointegration parameters. For this purpose, Kao and Chiang (2000) argue that their parametric panel Dynamic OLS (DOLS) estimator (that pools the data along the within-dimension of the panel) is promising in small samples and performs well in general in cointegrated panels. However, the panel DOLS due to Kao and Chiang, (2000) does not consider the importance of cross-sectional heterogeneity in the alternative hypothesis. To allow for cross-sectional heterogeneity in the alternative hypothesis, endogeneity and serial correlation problems to obtain consistent and asymptotically unbiased estimates of the cointegrating vectors, Pedroni (2001)

proposed the group mean Fully Modified OLS (FMOLS) estimator for cointegrated panels. The panel FMOLS estimators for the coefficient β is defined as:

$$\hat{\beta} = N^{-1}\sum_{i=1}^{N}\left(\sum_{t=1}^{T}(y_{it}-\bar{y})^2\right)^{-1}\left(\sum_{t=1}^{T}(y_{it}-\bar{y})\right)z_{it}^{*} - T\hat{\eta}_i \qquad (7)$$

Where $z_{it}^{*} = (z_{it}-\bar{z}) - \frac{\hat{L}_{21i}}{\hat{L}_{22i}}\Delta y_{it}$, $\hat{\eta}_i \equiv \hat{\Gamma}_{21i} + \hat{\Omega}_{21i}^{0} - \frac{\hat{L}_{21i}}{\hat{L}_{22i}}(\hat{\Gamma}_{22i} + \hat{\Omega}_{22i}^{0})$ and $\hat{L}_i$ is a lower triangular decomposition of $\hat{\Omega}_i$. The associated t-statistics gives:

$$t_{\hat{\beta}^{*}} = N^{-1/2}\sum_{i=1}^{N} t_{\hat{\beta}^{*},i} \text{ Where } t_{\hat{\beta}^{*},i} = \left(\hat{\beta}_i^{*} - \beta_0\right)\left[\hat{\Omega}_{11i}^{-1}\sum_{t=1}^{T}(y_{it}-\bar{y})^2\right]^{1/2} \qquad (8)$$

4.4 Panel causality test

To test causality, we employ the panel causality test developed by Dumitrescu and Hurlin, (2012). This test is a simplified version of Granger, (1969) non-causality test for heterogeneous panel data models with fixed coefficients. Also it take into account the two dimensions of heterogeneity: the heterogeneity of regression model used to test the Granger causality and the heterogeneity of the causality relationships. We consider the following linear model:

$$z_{it} = \alpha_i + \sum_{m=1}^{M}\gamma_i^{(m)} z_{i,t-m} + \sum_{m=1}^{M}\beta_i^{(m)} y_{i,t-k} + \varepsilon_{it} \qquad (9)$$

Where *i*=1,2,…….,N and *t* =1,2,…….,T. In above equation, y and z are two stationary variables observed for N individuals in T periods. $\beta_i = (\beta_i^{(1)}, ..., \beta_i^{(m)})'$ and the intercept term α_i are assumed to be fixed in the time dimension. We assume that lag order of M are identical for all cross-section units of the panel. We also allow the autoregressive parameter $\gamma_i^{(m)}$ and the regression coefficients $\beta_i^{(m)}$ to be vary across cross-sections. Under the null hypothesis, we assume that there is no causality relationship for any of the cross-section of the panel. This assumption is called the Homogenous Non-Causality (HNC) hypothesis, which is defined as: $H_0 : \beta_i = 0 \qquad \forall_i = 1, 2, ..., N$. The alternative hypothesis is called as Heterogeneous Non-Causality (HENC) hypothesis. Two sub-group of cross-section units are specified under this hypothesis. There is causality relationship from *y* to *z* for the first one, but it is not necessarily based on the same regression model. For the second sub-group, there is no causality relationship from *y* to *z*. The alternative hypothesis is as follows:

$$H_a : \beta_i = 0 \qquad \forall_i = 1, 2, ..., N_1$$
$$\beta_i \neq 0 \qquad \forall_i = N_1 + 1, ..., N$$

We assume that β_i may vary across cross sections and there are $N_1 <$ N individuals processes with no causality from y to z. N_1 is unknown but it provides the condition $0 \le N_1 / N < 1$. We propose the average statistics $W_{N,T}^{HNC}$, which is related with the Homogenous Non-Causality (HNC) hypothesis, as follows:

$$W_{N,T}^{HNC} = \frac{1}{N}\sum_{i=1}^{N} W_{i,T} \tag{10}$$

Where $W_{i,T}$ indicates the individual Wald statistics for i[th] cross-section unit corresponding to the individual test $H_0 : \beta_i = 0$. Let $X_i = [e : z_i : y_i]$ be the (T, 2K+1) matrix, where e indicates a (T, 1) unit vector and $Y_i = [y_i^{(1)} : y_i^{(2)} : \ldots\ldots : y_i^{(k)}], Z_i = [z_i^{(1)} : z_i^{(2)} : \ldots\ldots : z_i^{(k)}]$. $\theta_i = (\alpha_i \ \gamma_i' \ \beta_i')$ is a vector of the parameter of the model. Also let $R = [0 : I_m]$ be a (M, 2M+1) matrix. For each i=1,2,…..,N, the Wald statistics $W_{i,T}$ corresponding to the individual test $H_0 : \beta_i = 0$ is defined as:

$$W_{i,T} = \hat{\theta}_i' R' \left[\hat{\sigma}_i^2 R (Z_i' Z_i)^{-1} R' \right]^{-1} R \hat{\theta}_i \tag{11}$$

Under the null hypothesis of non-causality, each individual Wald statistic converges to chi-squared distribution with M degree of freedom for $T \to \infty$.

$$W_{i,T} \to \chi^2(M), \quad \forall_i = 1, 2, \ldots\ldots, N \tag{12}$$

The standardized test statistics $Z_{N,T}^{HNC}$ for $T, N \to \infty$ is as follows:

$$Z_{N,T}^{HNC} = \sqrt{\frac{N}{2M}} (W_{N,T}^{HNC} - M) \to N(0,1) \tag{13}$$

5. Results and their discussion

The results in Table-1 reveal that foreign remittances show a positive correlation with economic growth and highest and positive correlation is also found between foreign direct invesmnet and economic growth. External debt is positively associated with economic growth. Exports and investment are also positively linked with economic growth. It is evident from Table-1 that the correlation between foreign aid and economic growth is positive. The results also portrays that foreign direct invesmnet, external debt and foreign aid are positively correlated with foreign remittances. Moreover, foreign direct invesmnet is positively link with external debt and foreign aid. A positive correlation exists between foreign aid and external debt. Exports are positlevy but investment is negatively correlated with economic growth. The correlation between exports and investment is positive. Exports are positively correlated with foreign remmitnces, foreign direct investment and external debt. The correlation of investment with economic growth, foreign remmitances, foreign direct investment, external debt and foreign aid is positive.

Table-1. Descriptive statistics and correlations

Variables	Y_{ti}	RM_{ti}	FDI_{ti}	ED_{ti}	AID_{ti}	EXP_{ti}	INV_{ti}
Mean	7.3134	19.5292	19.7464	22.2863	19.0861	3.5556	3.0507
Median	7.4664	19.9384	19.7237	21.8148	19.2940	3.6001	3.0906
Maximum	9.0733	22.9919	23.8164	26.6849	21.8829	4.5927	4.0554
Minimum	5.3259	12.8992	13.5924	17.3861	15.5629	2.3486	0.9732
Std. Dev.	0.8909	2.1428	1.9272	1.7836	1.1359	0.4537	0.3849
Observations	248	248	248	248	248	248	248
Y_{ti}	1.0000						
RM_{ti}	0.4709	1.0000					
FDI_{ti}	0.7208	0.4928	1.0000				
ED_{ti}	0.7381	0.5008	0.7869	1.0000			
AID_{ti}	0.1815	0.5807	0.3486	0.2908	1.0000		
EXP_{ti}	0.1279	0.2560	0.0721	0.0623	-0.2961	1.0000	
INV_{ti}	0.3863	0.1302	0.3256	0.1837	0.0225	0.0846	1.0000

Table-2 displays the results of Pesaran CD test which is applied on each variable. The null of cross-sectional independence is rejected for each variable. Prior to formal econometric modelling, it is necessary to have an understating of the integrating properties of the data. For this purpose, IPS panel unit root test is applied for each series. The results of IPS test reported in Table-3 indicates that each series is non-stationary in its level form and stationary in its first difference form with intercept and with both intercept and trend. However, as indicated in Table-1, all variables exhibit cross-sectional dependence properties confirmed by Pesaran, Friedman and Frees tests. As a result, Pesaran CIPS test for unit root is calculated (Table-3). This unit root test allows for cross-sectional dependence. The results indicate that all series are non-stationary at their level form with intercept and with both intercept and trend in each panel. However, at first difference level, all series are integrated. It implies that all variables are integrated at I(1) in each panel.

Table-2. Cross-sectional dependence test's analysis

Pesaran test	**Variables**	Y_{ti}	RM_{ti}	FDI_{ti}	ED_{ti}	AID_{ti}	EXP_{ti}	INV_{ti}
	CD-test	8.832	11.453	3.965	4.354	7.600	5.500	6.500
	P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Friedman Test	CD-test	76.107	13.686	40.550	17.757	22.250	20.757	15.700
	P-value	0.000	0.0571	0.000	0.013	0.002	0.003	0.023
Frees Test	CD-test	1.989	2.705	0.276	1.131	0.833	0.900	1.100
	P-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table-3. Panel unit root analysis

Variables	At level				At 1st Difference			
	Drift & No Trend	P-value	Drift & Trend	P-value	Drift & No Trend	P-value	Drift & Trend	P-value
IPS Unit Root Test								
Y_{ti}	3.2365	0.9992	1.0302	0.8486	-3.3274	0.0004	-4.4254	0.0000
RM_{ti}	1.8813	0.9790	0.9972	0.8407	-7.8496	0.0000	-6.3442	0.0000
FDI_{ti}	-1.0626	0.1440	-1.1262	0.1700	-9.5415	0.0000	-7.4840	0.0000
ED_{ti}	-1.6659	0.1274	-1.6969	0.1243	-5.7551	0.0004	-3.3385	0.0004
AID_{ti}	0.2611	0.6030	-1.0530	0.1462	-6.2711	0.0000	-4.7842	0.0000
EXP_{ti}	0.2012	0.6531	-1.6009	0.1313	-9.0011	0.0000	-5.2101	0.0000
INV_{ti}	-1.2600	0.1310	-1.2030	0.1501	-8.7011	0.0000	-6.0001	0.0000
CIPS Unit Root Test								
Y_{ti}	-1.115	0.132	0.306	0.620	-2.964	0.002	-2.634	0.004
RM_{ti}	-0.360	0.359	1.506	0.934	-5.784	0.000	-4.569	0.000
FDI_{ti}	-2.084	0.019	-0.212	0.416	-3.857	0.000	-2.588	0.005
ED_{ti}	0.749	0.773	-1.020	0.154	-4.642	0.000	-3.392	0.000
AID_{ti}	-0.925	0.177	1.577	0.943	-4.852	0.000	-3.809	0.000
EXP_{ti}	-0.901	0.180	0.507	0.701	-6.502	0.000	-4.891	0.000
INV_{ti}	-1.101	0.141	-1.101	0.141	-5.800	0.000	-5.091	0.000

Table-4. Pedroni panel cointegration test results

Test	Panel υ-statistic	Panel σ-statistic	Panel ρρ-statistic	Panel adf-statistic	Group σ-statistic	Group ρρ-statistic	Group adf-statistic
Statistic	-0.7309	1.6300	-1.9000	-1.7720	2.5100	-3.8558	-2.8090
Prob.	0.7690	0.9496	0.0290	0.0382	0.9954	0.0015	0.0055
Note: An intercept and trend is included in the cointegrating equations.							

Table-5. Johansen Fisher panel cointegration test results

No. of CEs	Trace. Statistics	P-Value	Max Eigen Statistics	P-Value
None	306.40*	0.0000	131.50*	0.0000
At most 1	174.09*	0.0000	54.87*	0.0041
At most 2	120.03*	0.0000	39.63**	0.0240
At most 3	80.50*	0.0000	34.64**	0.0180
At most 4	45.29*	0.0086	24.43***	0.0801
At most 5	20.86	0.1451	13.929	0.2457
At most 6	6.931	0.9969	6.931	0.9969
Note: *, ** and *** significant at 1%, 5% and 10% levels of significance respectively.				

Table-6. Panel cointegration estimates

Dependent Variable = Y_{ti}						
	POLS		**FMOLS**		**DOLS**	
Variables	Coefficient	P-value	Coefficient	P-value	Coefficient	P-value
RM_{ti}	0.0431**	0.0368	0.0098**	0.0484	0.1551*	0.0000
FDI_{ti}	0.1344*	0.0000	0.0900*	0.0002	0.3231*	0.0000
ED_{ti}	0.2519*	0.0000	0.2338*	0.0000	0.2631*	0.0000
AID_{ti}	0.1090*	0.0000	0.0711*	0.0055	0.0060	0.1261
EXP_{ti}	0.3754*	0.0000	0.0909***	0.0658	0.1900***	0.0557
INV_{ti}	0.5289*	0.0000	0.2146*	0.0002	0.2042*	0.0002
Note: *, ** and *** significant at 1%, 5% and q0% levels of significance respectively.						

The unique order of integration of the variables helps us to apply panel cointegration approach to examine long run relationship between the variables in the panel. The results of Pedroni, (2004) panel cointegration tests are reported in Table-4. Pedroni uses four within dimension (panel) test statistics and three between dimension (group) statistics to check whether the selected panel data are cointegrated. Within dimension statistics contain the estimated values of test statistics based on estimators that pooled the autoregressive coefficient across different cross-sections for the unit root test on the estimated residuals. Between dimensions on the other hand, report the estimated values of test statistics based on estimators that average individually estimated coefficients for each cross-section. The results of within dimensions tests and between dimensions tests suggest that there is strong evidence to reject the null hypothesis of no cointegration in each panel. Therefore, economic growth, foreign remittances, foreign direct investment, external debt, foreign aid, exports and investment are cointegrated over the period of 1993-2013. The Johansen Fisher panel cointegration test results provide additional support for the presence of cointegration between variables by rejecting the null hypothesis of no cointegration in each panel at 5% level of significance (see Table-5).

The results of POLS, FMOLS and DOLS are reported in Table-6 show that by economic growth as dependent variable, all coefficients are statistically significant. Foreign remittances have positive impact on economic growth. A 1% increase in foreign remmitances lead economic growth by 0.0098-0.1551%. Similarly, foreign direct investment simulates economic growth and it is statistically significant at 1% significance level. A 0.0900-0.3231% increase in economic growth is led by 1% increase in foreign direct investment, keeping other things constant. External debt is positively linked with economic growth. All else remains same, 1% increase in external debt leads economic growth by 0.2338-0.2631%. Foreign aid adds in economic growth and it is statistically significant at 1% level. A 0.0060-0.1090% economic growth is supported by 1% increase in foreign aid. Exports are positively and significantly linked with economic growth at 1% level. Keeping other things constant, a 0.0909-0.3754% increase in economic growth is due to 1% increase in exports. The relationship between investment and economic growth is positive and significant at 1% level. A 1% increase in investment augments economic growth by 0.2042-0.5289%.

After finding the marginal foreign remittances, foreign direct investment, foreign aid, external debt, exports and investment on economic growth, we apply the Dumitrescu and Hurlin

(DH) causality tests to examine the direction of causality between the variables. The results of DH causality test for global panel are reported in Table-7. We find that foreign remittances cause economic growth and economic growth cause foreign direct investment. The feedback effect exists between external debt and economic growth. Economic growth leads exports validating growth-led exports hypothesis. The relationship between foreign aid and economic growth is bidirectional. Investment causes economic growth and economic growth causes investment in Granger sense. The feedback effect exists between foreign direct investment and foreign remittances and between foreign remittances and external debt but foreign aid causes foreign remittances. Foreign remittances cause exports and exports cause foreign remittances. The relationship between foreign remittances and investment is bidirectional. The feedback effect exists between foreign direct investment and external debt but foreign aid is cause of foreign direct investment. Foreign direct investment causes exports and exports cause foreign direct investment in Granger sense. Furthermore, the feedback hypothesis is valid for foreign aid and external debt, exports and external debt, exports and investment. The unidirectional causal relationship exists from foreign direct investment to investment, external debt (foreign aid) to exports and foreign aid to investment.

Table-7. The DH panel causality analysis for all countries

Pairwise Dumitrescu Hurlin Panel Causality Tests			
Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
RM_{ti} does not homogeneously cause Y_{ti}	3.59657	1.58501	0.1130
Y_{ti} does not homogeneously cause RM_{ti}	8.56417	7.81800	5.E-15
FDI_{ti} does not homogeneously cause Y_{ti}	1.16906	-1.45935	0.1445
Y_{ti} does not homogeneously cause FDI_{ti}	5.18177	3.53567	0.0004
ED_{ti} does not homogeneously cause Y_{ti}	3.75542	1.78434	0.0744
Y_{ti} does not homogeneously cause ED_{ti}	8.92355	8.26893	2.E-16
AID_{ti} does not homogeneously cause Y_{ti}	4.44181	2.63595	0.0084
Y_{ti} does not homogeneously cause AID_{ti}	4.21293	2.34947	0.0188
EXP_{ti} does not homogeneously cause Y_{ti}	2.99293	0.82761	0.4079
Y_{ti} does not homogeneously cause EXP_{ti}	6.35753	5.04928	4.E-07
INV_{ti} does not homogeneously cause Y_{ti}	5.99915	4.59960	4.E-06
Y_{ti} does not homogeneously cause INV_{ti}	6.33772	5.02441	5.E-07
FDI_{ti} does not homogeneously cause RM_{ti}	4.29384	2.43037	0.0151
RM_{ti} does not homogeneously cause FDI_{ti}	4.96218	3.26232	0.0011
ED_{ti} does not homogeneously cause RM_{ti}	6.01923	4.62480	4.E-06
RM_{ti} does not homogeneously cause ED_{ti}	5.46036	3.92357	9.E-05
AID_{ti} does not homogeneously cause RM_{ti}	5.53904	4.00932	6.E-05
RM_{ti} does not homogeneously cause AID_{ti}	2.58779	0.31534	0.7525
EXP_{ti} does not homogeneously cause RM_{ti}	4.77460	3.06313	0.0022

RM_{ti} does not homogeneously cause EXP_{ti}	4.42895	2.62943	0.0086
INV_{ti} does not homogeneously cause RM_{ti}	8.72568	8.02066	1.E-15
RM_{ti} does not homogeneously cause INV_{ti}	4.92886	3.25668	0.0011
ED_{ti} does not homogeneously cause FDI_{ti}	4.32744	2.47220	0.0134
FDI_{ti} does not homogeneously cause ED_{ti}	4.21617	2.33369	0.0196
AID_{ti} does not homogeneously cause FDI_{ti}	3.26823	1.14779	0.2511
FDI_{ti} does not homogeneously cause AID_{ti}	3.87634	1.90296	0.0570
EXP_{ti} does not homogeneously cause FDI_{ti}	5.27710	3.65433	0.0003
FDI_{ti} does not homogeneously cause EXP_{ti}	4.17905	2.28748	0.0222
INV_{ti} does not homogeneously cause FDI_{ti}	3.41192	1.33257	0.1827
FDI_{ti} does not homogeneously cause INV_{ti}	4.03006	2.10202	0.0356
AID_{ti} does not homogeneously cause ED_{ti}	4.01832	2.10589	0.0352
ED_{ti} does not homogeneously cause AID_{ti}	4.06321	2.16208	0.0306
EXP_{ti} does not homogeneously cause ED_{ti}	5.04759	3.40565	0.0007
ED_{ti} does not homogeneously cause EXP_{ti}	4.07755	2.18852	0.0286
INV_{ti} does not homogeneously cause ED_{ti}	1.81342	-0.65234	0.5142
ED_{ti} does not homogeneously cause INV_{ti}	7.46236	6.43554	1.E-10
EXP_{ti} does not homogeneously cause AID_{ti}	2.20264	-0.16674	0.8676
AID_{ti} does not homogeneously cause EXP_{ti}	3.85058	1.89593	0.0580
INV_{ti} does not homogeneously cause AID_{ti}	2.32432	-0.01444	0.9885
AID_{ti} does not homogeneously cause INV_{ti}	7.39225	6.32893	2.E-10
INV_{ti} does not homogeneously cause EXP_{ti}	7.85293	6.92559	4.E-12
EXP_{ti} does not homogeneously cause INV_{ti}	6.29259	4.96779	7.E-07

7. Concluding remarks and policy options

The present study investigated the effects of various forms of external sources include: foreign remittances, foreign direct investment, external debt, foreign aid, exports and investment on economic growth in Europe and Central Asia. The findings reveal that foreign remittances and incoming foreign direct investment have positive impacts on economic growth, implying that both foreign remittances and foreign direct investment inflows stimulate and add in long-run economic growth in ECA. The positive impact of foreign remittances on economic growth found is similar to those found in the previous studies such as Benmamoun and Lehnert (2013), Nsiah and Fayissa (2013) but contrary to Rahman and Shabnam, (2007). Further, our findings suggests that policy makers needs to devise investment friendly policy in order to enhance stable and long-term foreign direct investment into development-augmenting sectors, and physical infrastructure sectors comprising energy, communications and information technology is of rising importance for ECA to achieve sustainable development goals.

The government of each state in the region needs to play an important role to support migrants who intend to invest and run business. The migrants should be largely facilitated in term of market exchange rates and easy approach to formal banking institutions which are necessary to mitigate the amount of money spent on transfers of foreign remittances. Ensuring macroeconomic stability in the recipient country can helps to create environment conducive to investment, where, migrants will transfer maximally and will invest those foreign remittances, and consequently it would have a positive multiplier effect on entire macroeconomic performance. More importantly, to insure that foreign remittances adequately and effectively inflow in order to sustain economic growth, policy makers needs to improve technological innovation with a view of increasing formal remittances inflows maximally. Moreover, foreign remittances can be made to be more productive and its benefits maximized for both migrants and their country of origin.

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