The Impact of the Global Financial Crisis on the Economic Development in the Eurasian Region.

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Abstract

This study presents an empirical analysis of the impact of the global financial crisis on the economic development of the Eurasian region. The region covers fifteen states of the former Soviet Union: Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan. Emerging economies of estimated countries are highly attractive for foreign investors, who stimulate economic growth in the region. This paper particularly investigates the relationship between economic growth and international capital flows in the Eurasian region before and after the global financial crisis. Panel estimations using annual data for the period 1990-2014 are made applying the Generalized Method of Moments estimation technique for the dynamic panel data, developed by Hansen (1982). Empirical results reveal that the main determinant of the regions' economic development is FDI inflow. This study finds evidence that after the global financial crisis, economic growth in the region becomes more responsive to capital flows compared to the pre-crisis period.

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Key Words: Economic growth, capital flows, generalized method of moments (GMM), Eurasia, dynamic panel data.

1. Introduction

Economic growth in emerging countries has been attracting great interest from researchers. Numerous studies investigated various determinants of economic growth particularly in countries of the former Soviet Union (FSU) due to availability of mineral resources and therefore high potential for sustained growth, see for example Shiells et al. (2005), Apergis et al. (2008), Bildirici and Kayikci (2013), Dell'Anno and Villa (2013), Curwin and Mahutga (2014), Elkomy et al. (2016).

Question of how to promote economic growth in developing countries is widely discussed in the literature. It is argued that one of important determinants in economic growth of developing countries is capital mobility, see for example, Bailliu (2000), Kose et al (2009), Kyaw and Macdonald (2009), Obstfeld (2009), Varma (2009), Gourinchas and Jeanne (2013), Levy-Orlik (2013). Recent studies focus on comparative analysis of capital mobility impacts in developed and developing countries, for example Edwards (2001), Gheeraertr and Mansour (2005), Choong et al. (2010), Aizenman et al. (2013), Fan (2013).

In most studies the production function is used for measuring the impact of capital mobility on economic growth, where physical capital, human capital and labor inputs are endogenous variables, for example Gheeraert and Mansour (2005), Gourinchas and Jeanne (2013), Choong et al. (2010). However, various econometric procedures are employed. For example the Weighted Least Squares and Instrumental Variables technique is employed in Edwards (2001) for the estimation of capital liberalization impact on economic growth. The fixed effect least square dummy variable (LSDV) technique is employed by Gheeraert and Mansour (2005). Increased interest to the dynamic panel generalized method of moments (GMM) technique is observed in latest studies (Choong et al. (2010), Azman-Saini et al. (2010), Kyaw and Macdonald (2009)) for its numerous advantages. For example, the potential simultaneity and endogeneity of explanatory variables are considered by the GMM and in addition it allows the inclusion of lagged dependent variables as regressors.

Findings of numerous studies indicate on stronger impact of capital mobility on economic growth in the case if a country reached a certain level of development. Established infrastructure assist capital flows to be efficient in promoting economic growth. For example, a group of developed countries is compared with several groups of developing countries in Edwards (2001). Findings of the study illustrate the importance the state of development of the domestic financial market. Economic growth in countries with advanced domestic financial markets is highly influenced by capital mobility, while underdeveloped financial markets are becoming a barrier for a positive impact of open capital mobility on economic growth. Similar to Edwards (2001), Choong et al. (2010) found that development level of the stock market is a superior determinant in the measuring of private capital impact, where the level of development of a country does not play a dominant role. Varma (2009) did not find strong connection between capital account openness and economic growth of developing countries. Kyaw and Macdonald

(2009) found that upper middle-income countries have stronger positive effect of capital flows on economic growth compare to low-income countries. Gheeraert and Mansour (2005) illustrated that countries have uneven starting conditions of capital mobility, thus they found that the level of inward private capital flows is higher in developed countries compared to developing and transition countries.

This study investigates the relationship between economic growth, its determinants and international capital flows in the CIS countries and how these relationships vary before and after the global financial crisis. Estimations are made for the period 1990-2014 on an annual basis.

The novelty of this study is the analysis of the capital mobility impact on economic growth in CIS countries before and after the global financial crisis. To my knowledge there are no similar studies in the literature. The rest of the paper is organized as follows. In the next section, the production function is discussed and derivation of the open economy production function is illustrated. Following section presents the applied methodological approach. The obtained empirical results are reported in section 3, and the final section consists of the conclusion.

2. Production Function

The simple endogenous-growth AK model is employed to measure the financial development impact on economic growth in a closed economy. The model was developed by Pagano (1993) and is presented by the following equation:

$$Y_t = \mathrm{A}K_t, \tag{1}$$

where Y_t is the aggregate output and is presented as is a linear function of the aggregate capital stock, K_t, where A is the productivity of capital. The AK model is the simplified form of two alternative frameworks. One of the frameworks assumes that an economy is competitive with external economies, where firms retain technologies with constant returns to scale. Productivity function in this framework depends on the aggregate capital stock K_t that exhibits increasing returns to scale as in Romer (1989). Alternative approach assumes that K_t is reproducible with identical technologies and is a part of physical and human capital, as in Lucas (1988). Assuming that a single good is produced that can be consumed and that capital stock depreciates at a rate δ per period, at no population growth, the gross investment can be presented in the following form:

$$I_t = K_{t+1} - (1 - \delta)K_t, \tag{2}$$

According to a closed economy equilibrium definition, gross savings have to be equal to gross investments, however there is a portion of savings, $1 - \phi$ which is transferred to financial intermediaries as a payment for services provided; therefore, the capital market equilibrium can be expressed by the following equation:

$$\phi S_t = I_t, \tag{3}$$

Using equations (1), (2) and (3) and dropping the time indices, the steady-state growth rate is derived as follows

$$g = \mathrm{A}\left(\frac{I}{Y}\right) - \delta = \mathrm{A}\phi s - \delta, \tag{4}$$

where *s* presents the gross saving rate *S/Y*. Three different channels of the financial development impact on economic growth are incorporated in the model. The first channel includes an increase in ϕ, the proportion of savings that is transferred to investments, the second channel is presented by a raise in the productivity of capital, *A*, and last channel involves an increase in the private saving rate, *s*.

The AK model for closed economies has serious limitations for empirical studies. Therefore, it was extended by Bailliu (2000) for open economies by introducing international capital flows. New capital market equilibrium for open economies can be written as follows:

$$\phi^*(S_t + NCF_t) = I_t^* \tag{5}$$

where NCF_t presents net international capital flow. Positive net capital flow offers more investment opportunities for open economies compared to closed economies. However in the case of negative net capital flow, availability of domestic investments decrease in open economies. Using equations (1), (2) and (5) and dropping time indices, the steady-state growth rate in the presence of international capital flows becomes

$$g^* = A^*\frac{I^*}{Y} - \delta = A^*\phi^*\frac{(S+NCF)}{Y} - \delta = A^*\phi^* s^* - \delta. \tag{6}$$

International capital flows affect the economic growth through three alternative channels. The first channel is represented by an increase in an investment rate. Positive net international flows lead to economic growth in the case if they are used to finance investments and not consumption, and if they allow domestic savings to continue to be invested. Second channel involves increase in capital productivity, *A*, which is stimulated by investments financed by international capital flows. Finally, a third channel is an increase in efficiency of financial intermediates that leads to decrease in their charges and as a result an increase in rate of savings ϕ. Efficient financial intermediates are able to select more productive projects for investments, increasing capital productivity, *A,* Bailliu (2000).

3. Empirical Methodology

3.1 Unit root tests

The order of integration of variables in this study is tested by four alternative panel unit root tests: the Im, Pesaran, and Shin (IPS) test (Im et al., 2003), Fisher-type tests that employ ADF and PP tests (Maddala and Wu, 1999; and Choi, 2001), and Hadri tests (Hadri, 2000). These unit root tests have different advantages and are employed for the robustness of results. The advantage of the IPS test is that it is not restrictive to homogenous panels. The IPS test allows for heterogeneity in both constant and slope and is based on individual ADF tests. The advantage of the Fisher-type test is the estimation technique for panels that are not necessarily balanced. This test combines the P-values from ADF and PP unit root statistics. The null hypothesis of the Hadri test is the stationarity of the series. The Hadri test is the panel extension of the KPSS (Kwiatkowski-Phillips-Schmidt-Shin) test, Kwiatkowski et al. (1992), which allows for heterogeneous panels and individual and time effects.

3.2 GMM

This GMM (Generalized Method of Moments) estimation framework is employed in this study and it was designed for only stationary data. In the case if data stationary we proceed with the model estimations. The employed framework is used for a dynamic analysis of relationships between economic growth and capital flows in the EU countries taking into account global financial crisis. Numerous studies applied the GMM framework for the analysis of an impact of capital flows on countries economic growth (see for example Bailliu (2000), Choong et al. (2010), Shen et al. (2010), Vo (2010), Anwar and Sun (2011), Doytch and Uctum (2011), Zhang et al. (2012), Omri and Kahouli (2014)). The GMM was designed by Hansen (1982) and represents an instrumental variables estimation. The GMM includes various estimators such as ordinary least squares and instrumental variables as special cases. A superior advantage of the GMM framework is that such problems as heteroskedasticity and serial correlation are accounted in the GMM by using the orthogonality conditions with a weighting matrix. In order to apply the GMM framework, the theoretical equation (6) can be rewritten as follows:

$$Y_{it} = a_1 + \beta X_{it} + \gamma \mathrm{Z}_{\mathrm{it}} + \varepsilon_{\mathrm{it}}. \qquad (7)$$

The dynamic analysis of the GMM approach includes the lagged growth as an explanatory variable. Therefore the dynamic equation is expressed in the following form:

$$Y_{it} = a_1 + a_2 Y_{it-1} + \beta X_{it} + \gamma \mathrm{Z}_{\mathrm{it}} + \varepsilon_{\mathrm{it}}. \qquad (8)$$

where Y_{it} is the real output growth rate per capita, Y_{it-1} is the lagged term of the dependent variable, X_{it} and Z_{it} are row vectors of main economic growth determinants and international capital flow variables, respectively. In this study main macroeconomic determinants of economic growth are expressed by Initial income, Education, Private

credits, Government expenditures, Openness and Investment ratio variables and are among frequently employed determinants in similar studies (see for example Bailliu (2000), Prasad et al. (2006), Choong et al. (2010), Rogriguez-Pose and Tselios (2010), Shen et al. (2010), Mody and Murshid (2011), Rousseau and Wachtel (2011), Aizenman et al. (2013), Glewwe (2014)). International capital flows are represented by FDI (foreign direct investments). Equations (7) and (8) are first differenced to remove the country specific effects.

Equation (6) contained three channels through which economic growth can be influenced. In empirical equations (7) and (8) the first channel is represented by Investment ratio, a macroeconomic determinant of X_{it} and by FDI inflow, a capital variable of the Z_{it} vector. These variables capture an impact of investments on economic growth, which is expected to be positive. The second channel an increase in capital productivity is detained by X_{it} variables, Education, Government expenditures and Openness variables. It is commonly accepted that Education positively influence economic growth of emerging countries as well as advanced countries (see for example Barro (1991), Mankiew et al. (1992), Gemmel (1996)), especially in the longer run (Holland et al. (2013)). Countries, open for international trade, are expected to present more efficient performance in terms of output and productivity by having access to larger markets, Edwards (1993). Excessive government expenditures, in turn, may negatively influence an economy due to created distortions in economy, Barro and Sala-i-Martin (1995). Variables that increase efficiency of financial intermediates represent the third channel in this study. The third channel of an economic growth impact is captured in this model by the Private credits variable. Increase in private credits number leads to rise of banks transactions improving their efficiency. Advanced efficiency of financial intermediates lead to economic growth.

4. Empirical Results

4.1 Unit root tests

This study employs the GMM technique that requires estimation of stationary data; therefore, the integration order of the panel series is estimated in the first place. The IPS, ADF, PP, and Hadri alternative unit root tests were employed. The presence of an individual unit root process in the series was tested by the IPS, ADF, and PP tests, while the null hypothesis of the Hadri test was no unit root in the common unit root process. Table 1 presents the results of the Hadri test estimations. Only Initial income, Education and Private credit variables demonstrated the presence of unit root in levels, other variables were found stationary in levels and all variables were estimated as stationary in their first differences. Results of all tests are consistent except the results of the Hadri test, which rejected the stationarity of Government, Openness, Investments and FDI inflow variables in their levels, while the IPS, ADF, and PP tests rejected the hypothesis of the unit root presence in levels. The Hadri test tends to over-reject the null hypothesis

of stationarity in the presence of high autocorrelation when the size distortion persists. The results of these alternative unit root tests illustrate that all series are generated by a stationary process in their first differences and free from issues of time-series processes. The GMM approach estimates first differences of employed variables.

Table 1. Panel Unit Root Tests

Variable	**IPS**[a]		**ADF**[a]		**PP**[a]		**Hadri**[b]	
	Level	*Δ*	*Level*	*Δ*	*Level*	*Δ*	*Level*	*Δ*
Growth	-2.51**	-16.08**	46.71*	250.32**	54.14**	507.81**	4.93**	-1.14
Initial income	2.63	-10.58**	16.80	169.74**	18.89	56.52**	11.61**	4.47**
Education	1.34	-4.07**	16.86	68.47**	9.07	156.13**	11.82**	0.76
Private credit	1.71	-7.52**	25.49	115.66**	21.84	132.73**	11.18**	0.04
Government	-5.88**	-12.77**	96.03**	196.47**	97.95**	240.34**	5.79**	-0.41
Openness	-7.72**	-18.39**	122.98**	302.20**	84.81**	328.07**	5.29**	1.09
Investments	-2.45**	-8.41**	48.68*	127.58**	64.23*	252.32**	2.35**	-0.35
FDI inflow	-2.83**	-10.03**	50.59**	151.79**	62.52**	331.92**	2.43**	-0.98

Notes: In panel unit root tests, probabilities are computed assuming asymptotic normality. (a) tests the hypothesis of the presence of the individual unit root process, and (b) tests the hypothesis of no unit root in the common unit root process. * and ** denote the rejection of the null hypothesis at the 5 and 1 percent significance level, respectively.

4.2 GMM estimations

CIS countries were estimated in this study. In order to capture the impact of the global financial crisis of 2008 on the economic growth in these countries, three different periods were estimated; full period: 1990-2014, period before the financial crisis: 1990-2007 and the period after the global financial crisis: 2008-2014. Table 2 presents the results of the GMM estimations for equations (7) and (8). The results of the Sargan diagnostic tests indicate on good specification of all models by not rejecting the over-identification restrictions.

Table 2. GMM Estimations

	1990-2014		***1990-2007***		***2008-2014***	
	GMM (7)	**Dynamic GMM (8)**	**GMM (7)**	**Dynamic GMM (8)**	**GMM (7)**	**Dynamic GMM (8)**
Growth(-1)	-	0.010	-	0.061	-	0.006
		(0.104)		(0.539)		(0.082)
Initial GDP	0.001	0.001	0.009	0.003	0.002	0.001
	(0.002)	(0.001)	(0.006)	(0.003)	(0.002)	(0.001)
Education	0.678**	0.404**	0.462	-0.175*	-0.562	-0.859
	(0.254)	(0.155)	(0.411)	(0.086)	(0.543)	(0.844)
Private credits	-0.465*	-0.267*	-1.092**	0.039	-0.071	-0.121
	(0.177)	(0.129)	(0.364)	(0.245)	(0.221)	(0.199)
Government	-0.631	0.076	0.602	0.568	-1.263	-2.192
	(1.022)	(0.693)	(0.558)	(0.738)	(2.619)	(1.416)
Openness	0.026	0.164**	-0.061	0.181	0.124	0.016
	(0.120)	(0.063)	(0.082)	(0.138)	(4.154)	(0.107)
Investments	-0.532*	-0.295	-0.021	-0.165	-0.039	-0.147
	(0.263)	(0.512)	(0.183)	(0.518)	(0.265)	(0.395)
FDI	0.729**	0.379	-0.420**	-0.226	0.749*	1.225**
	(0.301)	(0.268)	(0.134)	(0.262)	(0.397)	(0.502)
NOI	9	8	3	7	10	6
ST	0.37	0.22	0.20	0.22	0.27	0.27

Notes: ** and * indicate significance level at 1 and 5 percent, respectively. Standard errors for the coefficient estimates are given in parentheses. Sargan *p* values are reported. α and β coefficients are from equation 1. NOI: Number of instruments, ST: Sargan test.

Estimations of GMM and dynamic GMM regressions for the full 1990-2014 period indicate that education is one of significant macroeconomic growth determinants of CIS countries, positively effecting the growth level. Both models indicated the negative effect of private credit rate on economic growth. According to the theory it is expected that increase in credits to private sector will improve the efficiency of the banking sector and indirectly positively affect economic growth of a country. However, a negative effect is possible when domestic credits are not concentrated in growth-oriented sectors; similar results take place in the literature for different countries, see for example Favara (2003), Beck and Levine (2004), Loayza and Ranciere (2006), Aric (2014), Barzergar (2014). Most of these studies support the hypothesis that negative impact of the banking improvements may take place in the short run following a positive impact in the long run. Another macroeconomic determinant estimated as significant with a positive expected sign is openness ratio. Exposure to larger markets increases domestic sectors competitiveness and as a result improve market efficiency leading to economic growth. Investments ratio was estimated with negative sign in both models through all years; however, it has a negative significant effect only in the full estimated period. Even if domestic investments are directed on growth-oriented sectors, the final impact on economic growth appears in the long run; therefore, the estimated negative significant effect of investments ratio demonstrates the short run impact. Impact of the FDI inflows

is estimated by the GMM regression with a significant and expected positive sign. Increase in domestic productive sectors directly improves economic productivity leading to economic growth.

Estimations for the 1990-2007, pre-crisis period indicate slightly different results, where education in the dynamic model is found significant with negative sign. The proxy for the education variable in this study is the enrollment ratio in tertiary education, which includes universities and other types of post-secondary education. Most of the estimated countries have a tendency of increase in enrollment in post-secondary education. Therefore, the reason of negative impact of education in the pre-crisis period may be in accumulation of human capital and its long-run effect. In the short-run however, potential young labor prefer to get education instead of working; therefore, the certain attained level in accumulated human capital, economic growth may be negatively affected. Ratio of domestic credits to private sector as share of GDP was estimated highly significant with negative sign indicating short run impact on economic growth. In the pre-crisis period FDI inflow was found significant but with unexpected negative sign. The pre-crisis period, which at the same time overlaps with the post-Soviet period is characterized by decline in production and by extensive reforms implementation. New reforms started to attract FDI inflows, however, adaptation of CIS countries to new economic systems was still associated with decline in production. The adjustment process took about 5-6 years till the CIS countries switched to increase in GDP. The post-crisis period 2008-2014 is characterized by the significance of only one variable, which is FDI inflow. Both models GMM and the dynamic GMM estimated FDI inflow as highly significant with expected positive sign. Coefficient of the FDI inflow in the dynamic GMM model is estimated at the level above unity illustrating the important role of FDI in the CIS economies.

5. Conclusion

This study analyses an effect of FDI capital inflows on economic growth in the CIS countries and an impact of the global financial crisis on variables relationships. The impact of the global financial crisis of 2008 on the growth of CIS economies is captured in this study by three different periods; full period: 1990-2014, period before the financial crisis: 1990-2007 and the period after the global financial crisis: 2008-2014. Two equations were estimated, (7) and (8), the GMM and the dynamic GMM models.

The pre-crisis period is characterized by negative impacts of education, credits to private sectors and FDI inflows on economic growth in the CIS countries. There are examples in the literature of negative impact of ratio of private credits to GDP on economic growth, which is explained by the short run effect, which shifts to the positive effect in the long run. Negative impact of FDI inflows in the pre-crisis period may be explained by the general adjustment process after the Soviet Union collapse, where positive impact of foreign investments may be seen only in the long run. Empirical results in the literature found similar results for developing countries, arguing that foreign

capital flows may have a positive impact if a country reached the advanced level of the domestic financial market, otherwise, the financial system may become an impediment for transforming positive effect to economic growth, see for example Edwards (2001), Choong et al. (2010), Kyaw and Macdonald (2009). Results of estimations for the post-crisis period support the above-discussed hypothesis, and illustrate strongly significant positive impact of FDI inflows on economic growth of countries. The main findings of this study are negative impacts of education and FDI inflows on economic growth in CIS countries in the pre-crisis period. However, the estimations of the post-crisis and full periods indicate that the most important factor that promotes growth in these countries is FDI inflow and not other macroeconomic determinants.

Results of various studies illustrate that well-established infrastructure and better financial developments are important factors in relationships between private capital flows and economic growth (Edwards (2001), Kyaw and Macdonald (2009), Choong et al. (2010)). Empirical results of this study illustrate that capital flows such as FDI have a stronger effect in the post-crisis period indicating that countries which reached the sustained growth, attained certain level of development and may be considered as countries of the better performance of domestic financial markets and market structures.

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