Foreign Direct Investment and Sustainable Development. A Regional Approach for Romania

Mihaela Simionescu[1]

Abstract

In this paper, the relationship between foreign direct investment (FDI) in Romania and economic and social development as part of sustainable development is analyzed. The research is based on a regional approach, some panel vector-autoregressive models being proposed for evaluating the influence of FDI on economic growth and on relative poverty rate in the Romanian regions during 2005-2014. Two types of analyses were proposed: one that includes all the 8 regions and one that excludes Bucuresti-Ilfov region from study, because it is an outlier with respect to FDI weight in total FDI and to economic growth. Indeed, if the Bucuresti-Ilfov region is included, FDI generated economic growth in Romania, but if this region is excluded, in the rest of the country, FDI had a negative impact on economic growth. In the seven regions of Romania, excepting Bucuresti-Ilfov one, FDI did not diminish the poverty rate.

Key-words: sustainable development, FDI, economic growth, poverty rate

JEL Classification: C51, C53, E22

1. Introduction

Foreign direct investment in the host country should ensure a sustainable development concerning all the pillars of this process. Most of the studies refer to the economic dimension of sustainable development by analyzing the relationship between economic growth and FDI, but in most cases the social dimension is neglected. A particular attention should be accorded to Romania, where the relative high economic growth in the last year did not solve the problem of poverty, mainly because the economic growth in Romania is based on consumption and the investment was not rational. The relationship between economic growth, FDI and poverty was also studied by Howard (2015). For African regions, Gohou and Soumaré (2009) showed that at aggregate level FDI had a positive effect on poverty reduction, but at regional level there are

[1] *Institute for Economic Forecasting of the Romanian Academy.*
Email:mihaela_mb1@yahoo.com

significant differences between regions. For some of them, FDI inflows did not bring the expected effect in terms of welfare.

The advantages of FDI are related to the implementation of new technology, improvement in human capital, employment creation, acceleration of international trade integration, and more tax revenues determined by FDI (Jenkins and Thomas, 2002).

These advantages generate higher economic growth and contribute to poverty reduction.

On the other hand, the effects of FDI on poverty are related to many factors that include policies and host countries' institutions, labor market performance, economic environment.

In Romania, there are some studies that analyzed the relationship between economic growth and FDI, more of them referring to national level. All these researches have a limitation given by the low set of data used in estimations. Therefore, the results should be cautiously accepted. Ulian et al. (2014) used a linear regression to show that FDI had a strong effect on economic growth in Romania during 2006-2012. Using a neo-classical model, Roman and Padureanu (2011) obtained the same positive impact of FDI on GDP growth. On quarterly data, Pelinescu and Rădulescu (2009) observed a low influence of FDI on economic growth during 2000-2009. A vector autoregressive model was proposed by Ludosean (2012) who show that FDI did not generate economic growth, but the increasing GDP attracted more foreign investors in Romania. A VAR model was also built by Carp and Popa (2013) for 1990-2011 who obtained the same conclusion. A regional approach was proposed by Nistor (2012), who observed a direct correlation among FDI stock and per capita GDP in Romania. At regional level, the study of disparities regarding economic growth and FDI is very important. In this context, a regional study of the FDI contribution to economic and social development in the Romanian regions by during the economic crisis was provided by Zaman, Goschin and Vasile (2013). The authors observed positive effects like implementation of high technologies, increases in salaries and productivity, improvement in human capital quality, a better management. Innovation and technological development might contribute to economic growth and a better life standard. An improvement in productivity in agriculture is required to generate security in alimentation.

In this study, the limitations of previous researches are surpassed by proposing a panel data approach to study the relationship between economic and social development and FDI in Romanian regions. In the context of sustainable development, the economists are interested to get economic growth thought FDI, but also to ensure a better life standard. A proxy for social dimension of sustainable development is relative poverty rate. In this case, FDI should contribute to the decrease of relative poverty rate in Romanian regions. However, we expect to exist high disparities between regions. In Bucuresti-Ilfov region, where most of the FDI are concentrated, we expect to find a higher economic growth than that in the other regions. On the other hand, this economic growth ensures a better life standard which diminishes the poverty. In North-East region, where FDI are less, the economic growth is, indeed, lower and the poverty is an acute problem.

2. Methodology

If a vector y_{it} with G variables is considered for a spatial unit i (i=1,…,N) at moment *t* (t=1,…,T) and $Y_t = (y_{1t}^{'}, \dots, y_{Nt}^{'})^{'}$. For one spatial unit *i*, the VAR model is built as:

$$y_{it} = A_{1i}Y_{t-1} + \cdots + A_{Pi}Y_{t-P} + e_{it} \quad (1)$$

A_{Pi}- matrices of Gx NG elements for each lag

p-lag (p=1,…,P)

e_{it}- uncorrelated errors in time with normal distribution (N(0,Σ_{ii}))

Σ_{ii}- covariance matrices (G x G elements)

$\Sigma_{ij} = cov(e_{it}, e_{jt}) = E(e_{it}, e_{jt})$ is the covariance matrix between VARs errors for spatial units i and j

This is the specification for unrestricted panel VAR model.

This type of model is general and the variables with lags from any spatial unit could influence any other spatial unit. The magnitude corresponding to these influences could be entirely unrestricted. Covariance matrices of errors model the contemporaneous relationships and they are also unrestricted.

The high dimensionality of parameter space can generate the problem of over-parametrization that affects the unrestricted panel VAR like that in equation (1). In the case of the panel VAR of Canova and Ciccarelli (2009), for a number of four variables for G7 countries, the unrestricted panel VAR model had 784 coefficients and 406 estimates for error covariances and variances.

In order to solve this problem of high dimension parameter space, specific methods are used in the context of panel VAR models on macroeconomic data. The literature in this domain is related to techniques for selecting the best models and to consider shrinkages. In this context, Banbura et al. (2010) used the Minnesota prior for high dimension VAR models making the restriction that for irrelevant parameters shrinkage tends to zero. For large models with thousands of parameters, other authors like Carrriero, Clark and Marcellino (2015), Gefang (2014), Koop (2013) and Korobilis (2013) used model selection techniques and the same shrinkage.

Applications like BMS and BMA are based on the restrictions that a coefficient might be zero or not. The panel data in the context of VAR models come with specific restrictions. A large traditional VAR model cannot be treated like a panel VAR model. The types of restrictions and their consequences in the context of panel VAR models are classified by Canova and Ciccarelli (2013).

For example, DI restriction considers the relationships across spatial units through the parameters of panel VAR model. In equation (1), each spatial unit endogenous variables depend on lags corresponding to exogenous variables of every spatial unit. Firstly, the existence of DIs should be checked and in case on non-existence a panel VAR with no interdependences should be considered. In order to define DIs between two spatial units j and k, the matrices of coefficients for panel VAR model is partitioned into a number of G x G matrices $A_{p,jk}$ that control if lags of unit k dependent variables come in the VAR for unit j.

$$A_p = \begin{bmatrix} A_{p1} \\ A_{p2} \\ \cdots \\ A_{pN} \end{bmatrix} = \begin{bmatrix} A_{p11} & A_{p12} & \cdots & A_{p1N} \\ A_{p21} & A_{p22} & \cdots & \cdots \\ \cdots & \cdots & \cdots & A_{p(N-1)N} \\ A_{pN1} & \cdots & A_{pN(N-1)} & A_{pNN} \end{bmatrix} \quad (2)$$

In case of an unrestricted VAR, a number of N(N-1) restrictions could be defined. This shows that DIs from unit k to I do not exist. The restriction is $A_{ijk} = \cdots A_{pjk} = 0$ for j=1,…,N and k=1,…,N, j$\neq k$.

Sis are based on error covariance matrix. Sis do not exist between units k and j, if $\Sigma_{jk} = 0$.

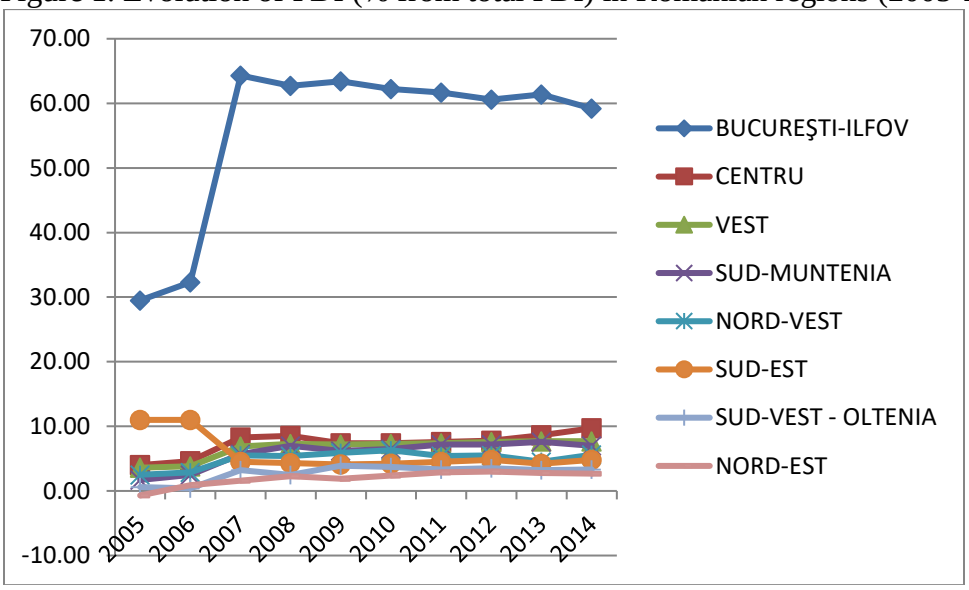
A number of N(N-1)/2 panel VARs models can be defined and $\Sigma_{jk} = 0$ for j=1,…,N and k=1,…,N, j≠ k. The restrictions in Sis are always symmetric. CSH are used when parameters of VAR model differ across units. A number of N(N-1)/2 panel VARs models can be defined with homogeneity between two different units.

3. Data and results

The data used in this research refers to real GDP rate, relative poverty rate and weight of FDI inflows with respect to total FDI in the 8 Romanian regions (Bucuresti-Ilfov, Centre, West, South-Muntenia, North-West, South-East, South-West Oltenia, North-East). The data covers the period from 2005 to 2014 for real GDP rate and FDI inflows and the period 2007-2014 for relative poverty rate. The data for real GDP rate are provided by National Commission for Prognosis. FDI inflows at regional level are taken from National Bank of Romania reports regarding FDI while Institute of National Statistics offered the data for relative poverty rate thought Tempo-online database.

Relative poverty rate represents the weight of poor people with respect to total population of a country. In the category of poor people we include those households with a lower disposable income than poorness threshold. In Romania this indicator is calculated by taking into account 60% of the disposable income median per equivalent adult.

Figure 1. Evolution of FDI (% from total FDI) in Romanian regions (2005-2014)



Source: own graph

As we can see from the previous graph, Bucuresti-Ilfov can be considered an outlier regarding the FDI weight with respect to national level. The disparities between the rest of the regions are not quite high. Therefore, another separate analysis could be made with the 7 regions after Bucuresti-Ilfov region was eliminated.

In a first stage, the analysis will include all the regions. In the second stage, the Bucuresti-Ilfov region will be dropped from analysis.

For conducting the panel data analysis, the presence of unit root is checked for each data series of the mentioned variables. According to Levin-Lin-Chu test, the data for all the variables are stationary at 5% level of significance. The p-value corresponding to LLC statistic is 0 in all the cases. In these conditions, the Granger causality test is applied to study the sense of the relationship between FDI and sustainable development indicators.

On these stationary data series, the Granger causality was checked between FDI and sustainable development indicators at 5% level of significance. In the case of panel VAR Granger causality Wald test, the null hypothesis states that excluded variable does not Granger cause the equation variable.

Table 1. Panel VAR Granger causality test between variables

Equation variable	Excluded variable	Chi-square statistic	Prob.>chi-square statistic
Real GDP rate	FDI	75.192	0.000
FDI	Real GDP rate	3.463	0.063
FDI	Relative poverty rate	0.008	0.927
Relative poverty rate	FDI	0.691	0.406

Source: author's computations

According to results in the Table 1, only FDI weight in total FDI for each region was a cause of economic growth during 2005-2014. It seems that a causal relationship between FDI and poverty did not exist.

Table 2. Panel VAR models for selected variables in all Romanian regions

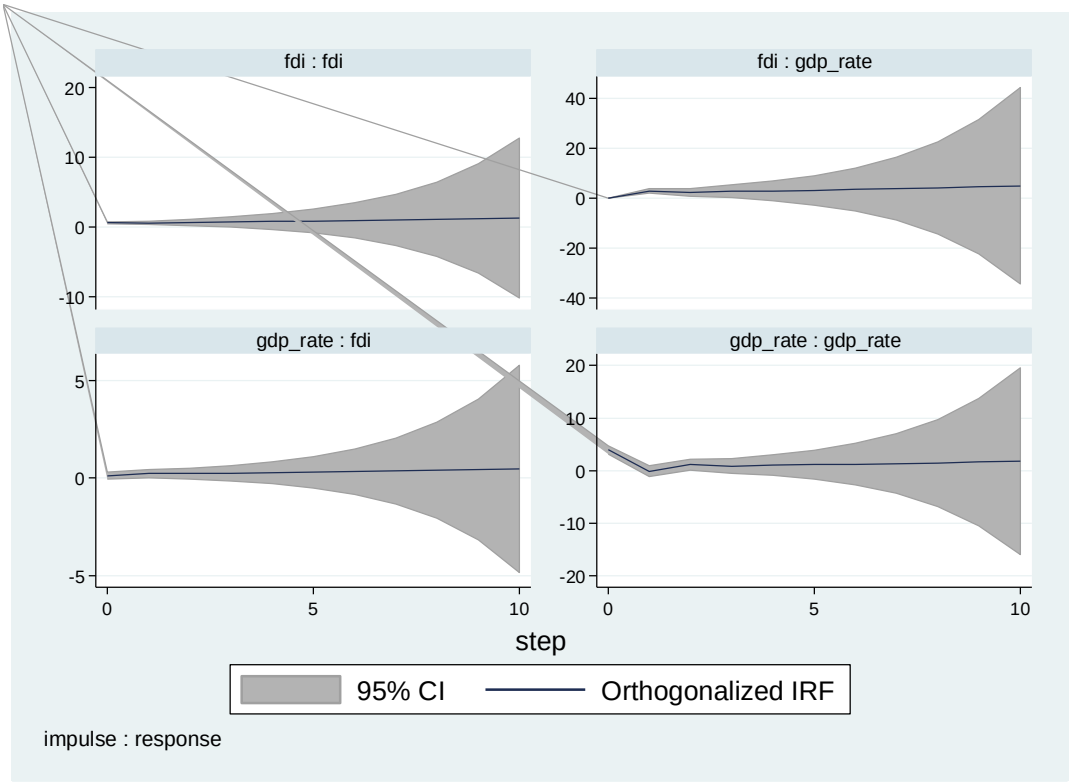
Dependent variable	Explanatory variables	Coefficient	Z	P>|z|
GDP_rate_{it}	GDP_rate_{it-1}	-0.18691	-3.18	**0.001**
	FDI_{it-1}	4.794504	8.67	**0.000**
FDI_{it}	GDP_rate_{it-1}	-0.90824	1.86	0.063
	FDI_{it-1}	0.614470	5.53	0.000
FDI_{it}	FDI_{it-1}	0.70004	2.30	0.022
	$poverty_{it-1}$	0.00436	0.09	0.927
$poverty_{it}$	FDI_{it-1}	-0.90824	-0.83	0.406
	$poverty_{it-1}$	0.614470	1.99	0.047

Source: author's computations

According to estimations results, real GDP rate in the current period depends on this variable in the previous period and the FDI in the previous period. The GDP rate had a tendency of decrease from a year to another at regional level, this negative correlation between GDP in two successive periods being caused by the economic crisis that started in 2009 in Romania. On the other hand, FDI weight in the previous period in a region had a positive and strong influence on current economic growth of that region. This result confirms the expectation that FDI is a factor that generates economic growth and consequently it ensures a sustainable development in

Romanian regions. This result might be attributed to the outlier Bucuresti-Ilfov that attracted many foreign direct investments and registered a high economic growth.

Figure 2. Impulse response functions (8 regions)



On the other hand, FDI in the previous period did not influence the current poverty rate. Even if FDI contributed to economic growth, it did not influence the standard of life. These results confirmed the recent European Commission observations: Romania achieved a high economic growth, but it is in the top of poorest countries in the European Union. This shows that economic growth is not well distributed in all regions. The poverty is more accentuated in rural zones. In the areas with the most agricultural exploitations we have the highest poverty. Even if these exploitations are based on high technologies, they do not use labour force and the unemployment is high in these zones. Moreover, the low minimum wage in Romania could explain the high poverty in Romania. In Romania, the competitiveness is based on low costs and low wages and not on quality.

In this context, the social protection system based on social transfers helped the disadvantaged population. Before social transfers the poverty rate at national level was about 48.6% in 2014, but after transfers it reduced to half. The poverty rate for population with 65 years and more diminished by 5 times after social transfers in 2014.

Some policy measures are recommended in this context in order to reduce the poverty and ensure social development. These might refer to labour market reforms, innovation

promotion, measures for attracting more FDI in poor regions by creating a favorable economic environment, corruption reduction, reforms in education.

A separate analysis will be conducted on the 7 regions, excepting Bucuresti-Ilfov.

Table 3. Panel VAR Granger causality test between variables in 7 regions of Romania

Equation variable	Excluded variable	Chi-square statistic	Prob.>chi-square statistic
Real GDP rate	FDI	6.338	0.012
FDI	Real GDP rate	0.752	0.386
FDI	Relative poverty rate	3.955	0.047
Relative poverty rate	FDI	9.860	0.002

Source: author's computations

According to results in the Table 3, only FDI weight in total FDI for each region was a cause of economic growth during 2005-2014. On the other hand, it seems that a bi-directional causal relationship between FDI and poverty existed at 5% level of significance. The poorest regions attracted the lowest FDI, while the regions that attracted more FDI are less poor. Indeed, the North-East region registered the lowest poverty rates in all the analyzed years. For this region we also have the lowest GDP rates and the lowest weights for FDI.

Table 4. Panel VAR models for selected variables in 7 Romanian regions

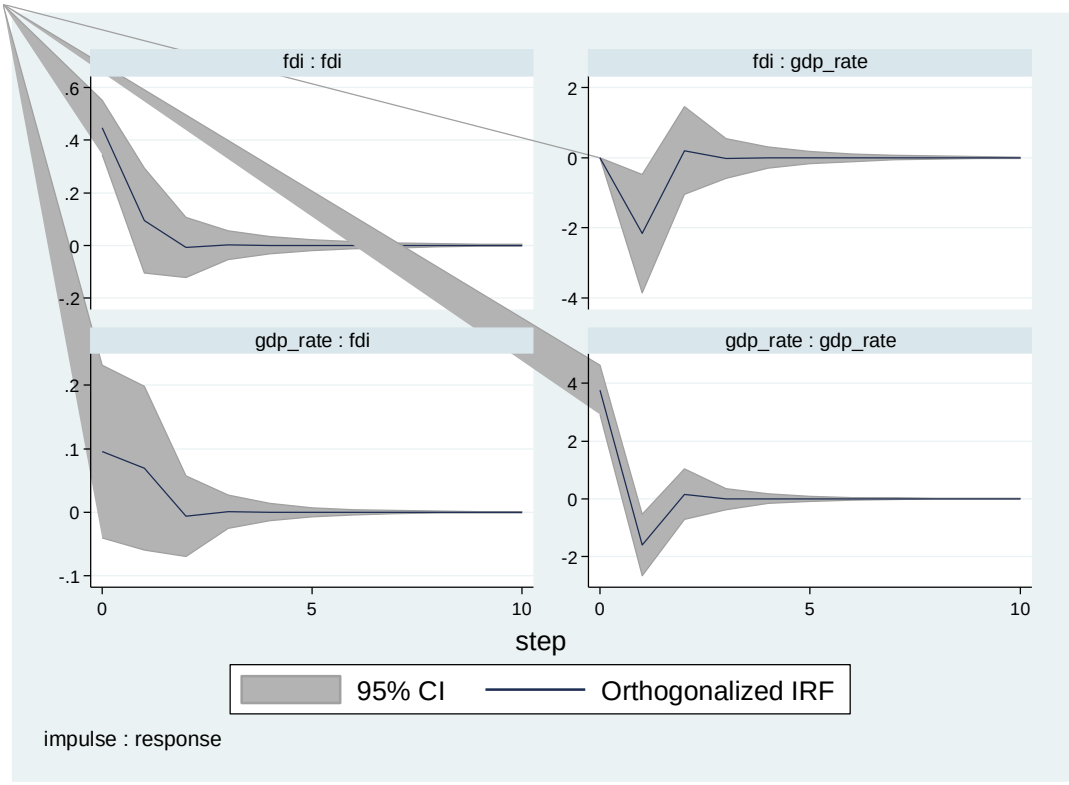
Dependent variable	Explanatory variables	Coefficient	Z	P>|z|
GDP_rate_{it}	GDP_rate_{it-1}	-0.30447	-2.42	**0.016**
	FDI_{it-1}	-4.8293	-2.52	**0.012**
FDI_{it}	GDP_rate_{it-1}	0.01311	0.87	0.386
	FDI_{it-1}	0.21072	0.89	0.372
FDI_{it}	FDI_{it-1}	0.51463	2.03	**0.042**
	$poverty_{it-1}$	0.07459	1.99	**0.047**
$poverty_{it}$	FDI_{it-1}	7.78432	3.14	0.002
	$poverty_{it-1}$	0.3277909	1.07	0.284

Source: author's computations

According to estimations results, real GDP rate in the current period depends on this variable in the previous period and the FDI in the previous period. The GDP rate had a tendency of decrease from a year to another at regional level, this negative correlation between GDP in two successive periods being caused by the economic crisis that started in 2009 in Romania. Contrary to expectations, FDI weight in the previous period in a region had a negative and strong influence on current economic growth of that region. This result showed that FDI in the 7 regions was not a source of economic growth. The situation is explainable, because the investments were inefficient. We only have to think to the privatizations failures in Romania, many economists criticizing the under-evaluated prices for selling the companies. In the last years, some failures after privatization can be mentioned (Rafo, Mechel, Oltchim, Cupru Min).

In this context, many job losses registered fact that increased the poverty problem. The panel data approach also indicated that the inefficient FDI in the last period had a strong impact on poverty rate that increased since 2007 till 2014.

Figure 3. Impulse response functions (7 regions)



Source: author's graph

So, the FDI in the previous year had a negative impact on sustainable development in the 7 regions of Romania, this results being also confirmed by the study of Goschin, Zaman and Vasile (2013).

4. Conclusions

All in all, this study emphasized the problem of high disparities between Bucuresti-Ilfov region and the rest of the country's regions regarding the economic and social development. If we introduce Bucuresti-Ilfov region in the panel VAR analysis, we can conclude that in Romania FDI generated economic growth. In fact, especially this developed region benefited by the advantages of FDI during 2005-2014 in terms of economic growth. On social plan, this economic growth did not translate too much in the poverty eradication. On the other hand, the analysis of the 7 regions in Romania reflected that FDI had a negative impact on sustainable development. These conclusions allow us to formulate several recommendations. The reforms on labour market and FDI attraction should concentrate mainly on the 7 regions, excepting Bucuresti-Ilfov.

The political instability, including regional political instability, is the factor that mostly discourages the foreign investors and in this case the Government should have the Parliament support. The fiscal predictability is another key factor. The new taking system regarding natural resources should take into account the sustainable development criteria but also the foreign investors attraction.

References

Bańbura, M., Giannone, D., & Reichlin, L. (2010). Large Bayesian vector auto regressions. *Journal of Applied Econometrics*, *25*(1), 71-92.

Canova, F., & Ciccarelli, M. (2009). Estimating multicountry var models. *International Economic Review*, *50*(3), 929-959.

Canova, F., & Ciccarelli, M. (2013). Panel Vector Autoregressive Models: A Survey The views expressed in this article are those of the authors and do not necessarily reflect those of the ECB or the Eurosystem. *VAR Models in Macroeconomics–New Developments and Applications: Essays in Honor of Christopher A. Sims (Advances in Econometrics, Volume 32) Emerald Group Publishing Limited*, *32*, 205-246.

Carp, L., Popa, D. (2013), The relationship between foreign direct investment, trade and economic growth in Bulgaria and Romania under the impact of the globalization. The 2nd International Conference ICTIC 2013, Conference of Informatics and Management Sciences.

Carriero, A., Clark, T. E., & Marcellino, M. (2015). Bayesian VARs: specification choices and forecast accuracy. *Journal of Applied Econometrics*, 30(1), 46-73.

Gefang, D. (2014). Bayesian doubly adaptive elastic-net Lasso for VAR shrinkage. *International Journal of Forecasting*, 30(1), 1-11.

Gohou, G., & Soumaré, I. (2009). Impact of FDI on Poverty Reduction in Africa: Are There Regional Differences. In African Economic Conference 2009: Fostering Development in an Era of Financial and Economic Crises.

Howard, R. (2015). FDI, growth and poverty.

Jenkins C., Thomas, L. (2002). "Foreign Direct Investment in South Africa: Determinants, Characteristics and Implications for Economic Growth and Poverty Alleviation," Center for the Study of African Economies. University of Oxford, 2002.

Koop, G. M. (2013). Forecasting with medium and large Bayesian VARs. *Journal of Applied Econometrics*, 28(2), 177-203.

Korobilis, D. (2013). VAR forecasting using Bayesian variable selection. *Journal of Applied Econometrics*, 28(2), 204-230.

Ludoşean (Stoiciu), B.M., (2012), A VAR analysis of the connection between FDI and economic growth in Romania. *Theoretical and Applied Economics*, Volume XIX, No. 10(575), pp. 115-130.

Nistor, P. (2012) FDI and regional disparities growth in Romania. *Procedia Economics and Finance*, No. 3, pp. 740-745.

Pelinescu, E., Radulescu, M. (2009), The impact of foreign direct investment on the economic growth and countries export potential. *Romanian Journal of Economic Forecasting*, No. 4, pp. 153-169.

Roman, M.D., Padureanu, A. (2011), Foreign Direct Investments Influence on Romanian Economy, 2011 International Conference on E-business, Management and Economics, IPEDR, Vol. 25.

Ulian, G., Turliuc, D.G., Popovici, A.N. (2014), Foreign direct investment - a key driver for growth and prosperity in Romania and the Republic of Moldova, International Conference "Monetary, Banking and Financial Issues in Central and Eastern EU Member Countries: How Can Central and Eastern EU Members Overcome the Current Economic Crisis?" Available at: <http://www.mbf-eu.info/Files/53ca7065-635b-4870-9d4d-d5254f3c72b0/paper_ULIAN.pdf> [Accessed on April 2016]

Zaman, G., Goschin, Z., Vasile, V. (2013). Evoluţia dezechilibrelor teritoriale din România în contextul crizei economice. *Revista Română de Economie*, 2(46), 20-39.