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Economic Growth and Globalization in Romania

Mihai Mutascu and Anne-Marie Fleischer

Faculty of Economics and Business Administration,
West University of Timisoara, 16, H. Pestalozzi St., 300115, Romania

Abstract: The existence and the direction of the relationship between economic growth and globalization are very debatable. In this context, the paper analyses the "behaviour" of the relationship between economic growth and globalization, in Romania, using an unrestricted vector autoregressive model (Unrestricted VAR), for 1972-2006 period. The results show that if countries tend to maximize the economic growth, they must globalize more. This connection is functional only on medium and long term, but with a flat intensity. Unfortunately, this process cannot be absolutized.

JEL: O40, F41, O52, C32

Key words: Growth · Globalization · VAR analysis · Impulses function · Effects

INTRODUCTION

The interaction between economic growth and globalization has generated over years a large area of debates in the field literature. Some of these acquisitions claim a unidirectional causality between variables or a neutral situation, while other results state a bi-directional causality. For this investigation we have selected Romania, because this country has two relevant different periods: one autarchic, with autocratic political regime (until 1989) and another non autarchic, with democratic political regime (since 1989).

In this context, our research analyses the existence of the relationship between economic growth and globalization, their amplitude and vectorial direction, for the case of Romania, using an unrestricted vector autoregressive model (Unrestricted VAR), for 1972-2006 period. Our approach is particularly compared with other researches, because it's focused on cross-sectional panel models.

The "growth" is a complex term. Gould [1] sees the economic growth as a concept which compact three elements: the sustainability, the real term approach and per capita income. Growth means a sustained increase in real per capita incomes. Schutz [2] defines the growth as the sustained rise in quantity and/or quality of the goods and services produced in an economy, while Arestis at al. [3] argue that growth illustrates sustained or steady increases in real output per capita and per worker. Finally, according Tiwari and Mutascu [4], even if the definitions are different from one author to another, more or less, the content is the same: sustained increase of real per capita income.

Globalization has a multitude and complex definitions too. O'Rourke [5] defines globalization as declining barriers to trade, migration, capital flows, foreign direct investment and technological transfers. More complex, for Stiglitz [6] the globalization has several distinct elements: (a) trade; (b) foreign direct investment; (c) short-term capital flows; (d) knowledge; and (e) movements of labour.

According to Hoang and Liao [7], the globalization generates positive and negative effects, such as:

Positive Effects:

- increased national income through comparative advantage;
- access to global capital;
- spread of technology;
- opportunities for individuals;
- spread of human rights.

Corresponding Author: Mihai Mutascu, Faculty of Economics and Business Administration,
West University of Timisoara, 16, H. Pestalozzi St., 300115, Romania,
Tel: +40 256 592505, Fax: +40 256 592500, Email: mihai.mutascu@gmail.com, mihai.mutascu@feaa.uvt.ro

Negative Effects:

- Weakens the position of those lacking skill or capital;
- Economic openness can not be managed by poor weak states;
- Leads to exploitation of works in poorer countries;
- Global capital markets are destabilizing;
- Loss of cultural integrity;
- National economic autonomy is undermined or destroyed by open capital markets and flexible exchange rates;
- Weaker countries must accept the rules of the game set by the rich.

These effects can be propagated in strong connection with the globalization, determining or not determining a bi-directional causality between economic growth and globalization. Based on this context, the Romania's case is treated using an unrestricted vector autoregressive model.

The rest of the paper is organized as follows: Section 2 illustrates the main results of the literature in the field regarding the relationship between economic growth and globalization; Section 3 presents the methodology of analysis, the variables' description and results. The last section concludes.

THE LITERATURE

The literature in the field offers contradictory results about the intensity and direction of the relationship between economic growth and globalization, for both directions of discussion.

"Growth First and Globalization Later": The results in this area are very poor. Lee at al. [8] find that most measures of openness, as dimension of globalization, would have a positive effect on growth, even when controlling the effect from growth to openness. Aka [9] has performed a three-variables vector autoregressive (VAR) model, finding that these three variables are tied together in the long-run. In this approach, the globalization does have a negative effect on economic growth, while a positive effect of openness on growth is observed in the short-run. In the same way, Buch and Monti [10] argue that the openness might affect different social groups and regions asymmetrically, even within a given country. The main results show a positive link between trade openness and the level of income per capita.

"Globalization First and Growth Later": For Stiglitz [6], the countries that have managed the globalization process well have shown that globalization can be a powerful force for economic growth. The author is sure that the globalization - under the auspices of the IMF - has not been so well managed. The main points in this investigation is the role of the globalization process management. Dreher [11] is very clear in the conclusion, stressing that the globalization is good for growth. His empirical study is based on a panel data for 123 countries, for the period 1970 - 2000. In other word, the countries that more globalise, experience higher growth rates. This finding is valid for actual economic integration and absence of restrictions on trade and capital (in developed countries).

Leong [12], analysing only two countries, India and China, illustrates that a policy of more openness in the economy has a multiplier effect on economic growth. The estimate has been conducted performing an OLS panel data model. Zhuang and Koo [13], based on production theory, studied the effects of globalization on economic growth, using a panel-data approach. The sample covers 56 countries and a period of 14 years, from 1991 to 2004. The main estimation results allow that economic globalization has a significant positive effect on economic growth for all countries.

China and India gain the most in this situation, followed by developed countries and developing countries. We can see that there is not a unanimous point of view regarding the intensity and direction between growth and globalization, for both directions. According to the mentioned premise, all the theoretical presented elements allow us to formulate two theoretical working assumptions.

The hypotheses are:

- H_1: "Growth First and Globalization Later": *The economic growth stimulates the globalization.*
- H_2: "Globalization First and Growth Later": *The globalization stimulates the economic growth.*

METHODS AND RESULTS

For our investigation, we consider two variables, economic growth and globalization, measured by real annual economic growth rate, respectively KOF index of globalization. The data set covers the period 1970-2007, in the Romania's case, with democratic and autocratic regimes (37 observations).

- Annual Growth Rate (AGR) describes the real annual GDP growth rate, in relative term (%), taken from Shane [14].

- Index of Globalization (G) represents the KOF index of globalization. KOF index of globalization is taken from Dreher *et al*. [15].

Based on the theoretical working assumptions (H_1 and H_2), for the analysis of the "binome AGR - G", we have used an unrestricted Vector Autoregression Model (VAR). For Cromwell *et al*. [16], such a model is commonly used for forecasting systems of interrelated time series and for analyzing the dynamic impact of random disturbances on the system of variables. In vector autoregression models some variables are treated as endogenous and some as exogenous or predetermined (exogenous plus lagged endogenous). In our study, these two considered variables - AGR and G - are treated as endogen variables. This choice is sustained by Baltagi [17]. The author allows that the VAR models can include some exogenous variables like trends and seasonal dummies, but the whole point is that it does not have to classify variables as endogenous or exogenous.

Assuming that each of two equations contains k lag values, for the t period, the VAR model can be written:

$$AGR_t = a_1 + \sum_{j=1}^{k} \beta_j AGR_{t-j} + \sum_{j=1}^{k} x_j G_{t-j} + u_{1t} \quad (1)$$

$$G_t = a_2 + \sum_{j=1}^{k} e_j AGR_{t-j} + \sum_{j=1}^{k} f_j G_{t-j} + u_{2t} \quad (2)$$

or, equivalently, in matrix form:

$$\begin{bmatrix} AGR_t \\ G_t \end{bmatrix} = \begin{bmatrix} a_1 \\ a_2 \end{bmatrix} + \begin{bmatrix} \beta_1 x_1 \\ e_1 f_1 \end{bmatrix} \begin{bmatrix} AGR_{t-1} \\ G_{t-1} \end{bmatrix} + \ldots + \begin{bmatrix} \beta_k x_k \\ e_k f_k \end{bmatrix} \begin{bmatrix} AGR_{t-k} \\ G_{t-k} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \end{bmatrix} \quad (3)$$

where a_1, a_2 are the intercept terms; β, χ, ε, ϕ are the coefficients of the endogen variables and the u are the stochastic error terms.

The principal steps of econometric analysis are: (a) unit root tests of variables; (b) joint lag selection and VAR; (c) stability test and (d) residuals' tests.

- Unit root tests of variables are based on Kwiatkowski-Phillips-Schmidt-Shin and Ng-Perron tests. The results, shown in Table 1, suggest that AGR is I(0) and G is I(1). According to Vogelvang [18a], we have chosen the assumption "constant term", because an additional trend term is generally superfluous.

The VAR's building problem in our case is that one of the series is stationary and another is non-stationary. In this context, the series G, which is I(1), has been transformed and becomes - IGR:

$$IGR = \frac{G_t}{G_{t-1}} \quad (4)$$

Gujarati [19] states that transformations of the data will not be easy if the model contains a mix of I(0) and I(1). In this case, it is important to recognize the effect of the unit roots on the distribution of estimators.

Table 1: KPSS and NP "unit root" tests of variables - level and 1st difference

			KPSS		Ng-Perron	
Explication			LM-Stat	LM-Stat	Mza	MZa
Unit root			Level	1st diff.	Level	1st diff.
Variables	Intercept	AGR	0.174477*	0.161107*	-9.36261**	-17.9764*
		G	0.617168***	0.333139*	1.07551	-14.6411*
	Trend and intercept	AGR	0.157845**	0.151008**	-9.45235	-17.9666**
		G	0.171562***	0.086914*	-3.68693	-16.0436*

Note: ***, ** and * denotes significance at p<1%, 5% and 10%.

Table 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	99.12360	NA	7.92e-06	-6.070225	-5.978616	-6.039859
1	113.0527	25.24656*	4.26e-06*	-6.690796*	-6.415970*	-6.599699*
2	115.6392	4.364663	4.68e-06	-6.602450	-6.144408	-6.450622
3	117.5346	2.961600	5.38e-06	-6.470914	-5.829655	-6.258355
4	122.2831	6.825897	5.22e-06	-6.517692	-5.693216	-6.244402
5	125.2639	3.912347	5.72e-06	-6.453994	-5.446301	-6.119973

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 3: Lag Exclusion Wald Test

	AGR	IGR	Joint
Lag 1	14.87955	2.097814	18.83245
	[0.000587]	[0.350320]	[0.000848]*
Lag 2	1.745704	1.206542	2.585200
	[0.417758]	[0.547019]	[0.629447]
Lag 3	2.606585	0.483707	2.710197
	[0.271636]	[0.785171]	[0.607431]
Lag 4	1.052281	4.255992	6.509637
	[0.590881]	[0.119076]	[0.164184]
Lag 5	3.224999	0.695024	4.186657
	[0.199389]	[0.706444]	[0.381334]
df	2	2	4

Note: (a) Numbers in [ ] are p-values
(b) ***, ** and * denotes significance at p<1%, 5% and 10%.

Table 4: "Unrestricted Vector Autoregression AGR and IGR" estimates

Variables	AGR	IGR
AGR(-1)	0.695291	0.006614
	(0.12841)	(0.12615)
	[5.41444]	[0.05243]
IGR(-1)	0.062057	0.449692
	(0.16090)	(0.15806)
	[0.38568]	[2.84503]
C	-0.056223	0.563585
	(0.16489)	(0.16198)
	[-0.34098]	[3.47939]
R-squared	0.470920	0.198450
Adj. R-squared	0.438855	0.149872
Sum sq. resids	0.056596	0.054617
S.E. equation	0.041413	0.040682
F-statistic	14.68621	4.085125
Log likelihood	65.11436	65.75489
Akaike AIC	-3.450798	-3.486383
Schwarz SC	-3.318838	-3.354423
Mean dependent	0.021612	1.023237
S.D. dependent	0.055284	0.044123
Determinant resid covariance (dof adj.)	2.79E-06	
Determinant resid covariance	2.34E-06	
Log likelihood	131.1914	
Akaike information criterion	-6.955078	
Schwarz criterion	-6.691158	

Note: Standard errors in ( ) and t-statistics in [ ]

- Joint lag selection and VAR, illustrate the joint lags selection criterias and the VAR performing. For the selection of the joint lags we consider the VAR Lag Order Selection Criteria (Table 2). In the case of VAR "AGI and IGR", all the criteria (LR, FPF, AIC, SC and HQ) recommend a joint lag 1.

Second, based on the data included in Table 3, we cannot reject the joint hypothesis that the coefficient of the lags 2, 3, 4 and 5 are all equal to zero. So, we have kept for our work the lag 1.

In such conditions, for 1 joint lag, the "Unrestricted Vector Autoregression AGR and IGR" may be written (see the estimates in Table 4):

$$AGR_t = a_1 + \beta_1 AGR_{t-1} + x_1 G_{t-1} + u_{1t} \quad (5)$$

$$G_t = a_2 + e_1 AGR_{t-1} + f_1 G_{t-1} + u_{2t} \quad (6)$$

- The VAR stability condition check test shows that the VAR satisfies the stability condition (Table 5).
- Residuals tests are focused to VAR Residual Portmanteau Tests for Autocorrelations, Residual Serial Correlation LM Tests, Unit Root Tests of VAR residuals and White Test for Residual Heteroskedasticity.

The results of first two tests are illustrated in the Tables 6 and 7.

Table 5: VAR stability condition check test

Root	Modulus
0.696951	0.696951
0.448032	0.448032

No root lies outside the unit circle.
VAR satisfies the stability condition.

Table 6: VAR Residual Portmanteau Tests for Autocorrelations

H_0: no residual autocorrelations up to lag h

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	2.149386	NA*	2.210797	NA*	NA*
2	3.173141	0.5293	3.294773	0.5098	4
3	5.742428	0.6761	6.097632	0.6363	8
4	17.04856	0.1478	18.81703	0.0930	12
5	17.34810	0.3634	19.16488	0.2602	16

*The test is valid only for lags larger than the VAR lag order.
df is degrees of freedom for (approximate) chi-square distribution

Table 7: VAR Residual Serial Correlation LM Tests

H_0: no serial correlation at lag order h

Lags	LM-Stat	Prob
1	*4.769768*	*0.3117*
2	1.307144	0.8602
3	3.133857	0.5357
4	12.40085	0.0146
5	0.353917	0.9861

Probs from chi-square with 4 df.

Table 8: The Unit Root Tests of VAR residuals

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin and Chu t*	-7.38677	0.0000	2	70
Breitung t-stat	-5.84196	0.0000	2	68
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-6.28174	0.0000	2	70
ADF - Fisher Chi-square	38.4833	0.0000	2	70
PP - Fisher Chi-square	38.4904	0.0000	2	70
Null: No unit root (assumes common unit root process)				
Hadri Z-stat	-0.03329	0.5133	2	72

** Probabilities for Fisher tests are computed using an asympotic Chi
-square distribution. All other tests assume asymptotic normality.

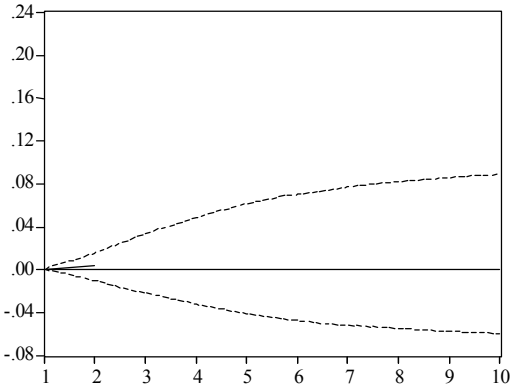
Table 9: VAR Residual Heteroskedasticity Tests with Cross Product

Joint test:		
Chi-sq	df	Prob.
9.800137	15	0.8321

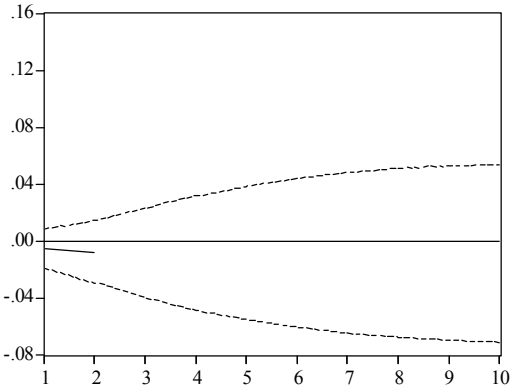
Both tests stress that the null hypothesis of no serial autocorrelation in residuals cannot be rejected. In a particularly way, the "unit root tests" of residuals suggest the same conclusions (Table 8).

Even if the heteroskedasticity is more relevant for the analysis of cross-section data than time-series data (Vogelvang [18b]), the White-Test has been involved. The results are illustrated in Table 9 and show that the variance of the disturbance term is constant (the null cannot be rejected).

The "Unrestricted Vector Autoregression AGR and IGR" model may be considered representative and stable to describe, for the case of Romania, the autoregressive connection between AGR and IGR and vice-versa.



Graphic 1: Accumulated Response of AGR to IGR



Graphic 2: Accumulated Response of IGR to AGR

Based on the model, we can conduct a series of impulse response functions. An impulse response function traces the effect of a one-time shock to one of the innovations on current and future values of the endogenous variables AGR and IGR. In this case, the accumulated responses of AGR and IGR to Generalized One S.D. Innovations ± 2 S.E., for 10 years, are illustrated in the Graphics 1 and 2.

The main results show that: (1) A positive impulse in IGR determines a flat increase of AGR's level on medium and long term. There is a low intensity reaction in the first 2 years (short term) and accentuate one in the rest of the interval; and (2) A positive impulse in AGD determines a flat decrease trend of IGR's level on long term. The results confirm the second hypothesis, but infirm the first one.

CONCLUSIONS

The main objective of this study was to investigate the relationship between economic growth and globalization, their amplitude and vectorial direction, for the case of Romania, using an unrestricted vector autoregressive model (Unrestricted VAR), for 1972-2006 period.

The results show that if countries tend to maximize the economic growth, they must globalize more. This connection is functional only on medium and long term, but with a flat intensity. Unfortunately, this process cannot be absolutized. In the same time, there exists a saturated level of economic growth under the impact of globalization, which can generate a "boomerang" effect.

This means that the acceleration in the level of economic growth can inhibit the opening for globalization. In this case, there is possible to appear the complacency in the management process of the public authority. Moreover, the national economic autonomy can be undermined or destroyed by open capital markets and flexible exchange rates. From this point, the process reiterates.

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