DETERMINANTS OF TOURIST INFLOWS TO ROMANIA: EVIDENCE FROM AUGMENTED PANEL GRAVITY MODEL

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Abstract: *The strategic importance of tourism sector for economy is well appreciated. Compared to the direct competitors, the Romanian tourism is not very successful. As a transition economy, Romania tries to stop the deterioration of the tourism sector and seeks the ways to reach a rigorous position in the international tourism market. Therefore, in order to develop the sector in a most planned and controlled manner, it is important to determine the factors which have impact on Romania's tourist inflows. In this paper, it is aimed to investigate these effective factors based on a panel gravity model framework for the period of 1993-2013. Though the results are sensitive to the specification of the model both in terms of the significance and sign of the coefficients, all variables (i.e. the economic size, distance and dummies) seem to have significant effect on tourist inflows to Romania.*

Keywords: *Tourism, panel gravity model, Romania.*

JEL classification: *C01, C33, L83*

1. Introduction

Even though it is an ancient phenomenon, it is widely accepted that as an economic activity tourism begun to attract more attention in the second half of the 20th century, more precisely after World War II. It seems that increasing economic prosperity, quick development of transport and some other factors (such as, improvement in working condition and communication, change in labor-leisure preferences) contributed to this case (Matias, 2004; 4). Tourism is one of the most rapidly growing sectors in the world. Global tourism flows and tourism receipts show a stable increase in recent years.

Despite the fact that global tourism demand fallen significantly under the influence of an extremely volatile world economy (financial crises, commodity and oil price rises and sharp exchange rate fluctuations)for many developing countries it is still one of the main income sources and the number one export category, creating much needed employment and opportunities for development (UNWTO, 2009). According to World Tourism Organization (UNWTO) data, with an additional 39 million international tourists, up from 996 million in 2011, international tourist arrivals surpassed 1 billion (1,035) for the first time in history in 2012. On the other hand, international tourist arrivals to Europe, the most visited region in the world, were up by 3% in 2012 and total arrivals reached 534 million. The sub-region of Central and Eastern Europe (7%) experienced the best result (UNWTO, 2013; 7).

Tourism can be considered as an invisible export item which has considerable impacts on the balance of payments. In this respect, tourism is a good and service exporting activity done in retail prices. Automation and mechanization ability of the sector is quite low while employment/investment ratio is high in general. Tourism, because of its stimulant effects, also causes to production, employment and income enhancement in

other sectors directly or indirectly (Kozak *et al.*, 2000). Micro and macro externalities which tourism had and its growth potentials urge most countries to obtain bigger part from the global tourism market. This makes it crucial to determine the factors those effective on tourist inflow in a country.

The recognition of the power of tourism as a driver of economic growth, a tool for development and a provider of employment, is raised the importance of the sector especially for developing countries, and Romania is not an exception. As revealed by Zaman *et al.* (2010) as the finding of an input – output analysis, tourism has a great impact on the national economy in Romania.

Table 1. Tourist inflow and tourism revenue of Romania and nearby countries.

	Tourist inflows (Million persons)			Tourism revenue (Billion USD)		
Country	2011	2012	% Change	2011	2012	% Change
Turkey	34,654	35,698	2,7	25,054	25,916	3,3
Austria	23,012	24,151	4,9	19,860	18,894	-5,1
Russian Fed	22,686	25,736	13,4	11,328	11,187	-1,3
Ukraine	21,415	23,013	7,5	4,294	4,842	11,3
Greece	16,427	15,518	-5,5	14,623	12,879	-13,5
Poland	13,350	14,840	11,2	10,683	10,938	2,3
Hungary	10,250	10,353	1,0	5,580	4,845	-15,2
Czech Rep	9,019	8,908	-1,2	7,628	7,035	-8,4
Bulgaria	6,328	..	..	3,967	3,748	-5,8
Slovenia	2,037	2,156	5,8	2,717	2,577	-5,4
Romania	*1,515*	*1,653*	*9,1*	*1,418*	*1,467*	*3,3*
Slovakia	1,460	1,511	3,4	2,429	2,299	-5,6
Serbia	764	810	6,0	992	906	-9,5
Bosnia&Herzg	392	439	11,9	643	603	-6,6
Belarus	116	119	2,3	487	664	26,7
Rep Moldova	75	89	18,6	195	213	8,5

Source: United Nations-World Tourism Organization (UNWTO), 2014.

Romania is considered by both Romanian and foreign specialists a country with high tourist potential, which could compete with any other country in the world in what concerns the wealth of tourist resources. Romanian tourism sector, however, witnessed a sharp deterioration in recent decades. In order to stop this negative process National Tourism Authority – NTA, launched a strategy project for 2007 – 2013.

This paper aims to investigate the determining factors of tourism demand based on a panel gravity model framework in the case of Romania in which the economic size, population and distance are considered as key variables. This is not the first attempt for the empirical evaluation of the demand for Romanian tourism sector. In a recent paper Surugiu *et al.* (2011) investigated the determinants of the tourism demand towards Romania in a similar manner. This paper, however, differs from their analysis in several aspects: the time span is longer (from 1993 to 2013), the sample is larger (36 countries) and the set of explanatory variables is richer.

The paper is organized as follows. A brief description of Romanian tourism sector is given in the next section. Employed methodology, data and variables used are described in

Section 3. Empirical findings are presented in Section 4. The paper concludes in Section 5.

2. Tourism Sector in Romania

There is nearly an agreement upon the idea that Romanian tourism sector has been in a recession for a long time. Okech and Nedelea (2010) assert that the deterioration started with the communist national isolation and its collapse has not brought the supposed good changes and today the Romanian tourism sector falls behind the neighboring countries.

Romanian tourism industry passed through its ups and downs, tourism demand being strongly affected by the economic, social, political, environmental factors (i.e. fall of communism, transition period to the market economy, poor image abroad, environmental phenomena as floods or heat wave, avian fluenza). Starting with the 90's, Romanian tourism industry entered in a new era, mostly marked by significant decrease in tourism demand. Romanian tourism market became volatile and tourism demand more sensitive to market changes. The slow process of privatization, low investments, decreasing in standard of living and purchasing power, poor management, lack of tourism policies, strong competition of other tourist countries (i.e. Bulgaria, Turkey, Greece, Austria, Italy), low standard in services which do not satisfy the tourists' expectations, insufficient promotion were other causes that have reduced substantially Romanian tourism activity and tourism demand (Surugiu et al., 2011; 135). Moreover after 1989 due to low income level, a restructuring of the consumption priorities took place and this was not in favor of tourism (Okech and Nedelea, 2010; Gina-Ionela and Florina-Iuliana, 2011). The strategy to promote Romania's tourism offer was not strongly enough to overcome the weakness of the already formed image of potential travelers. The important tour operators oriented to other tourism markets due to the low quality of services and the unbalance between prices and quality of tourism packages. (Surugiu et al., 2011; 135)

Mazilu (2010) points to the some structural problems such as, the lack of a coherent and stable action program regarding the development of tourism, the lack of funds for the investments for development, modification and rehabilitation of the infrastructure and the inexistence of facilities in the field of bank loans. Also, reformation of the tourism sector started very late and tourism field has not been proved too attractive for the foreign investors.

Travel and tourism in Romania had a different journey for the past 10 years, expressed in international arrivals. Beside a slight increase in 1999 – 4.5 million tourists – arrivals have had a continuous decline until 2001- 2002, when 1.5 million tourists arrived. This was also due to the global economic downturn after the events of September 2001, which negatively affected entire world tourism. After this period there was an impressive growth in 2003, with more than 16%, reaching in 2004 6.7 million tourists, growth that was sustained in 2005 the number increasing by 500 thousand over the previous year. The vast majority of international arrivals in Romania were from 2000, about 95% if the visitors from mainland. Of these, 75% are arrivals from five countries: Ukraine, Moldavia, Bulgaria, Hungary, Yugoslavia. In 2006 the number of tourist arrivals was 6 million while in 2008 it rose to 8.8 million tourists (Florentina *et al.*, 2011; 188).

Florentina *et al.* (2011) points to three main trends in Romanian tourism: sustainability, ecotourism and the increasing presence of cultural tourism. A quantitative examination reveals that there is an increase in Romanian tourism whereas qualitative concerns point to a setback in the last years. The strategy project for 2007 – 2013 issued by the NTA draws the attention upon the fact that Romania has stopped being an attractive tourist destination in terms of the quality – price ratio. The Romanian government has established that it is extremely necessary to draw-up a tourism development plan for laying the bases for implementing a sustainable approach of tourism development in Romania, by concluding a contact with World Tourism Organization for this action. The Master Plan

includes a 6-years action plan (2007-2013) and financial support through the structural funds to which Romania has access due to its integration in the EU, but refers to tourism development for a period of 20 years, until 2026 (Gruescu *et al.*, 2008).

Table 3. Top-10 tourist sender countries to Romania (as of 2013)

Source	Tourist Number	Source	Tourist Number
1. Hungary	1,443,000	6. Italy	332,000
2. Bulgaria	1,136,000	7. Yugoslavia	322,000
3. Moldova	995,000	8. Poland	300,000
4. Ukraine	794,000	9. Turkey	254,000
5. Germany	448,000	10. Austria	200,000

Source: Romanian National Institute of Statistics.

3. Empirical Model, Method and Data

3.1. Gravity Model Approach

The gravity model belongs to the class of empirical models concerned with the determinants of interactions. In its most general formulation, it explains a flow (of goods, capital, people etc.) from an area to another area as a function of characteristics of the origin, characteristics of the destination and some separation measurement. Customarily the model is estimated in log-linear form (Porojan, 2000; 2).

The gravity model has its origin in Newton's law of gravitation in seventeenth century. Newton's law of gravity in mechanics states that two bodies are subjected to a force of attraction force that depends positively on the product of their masses and negatively on the distance between them. Social scholars, in nineteenth century, applied this law to social phenomena of quite different nature the common character of which was transfers or flows between two or more entities or sources. Thus migration or traffic laws (vehicles, information, tourists etc.) were examined using this "law" (Simwaka, 2006; 6).

Following a specification reminiscent of Newton's gravitation theory, gravity models relate bilateral trade to the mass of these two countries (commonly measured as the size of the countries involved) and the distance that separates them. This standard formulation of the model, which is consistent with standard models of international trade, is commonly extended to include other factors generally perceived to affect bilateral trade relationships. Indeed, the notion of distance does not only relate to the geographical distance (i.e. transportation costs), but also to other factors affecting transaction costs. Besides or instead of distance variable some other variables also can be used, such as a dummy variable for each of the variables of having common language, common border, being in same territory and same free trade arrangement (Bussiére and Schnatz, 2006; 14).

The simplest form of the gravity model can be stated as below,

$$T_{ij} = A\frac{(Y_i \times Y_j)^{\alpha}}{D_{ij}^{\gamma}} \qquad (1)$$

where, T_{ij} is the trade volume between country *i* and *j*; A is proportionality constant; Y_i ve Y_j are economic sizes of country *i* and *j* (with respect to GNP, GDP or per capita GDP); D_{ij} is the distance between countries. Equation (1) is the core gravity model equation where bilateral trade is predicted to be a positive function of income and negative function of distance. When applied to predict trade flows, population size of both exporter and importer country are often included as variables in the equation, assuming larger populations support and promote larger trade volumes:

$$T_{ij} = A\frac{(Y_i \times Y_j)^{\alpha}(P_i \times P_j)^{\beta}}{D_{ij}^{\gamma}} \quad (2)$$

After a simple arrangement equation (2) can be written as follow:

$$T_{ij} = A\frac{(Y_i \times P_i)^{\alpha}(Y_j \times P_j)^{\beta}}{D_{ij}^{\gamma}} \quad (3)$$

If for the both side logarithms are took, the equation becomes linear:

$$T_{ij} = A^* + \alpha \log(P_i \times Y_i) + \beta \log(P_j \times Y_j) - \gamma log D_{ij} + \varepsilon_{ij} \quad (4)$$

where, *A** is *log A*, and α, β, and γ are parameters to be estimated. ε_{ij} is a white noise error term with constant variance and zero mean, and stands for to represent the random factors those effect bilateral trade.

Now trade flows are defined as a function of per capita GDP in two countries and the distance between these countries. Since there is no deviation in ($P_i \times Y_i$) with respect to the various importer countries, thus it cannot be a source of explanation for trade deviations to those importer countries, and hence can be dropped from the equation (Bos and van de Laar, 2004; 5). The estimable model can be written as;

$$T_{ij} = A^* + \alpha \log Y_i + \beta \log P_i - \gamma log D_{ij} + \varepsilon_{ij} \quad (5)$$

Trade theories based upon imperfect competition and the Hecksher-Ohlin model justify the inclusion of the core variables – income and distance. Most studies have however, included additional dummy variables to control for differences in geographic factors, historical ties and at times economic factors like the overall trade policy and exchange rate risk (Batra, 2004; 4).

Aforementioned gravity type models have achieved increasing recognition in the analysis of economic phenomena related to the flow of goods and services. In this respect it was also applied to the various aspects of tourism (see for example Durbarry, 2000; Batra, 2004; Matias, 2004; Gil-Pareja *et al.*, 2007).

The vast majority of the empirical papers on international tourism in the literature are divided into two main types. The first consists of papers that use modern time series and co-integration techniques in an attempt to model and forecast the dependent variable, between one or several pairs of countries. The second type includes papers that estimate the determinants of international tourism flows using classical multivariate regression framework (Halıcıoğlu, 2004; Eita and Jordaan, 2007). The gravity model approach used in this paper can be counted in the second class.

3.2. Model, Variables and Data

The models encompass the core explanatory variables of gravity model that is economic size, population and distance. It should be said something about the variables.

The variables that best measure the economic size are GDP and GDP per capita. With respect to the economic size of the origin country it seems evident that, the wealthier the country the larger the number of tourists. Additionally, since international tourism is a normal good in consumption (and, for most people, a luxury one) per capita income of the origin country should also have a positive effect (Gil-Pareja *et al.*, 2007). Assuming that tourism is an individual activity, it may be more plausible to use the per capita GDP instead of GDP itself. Because the former reflects the purchasing power more. Nevertheless, we have set two separate version of the model whether GDP or per capita GDP is used accordingly.

The most controversial part of gravity model is, probably, the determination of geographical distance. Some claim that this distance would preferably be the one between commercially important cities of the countries or the distance between capital cities. But, at global scale this choice does not make so much difference. Definition of the distance is also problematic, due to its time invariant nature. Although it is not a problem in cross sectional analysis, when time dimension entered in the analysis (i.e. time series regression) the variable causes to trouble. In order to overcome this difficulty and to make the distance a *varying variable* over time, various approaches have been suggested in the literature. These approaches suggest weighted definitions of distance. Following Head and Meyer (2002) the distance we adopt in this paper is defined as;

$$WDIST_{ij} = \sum_{k \in i}(POP_k/POP_i) \sum_{l \in j}(POP_l/POP_j) DIST_{kl} \qquad (6)$$

where, $WDIST_{ijt}$ is the weighted distance between the countries *i* and *j* at year *t*; $dist_{ij}$ is the geographical distance between the countries *i* and *j*; GDP_{it} is GDP of the country *i* at year *t*; and $\sum GDP_i$ is overall sum of the GDPs of the countries for the years 1993 up to 2013.

Based on the distinction as to represent economic size and regarding the fact that a regression equation is sensitive to its content we have estimated ten alternative balanced panel-data models as below.

Model I: $ln\ TA_{it} = \alpha_0 + \alpha_1\ ln\ GDP_{it} + \alpha_2\ ln\ WDIST_{it} + \varepsilon_{1t}$ (7)

Model II: $ln\ TA_{it} = \alpha_0 + \alpha_1\ ln\ GDP_{it} + \alpha_2\ ln\ WDIST_{it} + \alpha_3 D_1 + \varepsilon_{2t}$ (8)

Model III: $ln\ TA_{it} = \alpha_0 + \alpha_1\ ln\ GDP_{it} + \alpha_2\ ln\ WDIST_{it} + \alpha_3 D_2 + \varepsilon_{3t}$ (9)

Model IV: $ln\ TA_{it} = \alpha_0 + \alpha_1\ ln\ GDP_{it} + \alpha_2\ ln\ WDIST_{it} + \alpha_3 D_3 + \varepsilon_{4t}$ (10)

Model V: $ln\ TA_{it} = \alpha_0 + \alpha_1\ ln\ GDP_{it} + \alpha_2\ ln\ WDIST_{it} + \alpha_3 D_1 + \alpha_4 D_2 + \alpha_5 D_3 + \varepsilon_t$ (11)

Model VI: $ln\ TA_{it} = \beta_0 + \beta_1\ ln\ GDP_{it} + \beta_2\ ln\ WDIST_{it} + u_t$ (12)

Model VII: $ln\ TA_{it} = \beta_0 + \beta_1\ ln\ GDP_{it} + \beta_2\ ln\ WDIST_{it} + \beta_3 D_1 + u_t$ (13)

Model VIII: $\ln TA_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln WDIST_{it} + \beta_3 D_2 + u_t$ (14)

Model IX: $\ln TA_{it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln WDIST_{it} + \beta_3 D_3 + u_t$ (15)

Model X: $\ln TA_{it} = \beta_0 + \beta_1 \ln GDPPC_{it} + \beta_2 \ln WDIST_{it} + \beta_3 D_1 + \beta_4 D_2 + \beta_5 D_3 + u_t$ (16)

where *TA* is number of tourist arrivals from sampled countries, *GDP* (gross domestic product) and *GDPPC* (GDP per capita) are proxies for economic size of the source country, and *WDIST* is a weighted measure of the distance between source countries and Romania. In this paper, considering the data availability, we have employed a balanced panel of 36 countries and time span of 21 years (1993 – 2013). The GDP data were gathered from the World Bank's online database of World Development Indicators, tourism data from website of the Statistical Institute of Romania, and distance data from CEPII.

Additional to the core variables of the traditional gravity model, three dummy variables were also included in the regression equations. The first one (D_1) denotes the impact of ideological proximity which takes the value of unity if the host country was a member of abolished Warsaw Pact. The second dummy (D_2) denotes the impact of being EU membership, and the third one (D_3) stands for the impact of religious proximity, i.e. Orthodox Christianity, on the touristic destination choice.

4. Empirical Findings

Descriptive statistics for the variables being used are presented in Table 4.

Table 4. Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Lnntour	756	10.515	1.994	4.615	14.772
Lngdp	756	11.746	1.933	7.639	16.490
Lndist	756	7.109	0.624	5.866	9.091
lngdppc	756	9.495	1.133	6.346	11.382

Levin, Lin and Chu, Im, Pesaran and Shin and Fisher unit root tests are given in Table 5 for the variables being used. Results in Table 5 show that all of the variables are stable on the level, in other words, they have no unit roots.

Table 5. Unit root tests

Variables	Levin, Lin and Chu (t stat.)	Im, Pesaran and Shin (W-t stat)	Fisher (χ^2 stat.)
Number of tourists	-4.051*	-1.872**	118.190*
GDP	-9.136*	-2.101**	128.286*
GDP per capita	-8.657*	-2.287*	124.447*

* and ** denote the significance at 1% and 5% respectively.

Table 6 presents Feasible Generalized Least Square (FGLS) estimators for the modeling of the number of tourists visiting Romania. Dependent variable is the number of tourists visiting Romania from 36 countries. Independent variables used in the panel data model are GDP, GDP per capita and distance across countries. Estimated coefficients of the model are presented in Table 6. Hausman test results in Table 6 indicate that, while

the fixed effects model that by treating the data in a time series and cross-section in the Model 6- Model 10 is suitable, random effects panel model in Model 1-Model 5 is more appropriate (see Table 6). F test reported at the bottom of the Model 6 – Model10 in Table 6 provides a formal test for the pooled model estimator against the fixed effects panel estimator. The result of the F test indicates that the fixed effects panel estimator is important. Panel data models are appropriate to determine factors on the number of tourists visiting Romania. The results of the LM test in Model 1 – Model 5 indicate that the random effects panel estimator is preferred. The Wald test statistics reject the null hypothesis that the parameters in the regression equation are jointly equal to zero in all models.

Tests for heteroscedasticity are the Levene, Brown and Forsythe heteroscedasticity test and Modified Wald test for the fixed and random effects models. The result of the tests shows that our models suffer from a heteroscedasticity problem. Therefore the null hypothesis of homoscedasticity (or no heteroscedasticity) is rejected. Modified Bhargava et al. Durbin-Watson autocorrelation and Pesaran's tests of cross sectional independence tests indicate having autocorrelation and cross-section correlation in both types of models. In both of models, because the heteroscedasticity, autocorrelation and cross-section correlation are exist, FGLS method is used in the analysis. The results of the model in Table 6 demonstrate that, while GDP and GDP per capita has a positive and important effect on tourism demand for Romania, distance variable, as expected, has a negative effect.

5. Conclusion

Although it has not been appreciated adequately until recent years, tourism has become an importance-gaining sector in Romanian economy. Therefore, in regards to develop the sector in a most planned and controlled manner it is important to determine the factors which have impact on Romania's tourist inflow. In this paper we aimed to investigate these effective factors based on an augmented panel gravity model framework in which a number of exploratory dummy variables are used besides the key variables of economic size and distance.

Based on the distinction as to represent economic size we have estimated ten alternative balanced panel-data models. Results are sensitive to the specification of the model both in terms of the significance and sign of the coefficients. If GDP is adopted as a proxy for economic size each variable has a highly significant effect on tourist inflows and its coefficient is slightly below the unit value which means that tourism is not a luxury good. It also worth to note that being a member of EU has a negative effect on tourist number in some specifications. On the other hand, if GDP per capita is used instead of GDP all variables again seem have significant effect on tourist inflows. GDP per capita positively affects the tourist arrivals and its coefficient is quite below the unit value which compared to previous model, more strongly indicates that tourism is not a luxury good. In this latter case distance becomes a significant factor in explaining the tourist arrivals. The ideological, political and religious proximities seem to have positive impact on the tourist arrivals to Romania. Results of the analysis are in accordance with findings of Surugiu *et al.* (2011).

Table 3. FGLS Estimation of the Tourism Demand for Romania

	Model 1			Model 2			Model 3			Model 4			Model 5		
Independent Variables	Coef.	z value	Prob.	Coef.	z value	Prob.	Coef.	z value	Prob.	Coef.	z value	Prob.	Coef.	z value	Prob.
LnGDP	0.898	48.000	0.000*	0.931	48.30	0.000*	0.908	51.84	0.000*	1.003	61.93	0.000*	0.994	36.18	0.000*
LnWDIST	-3.031	-54.820	0.000*	-2.797	-54.46	0.000*	-3.016	-51.26	0.000*	-2.936	-56.16	0.000*	-2.809	-34.05	0.000*
D1				1.016	13.18	0.000*							0.677	6.43	0.000*
D2							-0.170	-5.74	0.000*				-0.135	-5.95	0.000*
D3										1.087	13.91	0.000*	0.717	6.75	0.000*
Constant	21.610	88.170	0.000*	19.297	39.89	0.000*	21.518	87.67	0.000*	19.375	51.56	0.000*	18.562	23.98	0.000*
Number of obs.	756			756			756			756			756		
Number of groups	36			36			36			36			36		
Time periods	21			21			21			21			21		
Wald χ^2 test	3023.45		0.000*	8016.43		0.000*	2818.67		0.000*	4931.72		0.000*	3190.91		0.000*
Hausman test (χ^2 stat.)	3.34		0.068	2.44		0.118	1.60		0.192	1.24		0.265	0.765		0.342
LM test stat.	71.22		0.000*	68.88		0.000*	55.33		0.000*	69.06		0.000*	55.37		0.000*
Levene, Brown ve Forsythe test (W50)	7.634		0.000*	7.618		0.000*	7.590		0.000*	7.580		0.000*	7.566		0.000*
Modified Bhargava et al. Durbin-Watson	0.379			0.379			0.384			0.379			0.384		
Pesaran's test of cross sectional independence	15.931		0.000*	15.753		0.000*	14.774		0.000*	15.325		0.000*	14.033		0.000*

* denotes the significance at 1%.

(continued)

Independent Variables	Model 6			Model 7			Model 8			Model 9			Model 10		
	Coef.	z value	Prob.	Coef.	z value	Prob.	Coef.	z value	Prob.	Coef.	z value	Prob.	Coef.	z value	Prob.
LnGDPPC	0.146	2.96	0.003*	0.305	4.60	0.000*	0.113	2.20	0.028**	0.236	3.82	0.000*	0.334	4.62	0.000*
LnWDIST	-1.595	-35.73	0.000*	-1.467	-23.46	0.000*	-1.587	-35.56	0.000*	-1.643	-20.63	0.000*	-1.552	-18.10	0.000*
D1				0.785	8.98	0.000*							0.993	7.63	0.000*
D2							0.113	3.74	0.000*				0.107	3.85	0.000*
D3										0.137	1.150	0.250	-0.328	-1.73	0.083***
Constant	20.583	31.04	0.000*	17.894	36.50	0.000*	20.812	30.85	0.000*	20.019	41.63	0.000*	18.307	27.21	0.000*
Number of obs.	756			756			756			756			756		
Number of groups	36			36			36			36			36		
Time periods	21			21			21			21			21		
Wald χ^2 test	1295.81		0.000*	1398.02		0.000*	1327.47		0.000*	1177.47		0.000*	1102.25		0.000*
Hausman test (χ^2 stat.)	17.36		0.000*	13.09		0.0003*	10.17		0.006*	17.04		0.000*	7.63		0.022**
F test	307.59		0.000*	307.59		0.000*	310.58		0.000*	307.59		0.000*	310.58		0.000*
Modified Wald χ^2 test	4127.64		0.000*	4127.64		0.000*	3447.37		0.000*	4127.64		0.000*	3447.37		0.000*
Modified Bhargava et al. Durbin-Watson	0.363			0.363			0.368			0.363			0.368		
Breusch-Pagan LM test of independence	3684.43		0.000*	3684.43		0.000*	3592.77		0.000*	3684.43		0.000*	3592.77		0.000*

*, ** and *** denote the significance at 1%, %5 and 10% respectively.

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Appendix: Countries included in the sample.

Austria	Hungary	Poland	U. S. A.
Belarus	Ireland	Portugal	Yugoslavia
Bulgaria	Israel	Russian Fed.	
Czech Rep.	Italy	Slovakia	
Denmark	Lithuania	Slovenia	
Egypt	Latvia	Spain	
Finland	Luxemburg	Sweden	
France	Malta	Turkey	
Germany	Moldavia	Ukraine	
Greece	Netherland	U. K.	