IMPACT OF TRANSPORTATION INFRASTRUCTURE, WITH EXTENSION ON QUALITY OF LOCAL GOVERNMENT AND EU INTEGRATION, ON ECONOMIC GROWTH, THE CASE OF ROMANIA

Master Mihail Pogorleţchi, Ghenadie Pogorleţchi

Universitatea Tehnică a Moldovei

ABSTRACT

It is analysis of the impact of transportation infrastructure, which differs in terms of quality and administrative status in Romania on economic growth. The general model is built on the basis of Cobb-Douglass production function, adding extra infrastructure variables, after this the model was run on different samples, created in dependence of voting turnover in corresponding counties, which reflect the quality of local government. Moreover, the model was extended by a dummy variable, which distinguish between periods before and after EU integration. Stock of roads makes larger contribution to economic growth in counties with lower quality of government, while overall stock of capital has larger impact on growth in counties with better local government.

1. Introduction

Romania performed a huge transition over the last 25 years: from the collapse of the communist regime in 1989 to integration in EU in 2007. Generally, this period of time can be characterized as a period of economic development and growth. Thus, EU is often associated with trade liberalization, so transportation infrastructure plays a crucial role within this framework. Actually it is impossible to benefit from liberalization of trade and following economic growth without developed transportation network. The majority of transportation services are conducted by the roads and railways system in Romania. For example, 74% of goods were transported by roads and 14% by railways in 2010. The density of roads is presented on Figure 1.

Romania was divided into 8 development regions in order to simplify implementations of projects in EU integration framework, however these development have no administrative status or regional authorities. Simultaneously, the official administrative division includes 42 counties (including municipality of Bucharest).

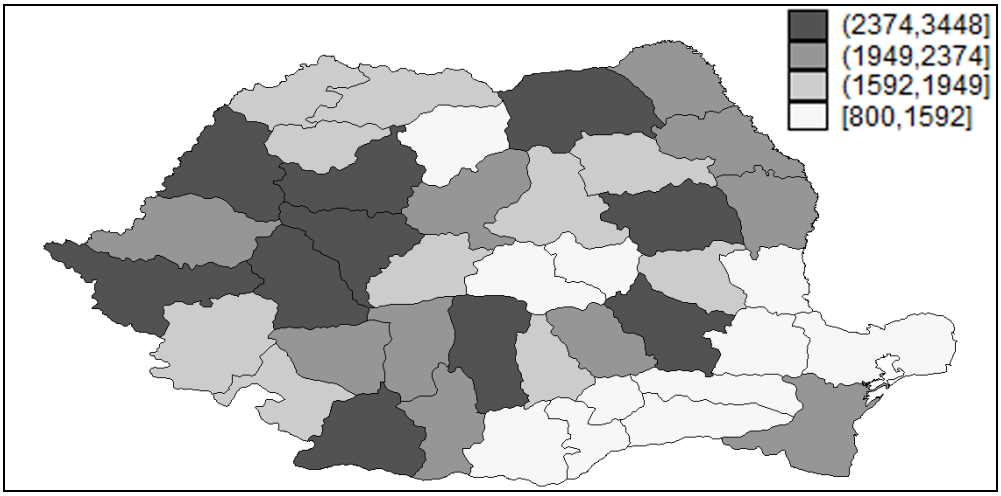

Figure1. The road density in 2010 (km).

2. The data and model

The panel data include 41 Romanian counties and municipality of Bucharest (42 regions) during the period from 1995 till 2010 years (672 observations). The data are provided by the Romanian National Company of Motorways and National Roads (RNCMNR).

In order to estimate the impact of infrastructure on economic growth I'm going to follow the approach described by Canning (1999). Using the Cobb-Douglass production function:

$$Y_{it} = A_{it} K^{\alpha}_{it} \; X^{\beta}_{it} L_{it}^{1-\alpha-\beta} U_{i\,t} \qquad (1)$$

Where: Y is the Gross Regional Product (GRP) produced in the region i in year t; A is the aggregate factor of productivity; K is a real stock of assets accumulated in the region i; X is the stock of infrastructure assets; L is labor; U is the error term; i is the index of the country or municipality and t is the index of the time. Also it is important to introduce a set of assumptions for this model: the first one is constant return to scale, that is why, the second assumption is that log A_{it} = a_i+b_t , where a_i is regional or municipality fixed effect and b_t is the whole country's overall productivity in a given year t.

Deriving by L and then taking logs in (1) it is easy to derive:

$$y_{it} = a_i + b_t + \alpha k_{it} + \beta x_{it} + u_{it} \qquad (2)$$

After that we split variable x in several groups in order to test the impact of the quality of covering and the administrative status. So the final model is

$$y_{it} = a_i + b_t + \alpha k_{it} + \gamma_1 nat\_road_{it} + \gamma_2 nat\_mod\_roads_{it} + +\gamma_3 nat\_light\_road_{it} + \gamma_4 cou\_road_{it} + \gamma_5 cou\_mod\_roads_{it} + \gamma_6 cou\_light\_road_{it} + \gamma_7 cou\_light\_road_{it} + \gamma_8 railways_{it} + eu + u_{it} \quad (3)$$

Where: nat_road means the stock of the paved roads with national administrative status; nat_mod_roads means the stock of roads with national administrative status which experienced modernization in period t; nat_light_roas means the stock of national roads with light covering, cou_road means the length of county paved roads available in period t; cou_mod road means the length of county roads after modernization in period t; cou_light_road means the stock of county roads with light covering and railways means the stock of railways available in county I in year t. Moreover we add a dummy variable eu,

The following data is used in order to fit the model, described above.

The dependent variable is GRP per capita in Romanian countries at constant prices 2000 in millions euro.

The independent variables are: stock of capital calculated by perpetual inventory method (k) at constant prices 2000 in millions euro; the length of all kinds of roads and railways used in (3) and is in km per capita.

The regional stock of capital is calculated according to the perpetual inventories method: the law of motion for capital is set up as the following:

$$K_{t+1} = (1-\sigma)*K_t + I_t \quad (4)$$

Where: I – formation of fixed capital $ in real terms; K – stock of capital in period t $ in real terms; σ – depreciation.

Depreciation σ is calculated as the following:

$$\sigma = \frac{1}{t_2 - t_1 + 1} * \sum_{t=t_1}^{t_2} \frac{CF_t}{GDP_t} \quad (5)$$

Where: CF – consumption of fixed capital in $ in real terms.

The first value of K is taken as three times GDP of the initial period (1991). The source of data for calculating of capital stocks is World Bank.

Both GRP and capital follow up-trend in almost all counties in Romania during the period of interest, with the largest growth during the first three years after entering EU. All paved road variables also follow up-trend. Overall, Romania increased the stock of road capital by 15% during the period of interest.

The next issue is to distinguish Romanian counties on dependence of the quality of local government. We use Sundström and Stockemer (2013) results in order to do it. They used data for 174 regions of 18 EU countries (including Romanian regions) provided by European Election Database in order to estimate the relationship among the quality of local government and voter turnover. Using

multi-level model they showed that the voter turnover had positive relations with the quality of local government measured by European Quality of Government Index. In particular in regions with good governance there are 20 percent points more active citizens during elections. Probably, it is not the best measure of the quality of local government; however we work with the best available data. So we created three subsamples according to the average voting turnover during the elections in 2008 and 2012: counties with average voting turnover during more or equal to 58% of population are considered as counties with high quality of local government, counties with voting turnover between 51% and 58% of population are considered as counties with medium quality of local authorities and finally counties with low quality of local government are counties with voting turnover less or equal to 51%.

3. Empirical results and conclusions

We present the estimations of coefficients of interesting in the Table 1. This table contains the results obtained by checking for influence of the quality of the local government. This model also differentiates not only between roads with different quality of covering but also between roads with different administrative status. We consider separately national and county roads. Their impact on economic growth should differ since national roads system is responsible not only for transportation in Romania, but also for international transportation as well, while the impact of county roads is expected to be lower, but positive and significant, since transportation within the county directly depends on county roads network.

Here fixed effect regression is preferable to random effect regression according to the Hausman test. The majority of roads types have positive and significant coefficients in the second column, however their values seems to be very high, moreover this model suffer of endogeneity caused by reverse causality, anyway the solution of this problem is beyond the frameworks of this article.

Expectedly the coefficient on capital and eu variable is larger in counties with high quality of government, however, several types of roads show inverse relationships, so county modernized roads and county roads with light covering have larger impact on GRP in counties with lower quality of local government. Being unexpected, these results are in line with corresponding literature. Thus Steethepali et al (2008) showed that such types of infrastructure as water supply and stock of roads have lower impact in regions with high quality of government. A possible explanation can be the omitted variable bias: meaning that regions with better governance has many other drivers of the economic growth and roads are not such important as in regions with limited growth drivers due to poor performance of local authorities.

Table 1

Model for regions with different quality of local government

Variables	county	high	medium	low
log capital	1.172***	1.141***	1.150***	1.076***
	(0.02)	(0.05)	(0.03)	(0.05)
log railways	-0.211*	-0.327*	0,049	-0.935***
	(0.09)	(0.16)	(0.12)	(0.26)
log national roads	0.666*	3.409**	0.900**	-1.634*
	(0.27)	(1.05)	(0.34)	(0.74)
log national modernized roads	0.805**	-1,37	0,517	3.115***
	(0.27)	(1.17)	(0.31)	(0.76)
log national roads with light covering	-0,025	-0,013	-0,052	0,038
	(0.02)	(0.03)	(0.04)	(0.06)
log county roads	0.656***	-0,092	0.874***	0,222
	(0.16)	(0.35)	(0.21)	(0.43)
log county modernized roads	0,037	0,092	0,01	0.372***
	(0.03)	(0.07)	(0.03)	(0.11)
log county roads with light covering	0,05	0.325*	-0,018	1.050***
	(0.05)	(0.15)	(0.05)	(0.24)
eu	0.756***	0.705***	0.781***	0.542***
	(0.03)	(0.07)	(0.04)	(0.08)
constant	-20.097***	-18.859***	-20.416***	-17.264***
	(0.33)	(0.76)	(0.43)	(0.83)
R2	0,952	0,965	0,952	0,958

*Note: The numbers in parentheses are standard errors, *,**,***indicates significance at the 10%, 5% and 1% levels respectively.*

Bibliografie

1. Canning, David. 1999. *The Contribution of Infrastructure to Aggregate Output*, The World Bank Policy Research Working Paper 2246. World Bank.
2. Seethepalli, Kalpana, Maria Caterina Bramati, and David Veredas. 2008. *How relevant is infrastructure to growth in East Asia?*. World Bank Policy Research Working Paper Series.
3. Sundström A. and Stockemer, D. 2013. Voter Turnout in the European Regions: The Impact of Quality of Government.