



7<sup>th</sup> International Conference on Applied Statistics

## Challenges in analyzing correlation between water infrastructure and economic development

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### Abstract

Availability of infrastructure significantly influences the development of regions and countries, hence theoretical and empirical research on the relationship between infrastructure capital and economic growth should provide answers to an important question: increasing the stock of public capital can stimulate economic growth? The issue of investment in infrastructure is critical as infrastructure development in Romania is supported by the EU Structural and Cohesion Funds. Channels and models of economic growth with one factorial variable characterizing the infrastructure will be compared, analysing their approaches, features and limits.

Also, our case study will present some results for the impact of selected categories of public infrastructure sectors on the recent economic growth performances in some EU new member states. Thus, we hope to identify and discuss some conceptual and methodological challenges of grounding policies of development for various types of infrastructure. For Romania, we estimate the correlation between water supply and sewerage infrastructure and economic development indicator GDP per capita, at the regional county level.

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Selection and peer-review under responsibility of the Department of Statistics and Econometrics, Bucharest University of Economic Studies.

*Keywords:* infrastructure ; economic growth ; water supply and sewerage ; correlation ; cross-county

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## 1. Introduction

This paper was based on some recent study and research outcomes dedicated to the post doctoral thesis „*Investments in Environmental Infrastructure: Obligations and Opportunities for Romania's Sustainable Economic Development*” (Frone Simona, 2012). Romania's ability to provide efficient infrastructure and environmental services, both nationally and locally, is an important factor in stimulating and supporting sustainable economic development and the focus of our thesis is on the Water Supply and Sanitation (WSS) infrastructure, as the main part of the environmental infrastructure and a sensitive development issue for Romania.

One of the main research goals of the postdoctoral paper was the theoretical, methodological and empirical analysis of the correlation between investments in water infrastructure and economic development. The section named *Mathematical models of economic growth with a factorial variable characterizing the infrastructure* was dedicated to the study, comparison, analysis and applicability of important mathematical economic models of growth with an explanatory capital infrastructure variable. The infrastructure concept is explained, with the main channels through which this modern category of mainly public capital may influence economic growth and development; it also summarizes the most important types of mathematical and economic functions and approaches used to measure the impact of investment or resources of public infrastructure capital on economic growth.

In the following section: *Limitations and challenges for conceptual and methodological analysis of the correlation between WSS infrastructure and economic development at local, regional, national level* actually we proceeded to the application of linearized model of production function to analyze this correlation, showing first the main obstacles and conceptual and methodological limitations of this approach, both in general and especially for Romania, atypical in Europe in terms of the gap (shortfall) of endowment and access to public utilities networks for water supply and sanitation. Empirical applications are then presented to measure the impacts of infrastructure capital by estimating the elasticity of output (GDP) on the input of water infrastructure, identified by some proxy variables for which there were available data sets; there are several own regression computations and analysis of specific issues and challenges concerning the correlation between access to water infrastructure and socio-economic development at national and regional level.

## 2. Conceptual and theoretical issues

As analysed and argued in the doctoral paper (Simona Popescu Frone, 2000), an important class of capital for economic growth is the public capital, objectively requiring state action and investments. Public capital consists, in countries with market economies, especially in public infrastructure. This includes roads, highways, ports, dams, bridges, airports, water supply networks and sanitation, environmental protection systems, hospitals and some productive forms of capital typically publicly provided.

Recent realities of the market economy, namely the global economic and financial recession really show that not always all private savings automatically and effectively turn into a sufficient volume of investment, especially in an appropriate investments structure that would stimulate and support sustainable economic growth and socio-economic development. Likewise human capital, public infrastructure can be incorporated in the production function to explain the residual growth factor; it is a public good financed by public saving, not usually traded on international markets so that in some countries (including Romania) accumulation of public infrastructure may be insufficient, hence delaying economic growth convergence with other states.

Public capital, especially the infrastructure capital is essential for economic and social activities carried out by the population in households and businesses. Nevertheless, empirical research on the relationship between public capital and economic growth should provide answers to some important questions: first, by increasing the stock of public capital we can stimulate economic growth? Another issue relevant to economic policy is the net economic growth effect of these investments in infrastructure, which might this way divert resources from other uses (Canning D. and Pedroni, P. 1999).

However, public investment related to development of infrastructure and provision of public goods can be complementary and not competing private investment. Public investments of this nature enhance opportunities for private capital and increase the productivity as well as the demand for private sector production and related ancillary services through the expansion of aggregate economic activity and saving. Therefore, one can state that the marginal

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