

Effect of public-private infrastructure investment on economic growth

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Abstract - In this paper we analyze the effect of public and private infrastructure investment on economic growth from 2006 to 2016, using Mexico as the case study. We found a positive and significant effect, mainly in the private sector.

Introduction

Evidence exists that investment in infrastructure contributes to growth. A vast literature has already addressed this relationship, but most of previous studies have obtained ambiguous rather than robust results, mainly because of the problems associated with the methodology used (Teles and Mussolini, 2012). As a result of that, this subject has been recently addressed from different methodologies in different geographical areas, mainly in emerging economies. For instance, in a recent work using India as the case study, Pradhan and Bagchi (2013) find a bidirectional causality between road transportation and economic growth, and a unidirectional causality from rail transportation to economic growth. That paper suggests that expansion of transport infrastructure (both road and rail) along with gross capital formation will lead to substantial growth of the Indian economy.

In the case of Asia, Pradhan, et al (2016) assess the causal relationship among telecommunications infrastructure, financial development, and economic growth in 21 Asian countries between 1991 and 2012. Their results reveal that there is a causality, in a Granger sense, among the variables, both in the short and long run. For the region of Africa, Donou-Adonsou and Mathey (2016), investigate the impact of telecommunications infrastructure in Sub-Saharan Africa, in a panel of 47 countries over the period 1993–2012. Their results show that the internet and mobile phones have contributed to economic growth. Also, their results suggest that the development of telecommunications infrastructure fosters economic growth in Sub-Saharan Africa.

For Latin America Countries (LACs), in the case of Peru, Urrunaga and Aparicio (2013) confirm that public-service infrastructures (roads, electricity and telecommunications) are important in explaining temporary diffe-

rences in regional output. Meanwhile, Teles and Mussolini (2012) analyze the relationship between infrastructure and total factor productivity in the four major Latin American economies: Argentina, Brazil, Chile, and Mexico, between 1950 and 2000. Even when they analyze the case of Mexico, as we do in this work, one main difference between that paper and ours, is that they analyze the indirect effect of infrastructure on output, via productivity, while we analyze the direct effect. Also, we use a more recent database from 2006 to 2016.

As we can see in this short, but recent literature review, still there is no recent literature that addresses the link between economic growth and infrastructure investment in some LACs, as it is the case in other geographical areas. Therefore, the purpose of this work is to contribute to the literature in this subject. In particular, what we want to address is the lack of public infrastructure investment in Mexico, compared with the private infrastructure investment. To achieve this, we analyze the long-run relationship between these two variables, through an econometric analysis, dividing public and private investment.

Data and Methodology

In order to analyze the effect of infrastructure expenditure on economic growth, we use quarterly data from Mexico, from 2006 to 2016 (2006 is the year when the Mexican authorities began to account for infrastructure). We use information from the Mexican Institute of Statistics and Geography (Instituto Nacional de Estadística y Geografía). As a measure of economic growth, we use Gross Domestic Product (GDP). Also, we use the investments sectors that represent 85% of total investment in infrastructure in Mexico. These are: i) Building (Build), which includes investment in housing, industrial buildings, schools and

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hospitals; and ii) Telecommunications (Telc), which includes investment in works related to radio and television.

In this way, we establish the following function:

$$GDP = F(Build, Telc).$$

We expect a positive relationship of this function. It is important to separate public investment from private investment because, according to Zangouinezhad and Azar (2014), there is a debate in writings as to the correct definition, whether these two kinds of investments are substitutes or complementary. Given the above, we propose estimating three models.

a) Impact of private sector investment on infrastructure.

$$GDP_t = \alpha + \beta_1 Build_t + \beta_2 Telc_t + u_t.$$

b) Impact of public sector investment on infrastructure.

$$GDP_t = \zeta + \alpha_1 Build G_t + \alpha_2 Telc G_t + u_t.$$

c) Impact of public and private sectors investment on infrastructure.

$$GDP_t = \varphi + \lambda_1 Build_t + \lambda_2 Telc_t +$$

In order to calculate the impact in terms of elasticities, all variables are expressed at constant prices and logarithmic terms. It is also important to mention that in order to verify that the relationship we are analyzing is not spurious, we verify cointegration, through a cointegration test. For simplicity of the exposition, we do not show the results of these tests, but this condition is satisfied, in all cases, except for the infrastructure expenditure in public sector of telecommunications, and for this reason, we do not include it in the model “b”, nor in the model “c”. In the following Table 1, we show the results:

Method: OLS (Q1 2003 - Q1 2016)			
Dependent variable: Quarter GDP			
	Model a	model b	model c
Constant	12.57	14.7696*	12.2223
Build	0.2193*		0.1973*
Telc	0.0138**	0.1093*	0.0122**
Build G			0.0503*
The symbol * corresponds to coefficient of significance at 5%, ** to at 10%			
Source: Own estimations with data from INEGI			

First, the results in Table 1 confirm our hypothesis about a positive relationship between infrastructure investment and economic growth. Second, our interpretation of these results goes as follows: for every 1% of private sector investment in building (housing, industrial buildings, schools and hospitals), the Mexican GDP increases by approximately 0.2%. Also, for every 1% of private sector investment in telecommunications (radio and TV), the Mexican GDP increases by approximately 0.01%. On the other hand, for every 1% of public sector investment in building, the Mexican GDP increases by approximately 0.05% (taking model “c”). As we mention before, there is no a long-run relationship between public investment in telecommunications and economic growth.

From these results, we can conclude that private sector investment in infrastructure is driven, in a more significant way, by the Mexican economic growth, than by public investment. This result is important for policy makers, for at least two reasons: i) even when there is a positive relationship between infrastructure investment and economic growth, this link is not very significant, and more investment is required; ii) private investment results to be more effective to generate economic growth. Consequently, in order to increase private participation in investment in infrastructure in LAC through money and capital markets, it is necessary to create the institutional and market conditions. In order to do so, the LACs need a stronger regulatory framework, where institutional investors, such as pension and mutual funds, could increase their capital allocations in infrastructure, for example, through schemes such as Public Private Partnerships (PPPs), without increasing their exposure to risks.

Conclusion

In this work, we analyze the effect of public investment and private investment on economic growth in the Mexican economy, from the period 2006 to 2016. In particular, we study building, and telecommunications infrastructure. First, as we expected, we find a positive effect of infrastructure investment on economic growth. Second, we find that private investment has a bigger impact on economic growth, than public investment. As an example, on average, for every 1 US dollar that the private sector invests in building infrastructure, the Mexican GDP increases by about 0.2 cents, while if the investment is public, GDP would increase by only 0.05 cents.

These results are important for policy makers, because they serve as evidence for the efficiency of the private sector in contributing to economic growth, through investment in infrastructure. One of the challenges to foster the *private*

infrastructure in LACs, are some obstacles in the financial markets, some of which are: high transactions costs, political and governance risks, and policy and regulatory barriers. Consequently, in order to increase private participation in infrastructure investment in LACs, through money and capital markets, it is necessary to create the institutional and market conditions.

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