Chapter 3

The Impact of Infrastructure on Growth in Developing Countries:
Dynamic Panel Data Analysis

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ABSTRACT

Infrastructure and growth nexus has been debated in the literature since 1980s. This debate has a vital importance for the sake of developing countries. These countries need to grow faster in order to catch-up their advanced counterparts. Thus, it is important to detect the effect of infrastructure on growth. Bearing in mind this fact, we develop a standard growth regression in this present chapter using per capita GDP growth rate as a dependent variable. Infrastructure is added to the model as an index constructed from the indicators of infrastructure: total electric generating capacity, total telephone lines and the length of road network. We also employ set of instrumental variables comprising 29 developing countries between 1990 and 2014. In order to estimate our dynamic panel data we prefer GMM estimators. According to our empirical analysis, we can claim that infrastructure has a positive and significant impact on growth. But this impact is smaller than the earlier studies predict.

INTRODUCTION

Infrastructure consists of physical assets like roads, power plants, fiber cables or sewer systems as well as services like communication network services, power distribution services. According to World Bank, “infrastructure helps to determine the success of manufacturing and agricultural activities. Investment in infrastructure also improves lives and help to reduce poverty”. The role of infrastructure on economic growth has been discussed in the literature since the seminal study of Aschauer (1989). Several criti-
cisms emerged afterwards, but none of them totally refused the role of infrastructure on growth. After this asserting result of Aschauer (1989), it is generally accepted that the differences in the development levels could be attributed to the differences in infrastructure stocks. However, in the 1990s, most of the developing countries faced with crisis and forced to consolidate their fiscal budgets. Most developing countries postponed and even cancelled their infrastructure investment. The infrastructure gap between advanced and developing countries have been retched up as a result. After 2000s, most governments try to compensate the infrastructure investment gaps. Financial crisis erupted in August 2007 had also effects on developing countries. However, the crisis was a financial crisis that had repercussions on real economy. For this reason, governments expanded their fiscal expenditures generously. They introduced fiscal stimulus packages sequentially. Bearing in mind the growth effects of infrastructure, an average developing country devoted 40 percent of the fiscal stimulus packages to infrastructure investment, while advanced countries devoted 21 percent.1

Infrastructure was considered as a public good as it generates externalities and it is difficult to exclude the non-payers from using infrastructure. However, in recent decades, private sectors have begun to play an important role in infrastructure services. Infrastructure used to be provided by the governments in developing countries but with the widespread of the privatization trend, public-private partnerships and build-operate-own models gain importance.

Infrastructure, as World Bank (1994) classified, is analyzed in four broad categories: transportation, power (or energy), telecommunication and water and sanitation. In this study, we identify it in three broad categories: transportation, power and telecommunications. We exclude the water and sanitation infrastructure as the data is scarce. However, using these indicators in growth regression may lead to econometrical problems because these indicators are highly correlated. For this reason, in this study we compute an infrastructure index obtained from indicators of these three dimensions of infrastructure. We use Principal Component Analysis (PCA) while computing this index.2

In order to see the effect of infrastructure on growth, we develop a model of growth regression. The studies conducted to estimate this effect face with endogeneity problems as the relation may go in reverse. Economic growth could also necessitate infrastructure advancement in demand side. Furthermore, as countries grow and get richer, they could be able to devote more resources to infrastructure investment. Thus, they could build large stocks of infrastructures. This problem is important for empirical analysis as it could lead to spurious correlation. We estimate the model with using GMM estimators in order to consider endogeneity problem.

We construct a macroeconomic panel data set between 1990 and 2015 and comprising 29 countries. We get middle income countries as classified by the World Bank. But we exclude the small states – with a population less than 1 million- and the countries that do not have continuous data. As we are working with panel data comprising different countries, heterogeneity could be observed among these countries. We try to parametrize this heterogeneity by employing instrumental variables. We also use fixed effect estimators in line with the literature.

Before estimating the model we also utilize panel unit root test to detect the stationary of the data. We use the unit root test developed by Im, Pesaran and Shin. This is one of the different features of our study. Moreover, in this study we work with an updated data set –extended over 2014- which captures the effect of fiscal stimulus packages in the aftermath of the financial crisis.

The rest of the paper is organized as follows. In the following chapter, infrastructure and growth nexus is represented briefly. In this framework, we try to explain the channels between infrastructure and growth. The succeeding section offers an empirical literature review. We briefly discuss selective
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