Thesis Abstract

Registration Number:	□ "KOU" □ "OTSU" No. *Office use only*	Name:	Umid Abidhadjaev

Title of Thesis: Empirical Analysis of Economic Effects of Infrastructure

Summary of Thesis:

This thesis constitutes series of studies which focused on role and nature of infrastructure's economic effects. Infrastructure is defined as facilities of a country that make economic activity possible, such as communication, transportation and distribution networks.

In the Chapter 1 of the thesis I employed production function approach to explain the nature of infrastructure investment on economic activity. In terms of production function approach I augmented neoclassical growth model and provided theoretical framework which could explain how infrastructure investment can affect GDP under assumption of steady-state condition and empirically estimated the direction and magnitude of its impact on level of GDP per capita and growth rate of GDP per capita controlling for variables of infrastructure and level of education in cross-country growth regression.

Main contribution of the first chapter is it demonstrated that conditioned on choice of proxy variables for human capital infrastructure investment to GDP ratio constitutes a significant determinant of economic growth in terms of growth rates.

Chapter 2 to Chapter 5 present empirical evidence obtained through estimation of the impact of infrastructure provision on outcome variables of interest. While chapter 1 employs production function approach and demonstrates confirmatory results revealing statistically significant and positive association of infrastructure and income per capita, in absence of measurement on infrastructure in form of time varying covariates such as monetary or physical units this approach faces major limitation. Therefore, analysis presented in subsequent four chapters are accomplished by using difference-in-difference approach which focuses on the impact of infrastructure project when information about outcome variables of interest, geography (place) and time period of infrastructure project constitute sufficient condition to conduct an empirical study.

In the Chapter 2 of the thesis I examined the nature and magnitude of the effects of infrastructure provision on regional economic performance as observed by regional GDP growth rate and its components. The empirical evidence obtained in the scope of this analysis is based on difference-in-difference estimation linking the changes in the growth rate of regional-level economic outcomes in affected regions to the newly built railway connection in the southern part of Uzbekistan, conditioned on regions' time-invariant individual effects, time-varying covariates and evolving economic characteristics.

Main contribution of this chapter is that to explore the differential nature of infrastructure provision I estimated regional, spillover and connectivity effects from the railway connection, as well as the anticipation, launch and postponed effects of such a connection: the empirical evidence suggests that impact of the railway provision made a positive and statistically significant impact not only on the region of infrastructure itself but also extended to neighboring and distant regions

connected through integrated system of railway connection. Main reason for examining such effects came from literature survey of previous studies on infrastructure which had found positive results on aggregate level and negative results on regional level.

The chapter 3 focused on the same case of infrastructure provision in Uzbekistan but employed different estimation strategy. Major differences from the one used for previous chapter are as following: time periods of the observed impact are determined in consequential order and control group considered to be fixed irrespective of choice of treatment groups. Main contribution of this chapter was to reinforcing of the previously found results regarding spillover effects which took place not only across geographical points but also through timeline of project's construction and operation.

In the Chapter 4 and Chapter 5 I analyze the impact of infrastructure investment on fiscal revenues of local government authorities.

 The Chapter 4 analyzed the impact of Kyushu high speed rail line on tax revenues of the prefectures in Japan. The difference-in-difference coefficients were estimated focusing on time periods of construction and two operation phases. The analysis are carried out differentiating for geographical scope as well as disaggregated outcome variables in form of personal income tax and corporate income tax.

Main contribution of the chapter is that obtained empirical evidence allows to differentiate the spillover effects by directly affected prefectures, neighboring prefectures and prefectures of joint rail lines. The empirical evidence suggests that the prefectures of location of Kyushu high speed rail line had statistically significant increase in tax revenues during construction period and second phase of operation when Kyushu high speed rail line was connected to Sanyo high speed rail line, while during autonomous operation phase this effect as observed by deviation on tax revenues decreased.

In the Chapter 5 the impact of the highway on regional fiscal revenues is analyzed. In particular, the chapter examined the impact of construction and operation of Southern Tagalog Arterial Road on county-level government revenues in affected counties in Batangas province of the Philippines, conditioned on the counties' time invariant entity effects.

Main contributions of the chapter is that for the purposes of analysis I employed an estimation examining direct effect of the highway on the outcome variables of the counties of its location as well spillover effect on corresponding variables of neighboring counties, gradually testing the impact by dividing total observations under treatment into 5 groups. Similarly in terms of timeline the chapter examined the impact starting with pre-construction period, construction period and operation period of the highway. This allowed to obtain the empirical evidence suggesting that the Southern Tagalog Arterial Road in the Philippines induced a positive and statistically significant impact on local government fiscal revenues in counties of location during construction and operation periods, while spillover effects across neighboring counties appeared to be positive but of diminishing nature with respect to distance from the highway.

To summarize, in terms of role of infrastructure, the thesis demonstrated evidence of significant statistical association of infrastructure with economic growth. In terms of nature of infrastructure's impact on regional economic activity and fiscal revenue performance the thesis presented case studies with empirical evidence suggesting possibility of spillover effects across geography and time, meaning that impact of infrastructure might took place not only during operation period and on the region of location, but also prior to operation period and in neighboring and distant regions of the country connected through railway system.