ABSTRACT

Infrastructure plays an important role to support development and growth. The rationale behind using infrastructure as an argument for economy-wide growth stems from infrastructure’s direct impact - acting as intermediate input to production, enhancing private sector productivity and being complementary to private capital formation - to its indirect effects like reducing adjustment cost, helping increase durability of private capital, increasing competitiveness of a region, impacting demand and supply of health and education services. A wide debate on the influence of infrastructure on output levels and growth has led to attempts to quantify this effect and estimate the contribution of infrastructure as a factor of production to aggregate output. This study empirically estimates the impact of various infrastructure sectors on output at both All-India level and at State-level.

Since use has been made of time series data, special care was taken to use appropriate econometric methodologies in order to avoid biased results. Infrastructure indices, which were created using Principal Component Analysis for All-India were used alongside individual infrastructure indicators and were taken as explanatory variables. Upon considering the impact of growth rate of various infrastructure indicators as independent variables, it is found that overall, growth in index of infrastructure contributes 0.23% towards output growth. Electricity and telecommunication growth rate has had significant and positive impact on output growth. However, impact of growth rate of surfaced road density on output growth rate was not significant. To examine the dynamic relationship between output and infrastructure index, a VAR model was employed. A one unit shock to composite index of infrastructure leads to an increase in output growth of 0.012 in the first period which gradually dies out after 4 periods.

The impact of which infrastructure sub sector matters more and at which stage of development has been debated in literature and attempt was made to address this issue. With a one percentage increase in teledensity, growth rate of services sector increased by 0.15%, and that of industrial sector increased by 0.10%. However, a one percentage increase in electricity generation resulted in a 0.5% increase in Industrial output growth, and a 0.3% growth in services sector. Hence, it can be seen that even though both the infrastructure sectors were important for the growth of each sector, the importance varied for each.
Attempts are made to establish the nexus between per capita NSDP in India and infrastructure availability in the 17 major Indian states. The main conclusions that can be drawn are: considerable regional disparities exist in terms of per capita net state domestic product (PCNSDP) for the time period 1981 to 2010. These disparities have increased over the years even though the initially poor states have been growing at faster rate. After grouping the states into three categories important observations were that the poor states were also the ones with least amount of infrastructure development, whereas, the rich states had relatively much better infrastructure provision but there is evidence of an increase in infrastructure growth in poor states after the reforms of 1991 even though their level still remained considerably below that of the rich states. After undertaking panel data estimation it was found physical infrastructure variables did not have a uniform influence on output. The relationship not just differed for aggregate output, secondary and tertiary sector output; there was also distinct difference in the impact infrastructure had on the same sector for different time periods.

The relationship between output at state-level and infrastructure variables for the states is described for three different periods – 1980s, 1990s and 2000s. The decision to divide the time period into these three phases as each of these decades is characterised by differing political agenda which gets reflected in the infrastructure policies of the time. The impact of infrastructure varies not just on the specific sector of the economy but also depending upon the time period under investigation, as over time, the drivers of growth change and hence, the relative importance of infrastructure sub sectors evolve. For aggregate output, there was a significant and positive impact of electricity consumption which was highest in 1990s and it was the worst in 2000s in the face of poor quality of power infrastructure in the country. Output elasticity of telecommunication was highest in 1990s but declined in 2000s indicating that much needs to be done in terms of ICT diffusion in India. Contribution of roads infrastructure was found to be insignificant in the face of political agendas (building roads closer to election year) and poor quality of existing roads.

One of the important ways that infrastructure can impact economic growth is via its impact on total factor productivity growth in the country. Thus, impact of different infrastructure on TFP growth was studied and it was found from econometric estimation that the relation was positive and significant with the elasticity of TFP
growth with infrastructure index being 0.20, i.e. a one unit increase in the index of infrastructure, increases TFP by 0.20 percentage. Based on the available data, regional impact of infrastructure on TFP growth of organised manufacturing sector was also attempted and electricity generation, road density, and financial infrastructure were found to be significant for TFP growth rate of organized manufacturing sector.

India witnessed high levels of growth in the last decade but national levels of poverty and inequality remain high. However, it is not necessary that economic growth attributable to infrastructure development will consequently lead to a reduction in inequality. This study analysed the relation between physical infrastructure and inequality and determined the nature of this relation and focussed on 17 major Indian states. Gini coefficient (for rural and urban sectors combined) was used as the dependent variable and it was computed using data on Monthly Per Capita Consumption Expenditure (MPCE), which was estimated from surveys of National Sample Survey Organisation for the years 1983, 1987-88, 1993-94, 2004-05, and 2009-10 (the data was deflated using appropriate price indices). By evaluating Indian states with different levels of development (measured in terms of per capita net state domestic product (NSDP)) it has been shown that the impact of infrastructure on consumption inequality across states differs not just for the type of infrastructure under consideration but also for the income category the state belongs to. The results have shown that some components of infrastructure, mainly power and roads, tend to increase interpersonal inequality at the regional level. The results of this study do not prescribe abandoning transportation projects or infrastructure development but instead recommend that the government should emphasize also on investments in complementary policies. Infrastructure can help open up opportunities but it should not be that these benefits are reaped by those who are in a position to be able to take advantage of these.

This study can rightly claim to have supplemented to the existing empirical literature on importance of infrastructure development in India by looking at impact of infrastructure in a holistic manner — its impact on aggregate output and sectoral output — for the country as well as at state-level for different time period; its indirect impact on output growth via contributing towards TFP growth as well looking at the possible distributional impact and measuring the impact on inequality.