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Transport infrastructure, economic development and urbanization in India (1990–2011): Is there any causal relationship?

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ABSTRACT

Development of transport infrastructure has long been taken as a major tool in promoting economic development and urbanization of a region. However, it is quite debatable whether transport infrastructure promotes economic development and urbanization, or economic development and urbanization create demand first which leads to investment in transport infrastructure. Each of the views has theoretical support. Therefore, apart from theory, empirical evidence is required to establish direction of causality, which bears serious policy implications. This study looks into different sub-sectors of transport infrastructure to find its long-run relationship and direction of causality with economic development and urbanization. It first finds the order of integration of the variables and then tries to find their causal relationship using cointegration and Granger causality test approach for India between 1990 and 2011. It uses Vector Auto-Regression and Vector Error Correction model to find short-run and long-run causality. Results showed existence of long-run relationship between transport infrastructure and economic development, and the direction of causality is from economic development to transport infrastructure in most of the cases, thus drawing support in favor of Wagner's law.

1. Introduction

Economic development of a region has remained a major goal in regional planning as it is also thought to improve the quality of life of people. Economic development in terms of per capita income or per capita Gross Domestic Product (GDP) has remained a yardstick for measuring development of a region for a long period of time. Other indicators for development, such as Human Development Index (HDI), was developed later to address quality of life by taking into considerations aspects such as access to education and health apart from economic development. However, coefficient of correlation between ranking of per capita GDP and HDI was found to be 0.92 for the study of 175 nations (Meier and Rauch, 2012, p. 14), indicating close association between economic development and quality of life.

Various researchers have found close association between investment in infrastructure and economic development of a region (Aschauer, 1989; Fan and Chan-Kang, 2008; Kumar, 2002; Lall, 2007). Among the different types of infrastructure, transport infrastructure is considered to be one of the most important one by the policy makers since transport cost is very

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crucial in deciding choice of location for firms and therefore economic development of a region. However, it has been a matter of debate whether development of transport infrastructure promotes economic development or economic development promotes development of transport infrastructure or there is a feedback effect. Each of these views has found theoretical support. Endogenous growth theory supports the view that investment in infrastructure promotes economic development (Barro, 1990; Barro and Sala-I-Martin, 1992, 1995; Bleaney et al., 2001; Romer, 1994). On the other hand, according to Wagner's law, economic development leads to investment in public infrastructure (Akitoby et al., 2006; Verma and Arora, 2010; Wagner, 1958; Wagner and Weber, 1977).

The situation is similar in case of association between economic development and growing share of urban population (i.e. urbanization). Urbanization, often considered as a proxy for quality of life and development, has been observed to be positively correlated with economic development (Firebaugh, 1979; Moomaw and Shatter, 1996). However, agglomeration of people depending on non-agricultural activities (i.e. urbanization) may lead to increase in demand for economic opportunity as well as supply and division of labor and subsequently economic growth, or agglomeration of economic activities may lead to increase in productivity and wage and subsequently agglomeration of people, or they may happen simultaneously (i.e. feedback relationship).

Likewise, investment in various transport infrastructure may support growth of urban population as well as its spatial spread. Pradhan (2007) found close association between urbanization and infrastructure development for India. However, improvement in transport infrastructure in a region may attract people due to improvement in accessibility, boosting economic sectors located in urban areas, and thus enhancing productivity (by reducing cost of transportation) and subsequently increase in urbanization, or agglomeration of people may create demand first and this in turn may cause investment in infrastructure.

To have a pragmatic policy for investment in transport infrastructure and overall development of a region, it is important to find out the direction of causality between transport infrastructure, economic development and urbanization for that region. As theory alone is not sufficient to establish their relationship, empirical evidence is needed to establish the direction of causality between variables, pertaining to a specific region of study. If causality runs from transport infrastructure to economic development and urbanization, priority in fund allocation should be given to transport infrastructure projects. However, if the opposite is found to be true, priority should be given to creation of jobs in the secondary and tertiary sector, increase in productivity, etc.

In this study, dynamic time series analysis approach has been adopted to investigate cointegration (i.e. long-run relationship) and Granger causality between transport infrastructure, economic development and urbanization for India over the period 1990–2011 (i.e. post-liberalization period) in a framework which takes into consideration endogeneity of the variables. Moreover, this study considers several sub-sectors of transport infrastructure to know the nature of relationship in detail.

After introduction, Section 2 reviews the literature from similar areas across the globe on the relationship between transport infrastructure, economic development and urbanization, which incorporates dynamic time series approach of analysis using concepts such as cointegration and Granger causality. It also gives a brief review of history of Indian economy and urbanization from the existing literature focusing their relationship with transport infrastructure. It looks into the historical facts primarily from colonial and post-colonial period in India, with some reference to pre-colonial times. Section 3 explains the methodology and also describes the variables considered and sources of data. Section 4 shows the results followed by detailed discussion with respect to probable policy implications.

2. Literature review

2.1. Literature on the relationship between transport infrastructure, economic development and urbanization

Infrastructure development has generally been observed as a key for economic development of a region. The probability of getting the expected return from investment is related to the level of infrastructure in that region. According to the theory of 'New Economic Geography', the interaction between increasing return to scale and transport cost decides whether firms will try to agglomerate or disperse and thus influence economic activities of a region (Ascani et al., 2012; Fujita and Krugman, 2004). Physical infrastructure (like roads, railroads, and highways) plays a key role in deciding private economic growth (Cain, 1997). Herranz-Loncan (2007) considered railroad, urban transport, roads, ports, telecommunication, energy distribution and hydraulic works for calculating infrastructure investment and showed that investment in infrastructure had a strong positive impact on Spanish economic growth between 1850 and 1935. Development of urban roads and major regional roads led to rising GDP share in the city for both manufacturing and service industry (Ding, 2013). Air connectivity also influences access to markets, capitals, ideas and people (Tam and Hansman, 2002). Ades and Glaeser (1999) showed that openness in terms of port accessibility and railroad density has a significant influence on economic growth. Landlocked countries are observed to have lesser access to global market and slower economic growth (Hausmann, 2001). Thus, infrastructure in general and transport infrastructure in particular affect economic growth. However, investment in different types of transport infrastructure has been varying in India. Over the last two decades there has been significant increase in container port traffic and road length, whereas, investment in railways has remained stagnant (Chakravorty and Lall, 2007). Coastal districts in India have raised their share of national investment significantly and most of the foreign investments