Research in Transportation Economics 38 (2013) 139–148

Contents lists available at SciVerse ScienceDirect

Research in Transportation Economics

journal homepage: www.elsevier.com/locate/retrec

Effect of transportation infrastructure on economic growth in India: The VECM approach

Rudra P. Pradhan [a,*], Tapan P. Bagchi [b]

[a] Vinod Gupta School of Management, Indian Institute of Technology Kharagpur, India
[b] Narsee Monjee Institute of Management Studies (Mumbai), Shirpur Campus, Dhule 425405, India

ARTICLE INFO

Article history:
Available online 14 June 2012

Keywords:
Transport infrastructure
Economic growth
VECM

ABSTRACT

This paper examines the effect of transportation (road and rail) infrastructure on economic growth in India over the period 1970–2010. Using Vector Error Correction Model (VECM), the paper finds bidirectional causality between road transportation and economic growth. It also finds bidirectional causality between road transportation and capital formation, bidirectional causality between gross domestic capital formation and economic growth, unidirectional causality from rail transportation to economic growth and unidirectional causality from rail transportation to gross capital formation. The 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. Therefore, within its stated scope, this study suggests that a suitable transport policy should be retained to boost transportation infrastructure and hence sustainable economic growth in India.

1. Introduction

The transportation would be a key facilitator to sustainable economic growth is rarely questioned. In India in particular, transportation has been noted to be a critical infrastructure required for economic growth (Raghuram & Babu, 2001). Indeed, the benefits and importance of transportation infrastructure to economic growth have been recognized for a long time (see Phang, 2003). A well-oiled transportation infrastructure expands the productive capacity of a nation, both by increasing the mobilization of available resources, and by enhancing the productivity of those resources. The support for this assertion is straightforward and there are many ways we can justify it. First, transportation infrastructure can enter in the production process as direct input and in many cases as an unpaid factor of production. Second, transportation infrastructure may make other existing inputs more productive. For instance, a well-designed road allows goods to be transported to market in less time and hence, reducing the transportation cost in the production process. Third, transport infrastructure can act as magnet of regional economic growth by attracting resources from other regions, which is called agglomeration. In this vein one would recall that throughout the growth of civilization, most centers of economic activities flourished along riverbanks and coast lines where water was the convenient prime carrier of raw materials, goods and labor.

Transport infrastructure can also affect economic growth by changing aggregate demand. For instance, transportation infrastructure construction can create and increase demand for intermediate inputs from other sectors and stimulate multiplier effects in the economy. Similarly, the targets of "universal education and health care for all" would be tough to reach without the provision of transport infrastructure. In short, transport remains a crucial infrastructure that boosts economic development (Esfahani & Ramirez, 2003; Phang, 2003; Sanchez-Robles, 1998; Shah, 1992; Short & Kopp, 2005; Wang, 2002; WDR, 1994). But at the same time, we must acknowledge the need for in depth analysis to establish any "self-evident" causality implied here. Of necessity such analysis would be complex and must recognize the multidimensional nature of the links between transport, location, development and many other new factors relevant to our understanding of these processes as these too affect economic growth (see Fig. 1). The present approach to study a part of this will be empirical. The demand of the transport sector itself is likely to grow further with economic growth, population growth, industrialization, urbanization and so forth (Gramlich, 1994; Ramanathan & Parikh, 1999). Public transportation infrastructure, in fact, can influence economic output by crowding in or out private inputs such as labor and capital. An increase in public transport infrastructure would attract more private investments if there is a complementing relationship between them; or it could reduce private investments when public

* Corresponding author. Tel.: +91 3222 282316; fax: +91 3222 278027.
E-mail addresses: rudrap@vgsom.iitkgp.ernet.in (R.P. Pradhan), tapan.bagchi@nmims.edu (T.P. Bagchi).

0739-8859/$ – see front matter © 2012 Elsevier Ltd. All rights reserved.
doi:10.1016/j.retrec.2012.05.008

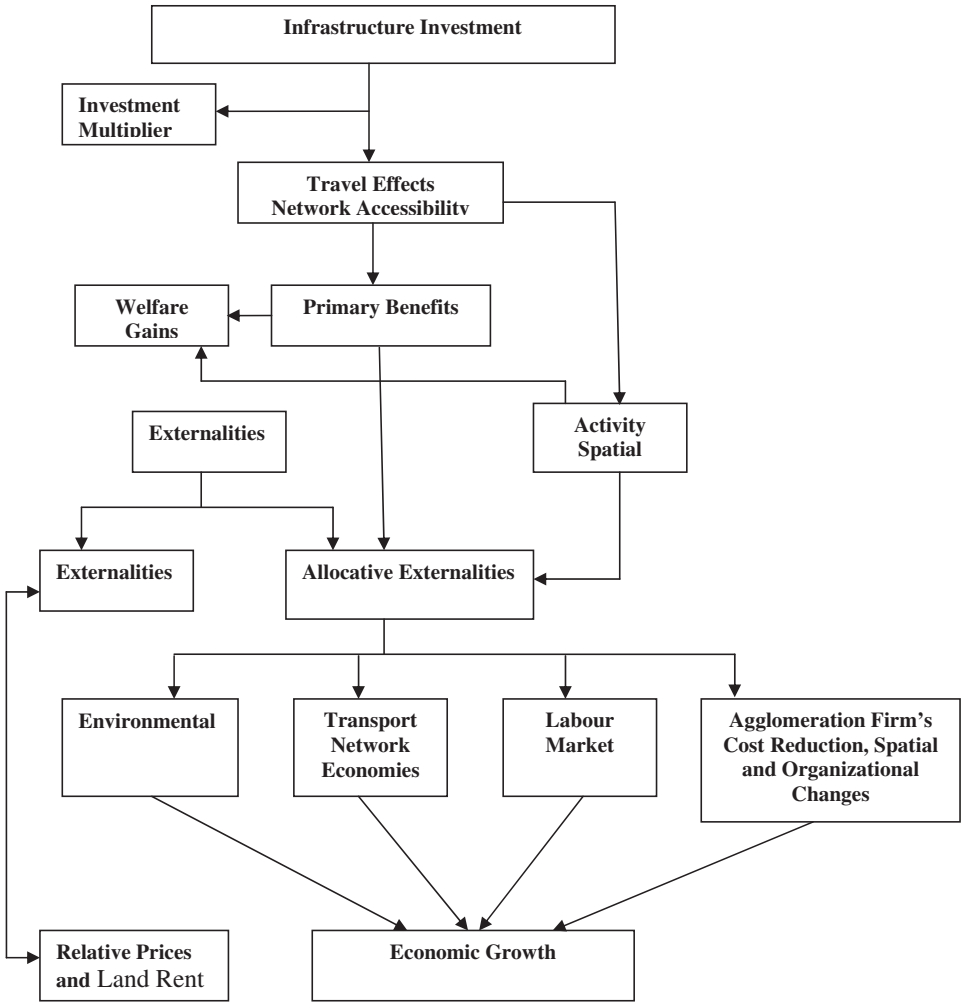

Fig. 1. Evaluation of economic growth benefits from the transport infrastructure. Source: Banister & Berechman, 2001

capital has a substitute effect on private inputs (Jiang, 2001). For illustration one notes that transport infrastructure accounts now for a major share of energy consumption in India, especially for petroleum products and the consequent development in that sector.

Historically, two possible methods may help one examine the nexus between transport infrastructure and economic growth. These are, respectively, cost benefit analysis and macro-econometric modeling. In the former, the rates of return of infrastructure projects are examined by calculating all the benefits and costs of infrastructure projects. The latter—macro-economic models—however, provide three approaches. These include the production function approach (Aschauer, 1989; Eisner, 1991; Munnell, 1992), the cost function approach (Gillen, 1996; Khanam, 1999; Lynde & Richmond, 1992; Morrison & Schwartz, 1996; Nadiri & Mamuneas, 1996) and the causality approach (Herranz-Loncan, 2007; Ramanathan, 2001). However, the first two approaches do not give adequate attention to the direction of *causality*—the beacon for effective policy formulation, while the third approach provides high attention to the direction of causality. This paper utilizes the third approach. The focus of this endeavor would be to empirically investigate whether adding transport infrastructure stimulates economic growth or economic growth itself acts as a stimulus for any consequent growth in transport infrastructure. As already noted, understanding such dependency between transport infrastructure and economic growth would be vital in the effective design and implementation of transport policies for an economy aspiring to grow. For instance, augmentation of transport infrastructure will in general be expected to aid higher growth in the economy. So transport infrastructure could be thought of as a useful factor in even *predicting* the future of an economy both in the short run and long run. In fact, a plausible "feedback hypothesis" asserts that transport policies that improve efficiency in the transport sector may not have a detrimental or draining impact on economic growth; it may actually enhance the quality of the transport infrastructure to help facilitate meeting the expanding demand of the economy. Besides, transport infrastructure is also a vital social asset; it structures space and determines mobility. It influences trade flows as well as industrial and residence locations. Its construction and maintenance absorb significant resources though its highly visible and public nature sometimes raises important policy concerns especially on its environmental effects (more roads and parking space for cars vs. public transport) (Short & Kopp, 2005).

However, the link between transport infrastructure's growth causing economic growth appears to be relatively weak in a country like India. Still, since substantial economic expansion is expected in India over the next two decades, building of transport infrastructure to cause or facilitate it should at least be modest. But there are other drivers of the transport sector. The recent high growth in India is resulting not only from the country's rapid economic growth in a feed-back mode, but also due to population expansion and changing economic lifestyles. The reverse is now