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Case report

Physical & social infrastructure in India & its relationship with economic development

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ABSTRACT

This study examines the relationship between infrastructure (physical & social) and economic development in India. Time period of the study remains as 1995–2013. The study used Augmented Dickey-Fuller test and Phillips Perron unit root tests to observe the stationary nature of the data series. Unrestricted VAR (vector auto regression) and Granger causality models were employed for checking the causal relationship among social, physical infrastructure and economic growth. Results show that both economic and social infrastructure have a positive linkages with economic growth in India.

1. Introduction

The term ‘infrastructure’ seems to be of relatively recent origin. It has been derived from the French language in the 19th century, perhaps as early as 1875. The word ‘infrastructure’ is a combination of two words ‘infra’ means below ‘structure’ means form. It can be defined as the set of interconnected structural elements that provide supporting framework of an entire structure of development. It also depicts the physical components of interrelated systems that provide commodities and services access to enable, sustain or reach up to the societal living conditions. Authors, economists, and urban planners have classified infrastructure mainly into two broad parts i.e. physical infrastructure and social infrastructure (Dash & Sahoo, 2010; Kumari & Sharma, 2016). Economic infrastructure assists in production functions by lowering production cost and raising the productivity of labor and capital while social infrastructure helps to improve the efficiency and skills of manpower.

In this study, the authors have empirically examined the relationship between infrastructure and economic development of India from 1995 to 2013.

2. Literature review

Numerous studies have been conducted on infrastructure and related issues. The present study presents a synoptic view of some relevant and most important studies. Most of the studies conducted in the past have concentrated on the relationship between infrastructure and economic development. The proven contribution of infrastructure in economic growth has been highlighted in many studies like Aschauer (1989), Sahoo and Dash (2009), Pradhan and Bagchi (2013), and Sharma and Vohra (2009). Aschauer (1989) was the first to prove the linkage between economic evolution and public funds invested in infrastructure sector. Author has used production function approach on time-series data of US and found that the slowdown of the US economy was due to a lack of investment in public infrastructure. Sahoo and Dash (2009) developed a composite index for infrastructure to study the impact of physical infrastructure on economic growth in India for the period 1970–2006 and found that labor force, infrastructure stocks and total investment played a significant role in economic development. Dash and Sahoo (2010) conducted a study to examine the impact of social and physical infrastructure on economic development for the period 1970 to 2006, and established that both infrastructure sectors positively affected economic development. Apart from economic growth, infrastructure also contributes to sectors such as rural development, poverty reduction, agriculture development, and regional development. India is a rapidly developing Asian country second to China (Sahoo & Dash, 2009). To maintain its economic growth, it needs well-established

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infrastructure. The relationship between physical and social infrastructure with economic development of India has been studied in the present case.

3. Rationale and Scope of the research

Every nation strives to fulfill the basic needs of its citizens and accomplishes higher growth rates. Infrastructure contributes towards fulfilling both objectives. Physical infrastructure directly supports economic growth and social infrastructure helps in improving the quality of living standards of the community. Many authors have discussed the significant role of infrastructure in economic development but very few studies have considered the contribution of both the infrastructure sectors towards economic development. Hence, the present study attempts to understand and highlight the causal relationship between infrastructure and economic development in Indian scenario.

4. Data and research methodology

Secondary and annual time-series data have been used in the current study and the World Bank Database has been a key source of data for the period 1995 to 2013. Variables for the study have been taken as air & rail transport, electric power & energy, telephone, primary & secondary education expenditure, health expenditure and GDP. In this study two types of unit root tests have been used such as ADF (Augmented Dickey-Fuller) and PP (Phillips and Perron) unit root approach. Considering the nature of variables and methodological arguments, study has used the unrestricted vector auto-regression (VAR) model and VAR Granger causality test to assess the underlying causal linkages between economic growth and both the infrastructure sectors in India (see Appendix 1).

5. Empirical analysis and Results

To understand the causal relationship between infrastructure and economic development empirical analysis of the time series data for the past 19 years was conducted. Unrestricted VAR model has been used to assess the underlying relationship among the variables. Results of the study reveal that economic and social infrastructure positively impact economic development with the lag effect of one to two years (see Appendix 2). The lag effect means the impact of infrastructure is not immediate but seen after a period of one or two years. Current findings are in line with previous findings of Dash and Sahoo (2010), Pradhan and Bagchi (2013) and Sahoo and Dash (2009). To further strengthen the present analysis and establish the association between infrastructure's dimensions and economic development study assessed the direction of causality between indicators of infrastructure and economic wellness of the country. Based on the results of VAR Granger causality test, physical infrastructure was found to have been impacting the economic development, whereas, social infrastructure and economic development were impacting each other. These relationships reveal that social and physical infrastructure sectors have a strong bearing on economic development in India.

6. Implications & recommendation

6.1. Implications of the present research

Present study serves as a ready reckoner for future researchers working on infrastructure. After examining the causal relationship between infrastructure (physical & social) and economic development of India, study has tried to highlight the significance of infrastructure for economic development. Results of the present study further highlight the preferred areas of infrastructure which contribute positively and effectively in economic development. Descriptive statistics given in Table 1 help to understand the variables used for the study and their outcome.

Descriptive statistics given in the Table 1 help to understand the state of physical and social infrastructure in India. Poor state of both types of infrastructure and their impact on economic development in India clearly demonstrate the relationship with each other. All the indicators of physical infrastructure like mean air transport, per capita electricity consumption, energy usage, telephone lines, rail lines show the poor state of physical infrastructure in India. Similarly, the social infrastructure is also in bad shape as exhibited by the figures given in the table. The level of economic development in India and state of infrastructure has a direct and clear relationship with each other. The low level of economic development may largely be attributed to the poor and insufficient infrastructure in India. Thus, Government of India must focus upon the development and growth of infrastructural facilities to augment the pace of the economic development of the country. On comparing the level of economic development of India vis.-a-vis. developed economies, one important parameter of comparison remains the level of infrastructure in two economies. Well developed infrastructure has direct and foremost impact on the level of economic development of developed economies. Both physical and social infrastructures contribute towards improved level of economic development in those economies. Thus, on studying the relationship between infrastructure and economic development in the present study authors are of the firm view that level of economic development and state of infrastructure in any economy have direct and visible impact on each other hence, to augment the pace of economic development investment in infrastructure development needs to be maximized.

Table 1
Descriptive Statistics.

Study Variables	Min.	Max.	Mean	Std. deviation
Air-transport Freight (million ton km)	515.37	1702.70	9.10	442.209
Per capita electricity consumption (kWh)	355.49	684.11	4.88	121.09
Energy use (kg of oil equivalent per capita)	402.05	613.72	4.93	77.56
Fixed telephone subscriptions (per 100 people)	1.25	4.45	2.949	0.890
Rail lines (total route-km)	62660	64460	6.335	591.992
Share of public expenditure for primary education (% of public education expenditure)	25.21	37.56	32.065	4.421
Share of public expenditure for secondary education (% of public education expenditure)	34.92	42.89	39.43	2.30
Health expenditure per capita (current US$)	16.09	61.41	33.47	16.125
Health expenditure, private (% of GDP)	2.65	3.56	3.03	0.27
Health expenditure, public (% of GDP)	1.00	1.28	1.10	0.07
Health expenditure, total (% of GDP)	3.81	4.56	4.145	0.24
GDP per capita (in USD)	383.55	1540	8.165	427.471