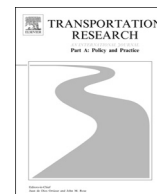




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Relative improvements in road mobility as compared to improvements in road accessibility and urban growth: A panel data analysis



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ABSTRACT

Previous studies revealed that the development of road infrastructure contributed positively to urban growth. However, the demand for and supply of different road types may change according to the level of urbanization, and this might have a significant impact on urban growth. The objectives of this study were twofold. First, to determine the investment level needed for different road types to facilitate urban growth at different levels of urbanization. Second, to understand how the development of different road types promotes export-led urban growth. We apply a fixed-effects panel linear regression analysis on a panel of 60 countries over the period of 1980–2010. The evidence presented in this study suggests that improvements in road mobility promoted export-led urban growth in countries with a low level of urbanization. This implies that policies to facilitate export should be executed in conjunction with high-mobility road network expansion to increase urbanization, especially in countries with a low level of urbanization that commonly suffer from low growth rates and that have a low level of high mobility road networks. Such expansion in road mobility is required to fulfil demands for long-distance travel to transport people from rural to urban areas. In contrast, in countries with a high level of urbanization, more investment is needed to develop roads with high accessibility. Such roads are needed to fulfil daily travel demands as a consequence of urban sprawl and decentralization of employment and populations. Moreover, the evidence shows that per capita education expenditure and physical capital stock per worker contributed to urban growth.

1. Introduction

According to United Nations data, in 2014, 54% of the world's population live in urban areas. This percentage is projected to increase to 70% by 2050, up from 30% in 1950 (United Nations, 2014). Previous studies indicated that concentrations of resources and human capital accumulation as a consequence of urbanization led to an increase in the spread of industry and the productivity of workers, thereby contributing to increased economic growth (Moomaw and Shatter, 1996; Mitra, 2000).

According to the law of migration, Ravenstein (1885, 1889) previously identified pull and push factors that explain rural-urban migration. Pull factors included environmental, social, political or economic stimuli, such as better employment opportunities,

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education, health care and living environments, in the country of destination. Push factors in the area of origin included inadequate employment opportunities, instability related to economic, social, or political. Lee (1966) explained that these pull-push factors determined the scale and direction of migration, which was mediated by intervening barriers and personal factors. Specific barriers included economic (wealth lost), political (international borders), physical (distance), and cultural obstacles (language differences). As countries develop, they are characterized by rapid growth in industrialization and urbanization. As a result, traditional farmers may lose their land and migrate to urban areas, where they can avail of employment opportunities. Industrialization and improved services in urban areas can result in more employment opportunities and high salaries, which serve as a pull factor for labour migration to urban areas.

Previous studies indicated that increased in exports contributed positively to urbanization. Huff (2012) demonstrated that the development of major port cities in Southeast Asian's countries was a direct result of export-led urban growth.¹ Sit and Yang (1997) revealed that foreign direct investment induced export contributed to urbanization. The same study pointed out the Pearl River Delta region in China had undergone the export-led urbanization and development. Zhang and Wan (2015) indicated that exports enhanced urban expansion via the growth of labour-intensive and export-oriented manufacturing sectors.

Over the last two decades, many researchers have examined the impact of road infrastructure on urbanization and concluded that road infrastructure development played a crucial role in urbanization (Brotchie, 1991; Parker, 1995; Handy, 2005; Jha et al., 2006; Meinel et al., 2007). However, the functionality of roads is dependent on their level of accessibility and mobility. Roads classified as high mobility, for example motorways, offer finite access but little interruptions to vehicle speed, thereby enhancing the reliability of transport times for goods, people and services. On the other hand, roads classified as high accessibility, for example local roads, offer finite mobility but provide direct routes to destinations. These roads contribute to human interaction intensity and support socio-economic development.

Requirements for road mobility and accessibility (different road infrastructures and types) changes greatly at different scales of development due to demand side and supply side factors. On the demand side, at lower urbanization levels, migration from rural to urban areas occurs as individuals move to avail of better living and employment opportunities in urban areas. Thus, there is more demand for roads with high mobility to transport people from rural to urban areas. However, as urbanization increases, more roads with high accessibility are required to fulfil daily travel needs because of urban sprawl and decentralization of employment and population. On the supply side, at lower urbanization levels, policy makers are more likely to invest in high mobility roads to facilitate the migration of rural labour to urban areas to support urbanization and economic growth. As urbanization increases, more government investment in high accessibility roads is required to sustain economic growth, especially in urban areas.

Although previous studies indicated that the development of road infrastructure contributed positively to urban growth, a number of gaps remain. First, as noted above, the demand for and supply of different road types may change according to the level of urbanization. However, no studies have examined this hypothesis directly. The exploration of this hypothesis would help to determine the investment level required in different road types to facilitate urban growth at different levels of urbanization. Second, a comprehensive understanding of how the development of different road types promotes export-led urban growth is crucial. Information on the importance of executing export-led urbanization policies in conjunction with road infrastructure policies to achieve sustainable urban growth and development would be of great benefit policy making. These are the objectives of this study.

2. Literature review

Road infrastructure plays a crucial role in urbanization by providing mobility for the efficient movement of people, goods and services, as well as providing accessibility to land and a wide variety of commercial and social activities (Meyer and Miller, 2001). High mobility roads, such as motorways and highways, can significantly increase the speed and volume of inter-regional migration and improve the efficiency of domestic and international trades by reducing transportation times and costs. Likewise, high accessibility roads such as local roads, can provide easy land access and promote commercial and social activities, such as material exchange (Saunders et al., 2002; Aljoufie et al., 2013). Indisputably, improvements in road mobility and accessibility increase human interactions and opportunities for commercial and social activities.

Numerous studies indicated that road infrastructure was the main driving force underlying urbanization.² In India, Pradhan (2007) found a positive relationship between urbanization and road infrastructure development. Several studies also proved that the development of high mobility roads increased urban expansion and population growth (Brotchie, 1991; Parker, 1995; Priemus et al., 2001). In the United States, Litman (1995) and Jha et al. (2006) reported that motorways influenced urbanization development patterns and that accessibility to motorways encouraged urban sprawl. Several researchers found that industrial areas usually developed close to motorways (Müller et al., 2010; Xie et al., 2013). In Germany, Meinel et al. (2007) reported a specific pattern of land use close to motorways, in which industrial and residential areas developed near motorway exits. Thus, there seems to be no doubt that accessibility to high mobility roads influences urban growth and urban landscape changes (Fan et al., 2009; Müller et al., 2010; Aljoufie et al., 2013; Tian and Wu, 2015).

¹ Increased primary production of commodities such as rice, sugar, tea, tin, rubber, etc., in Southeast Asian countries in response to high demand from Western countries resulted in extensive growth in urbanization.

² For instance, see Hall and Pfeiffer (2000), Hart (2001), Liu et al. (2002), Handy (2005), Xie et al. (2005), Jha et al. (2006), Ma and Xu (2010), Müller et al. (2010) and Huff (2012).

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