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Urban transport social needs in China: Quantification with central government transit grant

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ABSTRACT

Social inclusion requires suitable measures to improve public transport, thus satisfying the needs of socially disadvantaged groups (SDGs). Although numerous measures are available in principle, in practice, however, financial problems hinder the implementation of these measures. This study addresses an important issue in China—how to finance a socially inclusive public transport system given the incomplete nature of fiscal reforms at local government level. Central government grants are required to achieve a more equitable distribution of public transport resources. To calculate the demand for central government grants, an approach was developed to quantify transport social needs (TSNs). A primary component regression model was established to identify the factors that affect the SDGs using public transport. Further, a need-based method is proposed for the allocation of central government grants. The allocation procedure was designed with the categorization of cities to avoid distorted incentives, and a two-step formula was used to address the funding allocation equity problems. The data obtained from 252 municipal cities in China in 2010 show that the TSNs were 37.63 billion trip-kilometers. The corresponding central government grant was ¥18.82 billion. The results of the proposed allocation show that more funding was provided to small and low-density cities had unfavorable situations due to local public transport investment. This investigation would help in a more equitable distribution of public transport funding.

1. Introduction

The mobility of Chinese society highly depends on the transportation system. Mobility is a vital element for social participation; lack of mobility prevents socially disadvantaged groups (SDGs) to access the opportunities required to fulfill their roles as social members. SDGs encounter social exclusion because of poor access to social activities. A minimal "reserve" of mobility is a prerequisite for participating in a social order and a key component of social inclusion (Ureta, 2008). The provision of public transport as a "safety-net" for the basic mobility of SDGs is an important policy to satisfy their transport social needs (TSNs). Although in theory, the social value of basic mobility is understood, consistently supporting TSNs is often problematic. For example, the UK Accessibility Planning Program, a systematic process introduced by the central government to address transport-based exclusion, has promoted the improvement of public transport in deprived urban areas (Lucas, 2012). However, with major cutbacks in central government funding, local authorities could not maintain the financial support for transport services introduced for the SDGs. Evidences from Australia (Loader and Stanley, 2009) and Canada (Habib, 2014) also indicate that a suitable government financial support is crucial for implementing social inclusion strategies.

Immobility is an important issue for a minority of the population in developed countries. The main concerns in many cities are how to achieve a reasonable balance of access for the population. With the rapid urbanization in the majority of developing countries, the transport infrastructure needed to support the increasing population is not being developed (Sclar et al., 2014). Because of a large population influx from rural areas, it has been difficult to provide finances for increased TSNs.

In China, there is little empirical evidence to establish the relationship between the provision of public transport and TSNs. The Chinese government has paid more attention to the social consequences of insufficient and inaccessible public transport, rather than merely focusing on the development of new public transport

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infrastructures. In 2012, the central government emphasized the social role of public transport by including it in the national basic public service system in the 12th five-year plan. This identifies public transport as a nationwide ubiquitous service that the government should guarantee a minimum level. However, the major obstacles to achieve this inclusion involve how this should be undertaken and, in particular, how the financial challenge will be overcome. To identify the financial demand for addressing this issue on a national level, namely, central government grants, this investigation aims to quantify the total amount and distribution of TSNs in the urban areas in China. It also proposes a method to allocate central government grants across China's cities using a need-based approach.

2. Research context

2.1. A national strategy: priority development of urban public transport

Understanding the rapid urbanization and motorization development in China is important in understanding China's transport policy. This background information is also important to understand how the ideas on prioritizing urban public transportation were developed, and how they gradually became an important strategy for urban development in China. Before the 1990s, the population and area of urban cities were generally small because of the control on their urban scale and limit on internal migration. At the same time, the residential areas and working places were evenly distributed. This made most people to travel short distances, making cycling the major mode of transport. Therefore, urban public transportation was defined as an urban public utility and a part of the main infrastructure construction. In the late 1980s, the Chinese government relaxed the strict controls on urban development, leading to a wave of rural migration into cities. From 1995 to 2014 the annual urbanization rate of China increased by an average of 3.4%; it reached 54.77% in 2014. Moreover, with the reform of market economy system, the rapid development of real estate industry led to the sprawl of urban areas (Wang, 2011). With the increase in urban population and expansion of urban areas, the urban transportation system was significantly affected; a high mobility has gradually become a necessity of urban life. The early indications predicted that the mobility in China would be twice that of 2000 (Stigson, 2004). In the early 1990s, because of low-income levels, bus travel became the most important mode of transport for daily journeys. However, when the strategy of developing the automotive industry in China was implemented in 1994, the purchase of private vehicles was encouraged; this led to the prosperity of the automotive industry (Quan and Pan, 2009). During the following decade, many cities in China formed an automobile-oriented urban development pattern similar to the western countries (Pan, 2005). The area of the urban road network increased by 1.35 times; the private car ownership increased by 1.86 times. However, along with these changes, urban problems such as urban sprawl, traffic congestion, and air pollution also increased. In the decade from 1994 to 2004, the average vehicle speed in cities decreased by ~50%, and the expansion of urban construction was 31% faster than the growth of the urban population.

Since the 1990s, the concept of sustainable development became globally popular. Sustainability is regarded as an important objective of urban mobility, research, and planning. Based on the concept of urban smart growth and transit-oriented development (TOD) initiated in the early 20th century, public transportation is an important method to control the urban sprawl, reduce the energy consumption, improve the accessibility of all the social groups, and achieve sustainable urban mobility. Led by these modern concepts, urban planners and policymakers in China have realized that urban mobility is a rapidly increasing demand. To achieve sustainable development, the development of an urban public transportation system should be prioritized before the reliance on car ownership becomes unalterable (Kong, 2009). This can be achieved by including public transport in the national strategy to guarantee its effective promotion and implementation. In a landmark document published in 2005 (The State Council of China, 2005), the Chinese central government clearly stated that the priority development of urban public transportation is a national strategy. During the following decade, detailed national government documents regarding this strategy have been published almost every year. They continually specify the macro-strategic objectives and requirements as well as the development path. The provincial and local governments have also responded to these objectives by actively implementing many specific measures.

2.2. Development trends of urban public transport investment

With the implementation of prioritizing the public transport system in China, significant progress has been made. From 2004 to 2013, the number of public buses increased from 261,987 to 446,604, and the length of the urban rail system increased from 400 to 2213.28 km. The riderships of public buses and rail transit have increased by 61% and 722%, respectively, during this period, thus increasing the passenger ridership per citizen from 134 to 219 per year. However, it should be noted that with the implementation of the strategy for prioritizing public transport, a large amount of government financial investment is needed for the construction and operation of urban public transportation infrastructure. From 2004 to 2011, the total financial investment on the fixed assets of the urban public transportation system increased by 5.7 times, from ¥39.13 billion to ¥222.53 billion (Fig. 1). Moreover, based on the latest 2014 statistics, 3004 km of urban rail infrastructure is under construction. Assuming that ¥500 million is invested per kilometer, approximately ¥1.5 trillion is needed for this construction. With the constantly increasing investment needs of public transport, the financial funds for this expansion have been limited. On one hand, Fig. 1 shows that the local governments in China have borne almost all the financial responsibility for urban public transport construction, whereas the central government does not offer sufficient funds, even though it has consistently emphasized the crucial role of public transport in

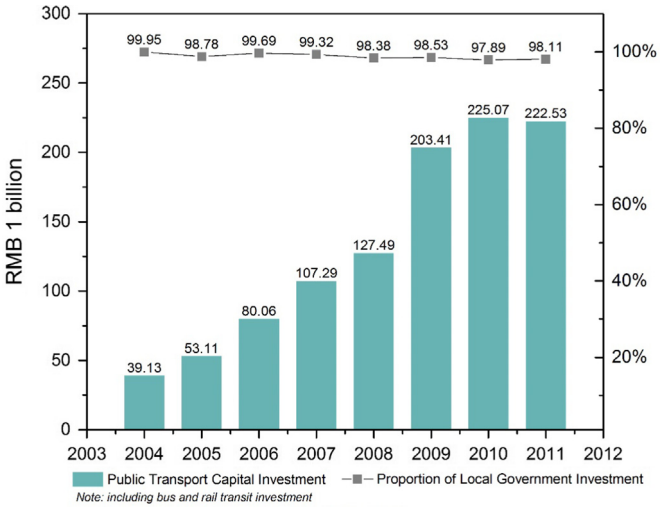

Fig. 1. Urban public transport capital investment trends in China, 2004–2011.
Data Source: Yearbook of China Transportation and Communication (2005–2012).