



Transit development shaping urbanization: Evidence from the housing market in Beijing



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ABSTRACT

Transportation plays a critical role in shaping urbanization paths and outcomes. This study investigates the interplay between transit and urban spatial development by looking at housing market performance related to different transit technologies. The study examines the capitalization of transit access in property values and compares variations in transit access premiums among bus rapid transit (BRT), light rail transit (LRT) and metro rail transit (MRT). A sample of 8601 housing sales in Beijing was used to estimate hedonic price models for the region and for market segments along 11 transit lines. Results show that the impact zone extends to one mile from stations for MRT but only to half a mile for LRT. For BRT, the impact zone is indiscernible. On average, homes near MRT enjoy a proximity premium of 248.31 yuan (or US\$39.41)/m² for every 100 m closer to the station. For LRT, the premium is 110.71 yuan (or US\$17.57). The study concludes that technologies play a role. Technological features of transit should be taken into consideration when delineating transit districts. The potential for future development or redevelopment in addition to capital costs should be considered when choosing transit technologies, especially when cities or regions are in the mid-process of urbanization and spatial growth. Nevertheless, development context is still critical for realizing and maximizing access benefits regardless of rail or bus.

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Introduction

Capitalization of transit access in property values has attracted wide interest from transportation researchers and policymakers around the world. A premium in property price induced by transit services measures the rate of capitalization and indicates that transit investments have positive economic benefits. Knowledge gained from studying transit access premiums helps inform transit investment decisions and is essential for developing transit-based policy initiatives such as value-capture and transit-oriented development. A sizable body of literature has accumulated from studies around the world. RICS (2002) and Debrezion, Pels, and Rietveld (2007) published two meta-studies reviewing more than

150 publications on the topic. Examples of recent studies include those by Hewitt and Hewitt (2012) on Ottawa, Jun (2012) on Seoul, and Kim and Lahr (2013) and Chatman, Tulach, and Kim (2012), both on New Jersey.

Nevertheless, these publications mostly come from studies in the United States and European countries, with few coming from Latin America and developed Asian economies. In contrast, the capitalization of transit access has not been researched adequately in China, where transit development has been booming in the past 20-plus years. This paper attempts to fill the knowledge gap with a case study of Beijing.

The study aims to contribute to the knowledge based on two grounds. First, the study reports evidence from China, one of the largest and fastest-growing transit markets in the world (Renner & Gardner, 2010). As of today, little is known to the outside world about market appreciation of transit access in Chinese cities, likely due to China's rather short history in the development of modern mass transit as well as its newly emerging land/property market. Beijing was selected for the in-depth empirical analysis due to its rapid development in mass transit since the beginning of the twenty-first century. Before 2000, mass transit in Beijing consisted

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of a 54 km-long metro network. By 2013, the system in operation ran nearly 600 km in length. Beijing offers a rich source of data for empirical study in the subject area.

Second, the study examines the variation in transit access premiums among bus rapid transit (BRT), light rail transit (LRT) and metro rail transit (MRT). Whether to develop rail- or bus-based mass transit has been a subject of policy debate for decades (Levine, 2013; O'Toole, 2010). Recent developments in BRT and LRT in the US and throughout the world have sparked further heated discussions on the comparative advantages of bus- vs. rail-based systems (MacKechnie, 2014). Those who advocate bus over rail emphasize the cost differential between the two types of technologies. For instance, the cost of building an MRT line may exceed US\$100 million/mile (Zhang, 2009). In contrast, a bus system may cost as little as US \$10 million/mile, one-tenth of the cost of MRT. Rail advocates, however, cite special benefits associated with rail. For example, they argue that rail transit generates broader economic impacts than bus and offers a strong potential for land (re) development along the system; these attributes allow rail transit to better shape urban form. Existing publications have covered various transit technologies in studying their impacts on property values (see Debrezion et al., 2007; RICS, 2002). However, the technologies are mostly studied separately, making it difficult to compare cross-study findings. The Beijing case presented here considers the three modes, BRT, LRT and MRT, all in one study.

After this introduction section, the paper provides a brief description of mass transit systems in Beijing. It then reviews related empirical research in both the Western and the Chinese

setting. The next section introduces study methods, followed by the presentation of analysis results. Finally, the paper discusses study findings and concludes by drawing policy implications.

Mass transit in Beijing

The municipality of Beijing consists of 16 city districts and two rural counties, with a total land area of 16,800 km² and a total population of 17.6 million in 2010. By 2013, Beijing had a total of nearly 500 km of rail transit network and nearly 100 km of BRT network in operation. The systems for this study include two LRT lines (#13 and #8T), three BRT lines (South Axis or #1, ChaoYang or #2, and AnLi or #3) and six MRT lines (#1, Loop or #2, #4, #5, Olympic or #8, and #10) (Fig. 1). Table 1 below shows base information about the 11 lines under study.

The BRT Line 1 (South Axis) route starts from Qianmen, the south end of Tiananmen Square (the city centre) and one of the three major commercial centres in Beijing. It goes out of the Outer Old City of Beijing through the Yongding Gate and ends at the southern terminus of Demaozhuang in the suburban Daxin County. BRT Line 2 aligns roughly parallel to LRT Line 8T, approximately 300–800 m apart. BRT Line 3 goes from AnDing Gate on the second ring road of North Beijing to Changping District. More than two-thirds of the Line 3 network runs parallel to (about one-third overlapping with) MRT Line 5. Due to a variety of technical and operational constraints, Beijing's three BRT lines fall a bit short of full-scale BRT operations as seen in Curitiba, Brazil or Bogota, Colombia. In Beijing, not all of the BRT lines have signal priority

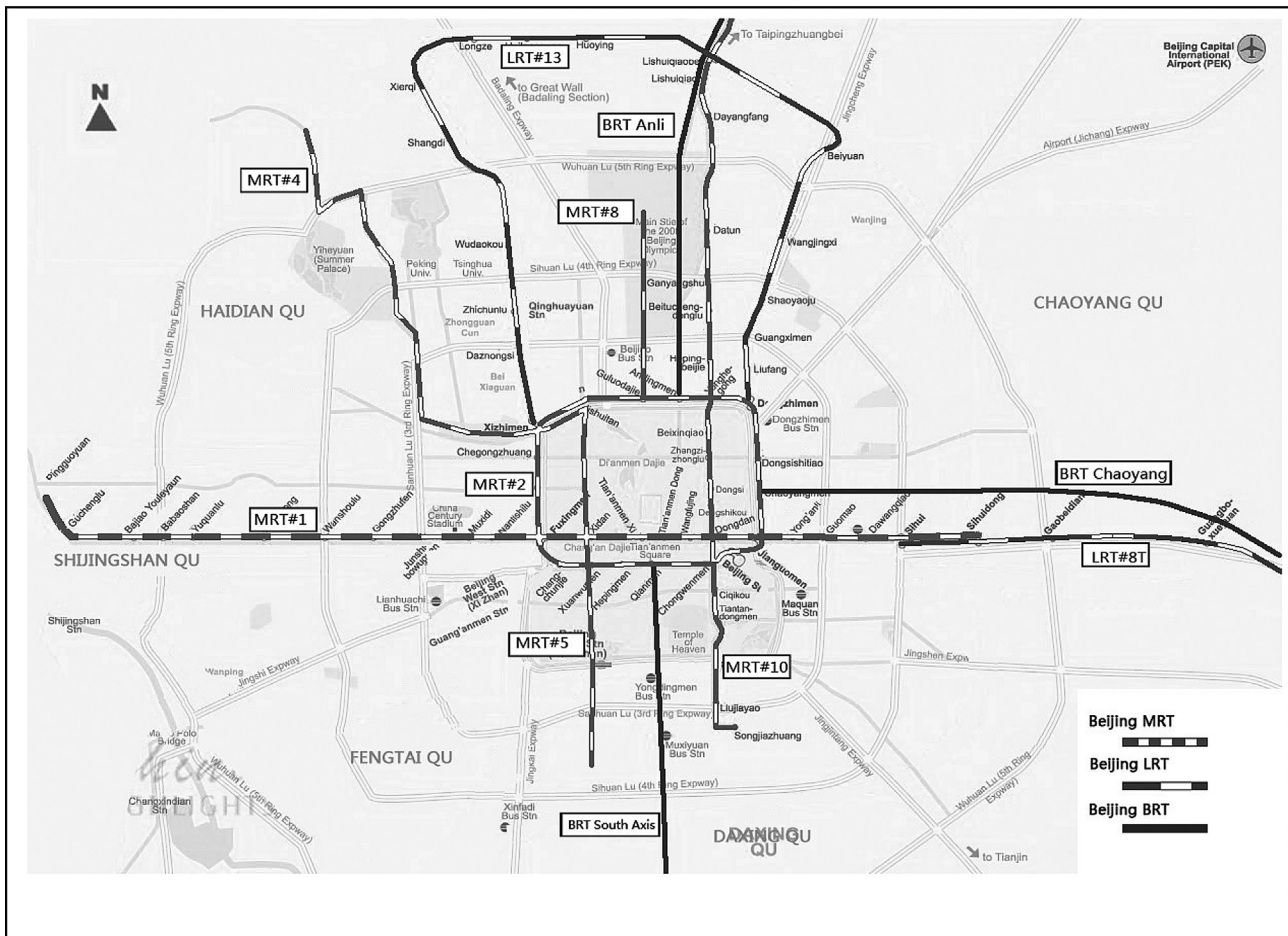


Fig. 1. Mass transit networks in Beijing by 2013.

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