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# Measuring the impacts of Bus Rapid Transit on residential property values: The Beijing case

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ABSTRACT

Bus Rapid Transit (BRT) has emerged as a cost-effective transport system for urban mobility. The study uses the hedonic price model to investigate the impacts of BRT on residential property values in Beijing, where BRT has been in service for over 6 years. The empirical analysis suggests that BRT has positive impacts on surrounding property values. The hedonic price model shows that for every 100-m closer to the BRT station, asking prices of residential properties increase by between 1.32% and 1.39%. The study suggests that accessibility improvement, rather than the type of transit system, has certain influence on property values. The paper underscores the importance of considering the application of value-capture tools to help finance BRT investments and calls for complementary investment policies to enhance property value impacts.



## 1. Introduction

Bus Rapid Transit (BRT) has emerged as a cost-effective transport system for urban mobility. The ability of BRT to provide significant transport improvement at low to medium costs within a short implementation time has prompted decision makers to rapidly deploy BRT schemes. Some countries have launched single lines, while others have implemented complete BRT networks (Deng & Nelson, 2011). These systems have achieved impressive outcomes in terms of social, economic, and environmental benefits, in spite of varying in size, design, service plan, operating features and technology application. Hensher (2007) indicates that BRT has the ability to deliver a high-quality service while costing much less than rail systems.

Although many BRT systems are successfully in operation across the world, it is arguable that the potential of BRT is not yet well understood by decision-makers. Since the implementation of modern BRT systems is relatively recent, there remains a lack of empirical evidence about what BRT can do for land development, except for a few places such as Bogotá where BRT has received extensive attention (Munoz-Raskin, 2010; Rodríguez & Mojica, 2009; Rodíguez & Targa, 2004). Bus services have long suffered from a negative image related to slow, polluting and unreliable service, which in turn cause stakeholders to hesitate to consider investing in BRT. In the report by the Transit Cooperative Research Program (TCRP), Christopher (2006) indicates that more research on land development benefits associated with BRT was needed, as such studies on BRT would improve the ability of government officials to negotiate with developers on dedicated BRT right-of-way and customer amenities. Recently, many cities have launched either a single BRT line or BRT network. Thus, the need for a clearer understanding of the economic impacts of BRT on land development is becoming increasingly important, especially as land value uplift conferred by BRT could be an incentive to encourage private financing in BRT projects.

This paper seeks to examine the extent to which accessibility improvements resulting from BRT have influenced surrounding property values. Our paper contributes to the literature in two aspects. Firstly, we make the argument of BRT-oriented development stronger, by introducing data from BRT implemented in China. Secondly, comparing proximity impacts from BRT in Beijing, Bogotá and Seoul, we explore possible operational features of BRT which may influence its impact on property value uplift.

The reminder of this paper is structured as follows. Section 2 reviews related literature about the impacts of BRT on property

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values, especially the quantitative effects. Section 3 provides background information on BRT implementation in Beijing, the first full-featured BRT line in China. Section 4 discusses the methodology and the data used. Section 5 presents the estimation results and compares findings with previous literature. Finally, Section 6 draws conclusions and discusses the importance of the findings in a global approach to funding BRT infrastructures.

## 2. Literature review: the impacts of BRT on property values

There is considerable interest in measuring and exploiting property value uplift impacts conferred by transport investment. Ryan (1999) indicates that property values are likely to show a relationship with transport access, when transport investment provides actual travel time saving. Banister (2005) argues that this issue is crucially important, largely because the property value uplift effect associated with transport improvement can be used as an investment mechanism to finance transport projects. RICS (2002) completed a detailed literature review, amounting to over 150 references from UK, Europe and North America, on the relationship between land use, land value and public transport. The study concludes that rail-based systems (heavy rail, Metro and Light Rail Transit (LRT)) generally have positive impacts on the residential and commercial property markets, but the range of impacts varied significantly across municipalities. As for BRT, its main attraction to policy-makers is that it can be an affordable approach to moving a large number of people. Nevertheless, a full-featured BRT system generally requires significant investments in support of construction of exclusive busways and enhanced stations. Currie (2006) yet argues that modern BRT systems, like other forms of Mass Transit, such as Metro and LRT, have a strong capability to lead bus-based Transit Oriented Development.

Some significant land development effects around BRT stations were identified in Pittsburgh, Ottawa, Adelaide and Brisbane reviewed by Levinson et al. (2003); in Cleveland, Boston and Pittsburgh assessed by Diaz and Hinebaugh (2009); in Nantes, Rennes and Lorient reviewed by Rabuel (2010). While those reports provides qualitative evidence that BRT has positive effects on land development, some studies (summarized in Table 1) go beyond the qualitative approach in an attempt to quantify the impact of proximity to BRT on property values.

Despite many BRT systems in operation, quantitative evidence on property value uplift effect resulted from BRT is still limited. While some well established BRT in Latin America have gained intensive attention, BRT experience in Asian cities has been less recorded.

In China, since the first full-featured BRT system was implemented in Beijing in the late 2004, up to now, BRT schemes have been implemented in 14 cities as one of key strategies for relieving traffic problems. Nevertheless, up to date, there has been no

**Table 1**
Quantitative studies on property value uplift impact from BRT systems.

| BRT system | Methodology | Property type | Data | Property value impacts | Reference |
|---|---|---|---|---|---|
| Bogotá TransMilenio (opened in 2000) | HPM | Multifamily residential properties | Residential rents | After only 2-years operation of BRT, residential rental costs increased by 6.8 −9.3% for every 5 min walking time to BRT stations. | Rodíguez and Targa (2004) |
| | Before − after HPM | Single-family and condominiums | Asking prices | Network effects were found from the extension of BRT. The asking price of properties in the BRT catchment area was found between 7% and 14% higher than that in the control area. | Rodríguez and Mojica (2009) |
| | HPM | Residential properties | Asking prices | Property value premium for proximity to BRT was found on middle-income properties but not on low-income housing. | Munoz-Raskin (2010) |
| Pittsburgh East Busway (opened in 1983) | HPM | Single-family house | Assessed prices | Significant proximity effects to BRT corridor were found: a property 100 feet away from a BRT station was valued about $9745 more than a property 1000 feet away.[a] | Perk and Catalá (2009) |
| Los Angeles Metro Rapid BRT (opened in 2000) | HPM | Residential and commercial properties | Assessed prices | BRT has small negative impacts on residential property values and positive impacts on commercial parcels. The absence of dedicated right-of-way, the newness of the service (only one year) and lying in distressed inner-city settings accounted for lower property value. | Cervero and Duncan (2002) |
| Seoul BRT (opened in 2004) | Multilevel logit model and HPM | Residential and non-residential land values | Assessed prices | Land use along BRT corridors was intensified. Within 300 m of BRT stations, residential land values gained premiums ranging from 5% to 10%; within 150 m of BRT stations, non-residential land values gained premiums varying between 3% and 26%. | Cervero and Kang (2011) |
| | Urban simulation model | Residential and non-residential locations | Monthly rents | BRT contributes to increased development density in urban centres. BRT has more significant redistributive effects on non-residential activities than residential activities. | Jun (2012) |
| Quebec city Métrobus (opened in 1992) | Difference-in-differences | Single-family house | Sales transaction data | BRT has generated an increase in house price ranging from 6.9% to 2.9%, for those properties located close to the service corridor. | Dubé, Rosiers, Thériault, and Dib (2011) |

[a] Perk and Catalá (2009) acknowledges that some factors introducing may upward bias the key results.

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