



Urban rail investment and transit-oriented development in Beijing: Can it reach a higher potential?



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ABSTRACT

As a response to severe urban congestion, megacities in China have sped up investment in urban rail transit. How effective urban rail investment and relevant planning activities can attract development in China's megacities has rarely been studied. Using eight years' land transaction data in Beijing (2004–2011), this research finds that the market environment in general supports higher density development around transit stations. However, relevant land market regulations and planning practices may prevent the development outcome from reaching its market potential. City governments should adjust existing planning and policy efforts, including more transparent and open process for station location selection, a better articulated investment program that improves transit service, social service and infrastructure quality in suburbs, a shift toward transaction modes of more competition, and a development guidance that grants density bonus to projects closer to metro stations.

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1. Introduction

After decades' prioritization of road infrastructure investment, China's megacities are resorting to urban rail transit for congestion relief. By the end of year 2011, over 50 urban rail lines have been built or are being built in 28 cities in China, with 1600 km of track in operation. By 2015, another 1400 km will be added with a total investment of 1200 billion Yuan (about 200 billion dollars) (XianDaiKuaiBao, 2011). The investment is expected to slow down the worsening congestion and energy consumption in high-density megacities, as it enables more individuals to gain access to this high-capacity and reliable transport mode, and it also helps to reduce dependence on automobile. However, it is still unclear how much this investment can significantly shape urban form, a factor that affects travel patterns and transit ridership in a long run (Bernick and Cervero, 1997; Board, 2005).

Addressing this question is important given China's rapid urban development trend. In 2015, China's National Bureau of Statistics reported that 54.77% of China's population was urban, which implies continuous urbanization in the coming decades. Transit-oriented development (TOD), which accommodates incremental urban activities within the proximity of urban rail stations in relatively high density, can serve as a development model with increased transport efficiency and

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energy saving (Zhang, 2007). This is essential for China's urban future considering the high population density and severe transportation congestion in today's megacities.

The ability of urban rail investment to attract high density development, however, may be compromised by many market and planning factors. First, on the real estate market, home owners' appreciation of transit proximity is affected by the quality of transit service in relation to automobile-based mobility. For example, the construction of urban expressways and the increase in automobile ownership can significantly reduce travelers' reliance on public transit. Research on individual travel behavior in Beijing indicates a significant change toward driving after owning a car (Yang, 2010). Without a significant reliance on urban rail for daily travel, real estate market may lack the economic incentive to cluster development around stations. As has happened in the USA, the influence of urban rail on real estate property tends to be moderate and success in TOD has to resort to strong planning intervention (Cervero and Landis, 1993; Hess and Lombardi, 2004).

In addition, a market appreciation for TOD may or may not become a reality of TOD, unless the planning practice is supportive. For example, the process for urban rail planning and in particular station location selection in urban China lacks transparency in general. Station location decisions are subject to the influence of different interest groups, including leaders of the city government, the district governments, the developers and the community nearby. Before station construction begins, announced station location tends to be viewed as temporary. The plan is subject to revision without soliciting sufficient input from those who might be negatively affected by the change (Yang et al., 2016). This uncertainty resulted from current planning practice could delay the arrival of TOD until station construction begins. Another important planning factor is density regulation. Even though density itself may not be sufficient for TOD (Duarte and Ultramari, 2012), a higher density at station proximity is desirable. However, the city government may or may not have the planning guidance that enables or encourages higher density at station proximity.

The effectiveness of urban rail investment on the development around stations, therefore, is subject to both market and planning forces. By examining land development around urban rail stations, we hope to reveal whether the market and planning forces are supportive for TOD in general and whether policy adjustment is needed to expand the benefit of urban rail investment. The task, however, is challenging. First, in a city where urban rail investment falls behind urban expansion, the built-environment can hardly suggest whether observed co-existence of high density development and railway stations indicates density-oriented station location selection or station-oriented development. Second, given the evolving nature of China's real estate market and the magnitude of redevelopment in Chinese cities, one can hardly tell the true impacts of proximity to railway stations as parcels of new development or redevelopment is mixed together with those developed before the land market reform. Third, one can follow the development trajectory around new railway stations in the outer skirts where station areas are far from a full built-out status, but the multi-year waiting period can significantly lower the value of research, considering the investment and development pace in China's megacities. An examination of the built-environment around stations, therefore, is not an adequate research strategy.

Instead, we study developers' willingness to pay (WTP) for station proximity and density bonuses under varied circumstances, as high density development around transit stations defines the spatial essence of TOD (Carlton, 2009; Porter, 1997). For example, are developers willing to pay a higher price for station proximity and higher allowable floor area ratio (FAR)? If so, a supportive real estate market for TOD exists. Are parcels closer to metro stations awarded a higher developable FAR? If so, a supportive planning practice exists.

Much of the literature on the linkage of transit investment and land development report empirical findings on the incidence of rising land and housing values related to proximity to transit station due to transit investments and improvement (Smith and Gihring, 2006). Our empirical analysis uses land transactions data after 2004, when Chinese governments tightened the enforcement of market-based land development right transfer. We estimate how land price varies according to the parcel's distance to its nearest stations and how it varies according to allowable FAR, a density measure. Based on that, we further examine whether developers' WTP for station proximity varies in different market segments defined by station location, development stages, and competition levels on land markets.

Besides station proximity and density, successful TOD also requires good walking and cycling conditions, efficient parking management, and appropriate development mix so that it becomes a complete community that includes shops, schools, parks, recreation centers (Cervero, 2004; Hess and Lombardi, 2004; Lund, 2006; Duncan, 2011). One empirical study on Beijing's mass transit and property values reaches a similar conclusion: The impacts of urban rail investment on land development are significantly positive, but unlikely to occur automatically. They rely greatly on supportive regional and site conditions. Integrated planning and design for mass transit and land development are critical to expand the return of transit investments (Zhang and Wang, 2013). Our study however does not focus on these planning and design details as they can be applied almost everywhere in high-density Beijing. If these planning and design features can be indeed observed at station proximity, it indicates a successful application of good principles to station proximity, which differs from the potential of transit investment to attract development to station proximity. By focusing on developers' WTP for station proximity and density bonus, we aim at a better understanding of whether market and planning forces are supportive for TOD in general and whether policy adjustment is necessary for more desirable TOD outcome in Beijing and in China's megacities. The next sections introduce the study case, the data and the methodology, analyze the market support for TOD, and reveal necessary adjustment in planning and policy-making.

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