

A financing mode of Urban Rail transit based on land value capture: A case study in Wuhan City



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ABSTRACT

While urban rail transit has gained increasing popularity, there are still many problems related to obtaining financial resources for constructing it in China. It is proved that the *Land Value Capture (LVC)* theory can provide theoretical support for exploring new financing mode of urban rail transit to solve these problems. This paper reviews the concept of *LVC* and the existing *LVC* finance mechanisms, in particular, *Joint Development (JD)*. It is revealed that *JD* can't be directly copied and reproduced in mainland China. The characteristics of land acquisition policy as well as the practice of rail transit construction in mainland China are summarized, and based on the findings, the *Predetermined Land Reserve Mode (PLR)* is proposed. The essence of this proposed mode is to link the reserve of specific land parcels with the relevant rail transit project and ensure it benefits from the predetermined land reserve. Rail transit companies, with the authorizations from the government, can reserve suitable land parcels prior to the planning and construction of the rail transit system so that they can capture the increased land value after the land transfer. *PLR* is a new finance mechanism based on *LVC* and it is different from *JD* under comparative analysis. Analytical results show that *PLR* has unique advantages. To demonstrate the performance of *PLR*, a case study of constructing the urban rail transit system in Wuhan City, China, is presented in this paper, and it shows that the *PLR* is well suited for financing the urban railway systems in cities of mainland China.

1. Introduction

The construction of urban rail transit in mainland China is in great demand and its investment scale has been increasing rapidly in recent years. From 2001–2005, the urban rail transit construction mileage is 399 km, the investment is in the scale of about USD \$ 29.90 billion¹; from 2006 to 2010, it is about 885 km and USD \$ 74.74 billion; while in the recent 5 years (2011–2015), it has up to about 1900 km and USD \$ 179.37 billion, which has increased 5 times compared to the first five years (Fig. 1). And according to the national planning, it will construct 2500 km in the next 5 years, which means by the end of 2020, the total mileage of rail transit completed nationwide will reach about 6000 km. The preliminary planning for investment is USD \$ 261.58 billion, which means average of USD \$ 52.32 billion annually. The years in the future are still the peak of urban rail transit construction, so the governments will still have the intense financing demand.

Facing the huge demand for construction funds, various cities have

been exploring the innovative financing modes of urban infrastructure, such as *BOT*, *PFI*, *PPP* and *ABS*, etc (Table 1). To some degree, those mentioned modes help to alleviate the tense situation in funding the construction of urban infrastructure. But the fact has not been substantially changed that the funding source of urban rail transit construction relies more and more on the government (Fig. 2). It is due to tight schedule and the enormous demand for monetary investment. Therefore all local government authorities in mainland China are facing tremendous challenges and pressure in financing urban rail transit. They have to find new ways of financing to improve the situation.

It is proven that the *Land Value Capture (LVC)* theory can provide theoretical foundation for exploring the new financing mode of urban rail transit. This paper reviews the concept of *LVC* and the existing widely used *LVC* finance mode—*Joint Development (JD)*. Because of the legal policy and experience factors, *JD* can't be directly copied and reproduced in mainland China, so the paper proposes a new financing mode based on the *LVC*—*Predetermined Land Reserve (PLR)*. The

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¹ In this paper, CNY is converted to United States Dollar at the rate of CNY ¥ 6.69 per USD \$1.00 based on the exchanging rate in Aug, 2016.

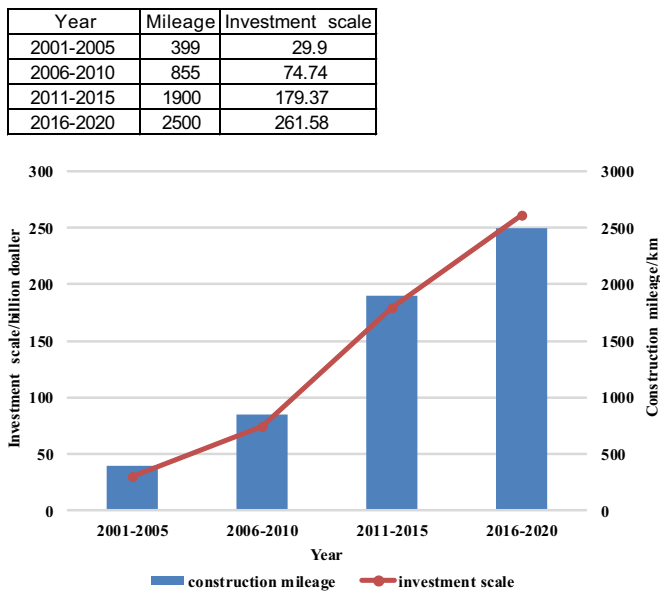


Fig. 1. The construction mileage and investment scale in Chinese urban rail transit, 2001–2020. < .

(Source: Collecting data from China Association of Metros. <http://www.camet.org.cn/sjtj/> > accessed on 07.09, 2016).

Table 1

The operation process and characteristics of some financing modes.

	The operation process	Characteristics of the mode
<i>BOT (build-operate-transfer)</i>	The private sector builds the project at its own expense and then operates the project, in turn receive the revenue from charging or selling within some years and finally transfer the project to the government (L. Y. Shen, 2002).	(1) Concession agreement. (2) A concession period. (3) The private through operating the project to recovery costs.
<i>PFI (Private Finance Initiative)</i>	The private company invests, designs, constructs and operates the infrastructure facility within a concession period and then returns the project to the public, and charge the government to recovery costs (Sulafa M. Badi, 2016).	Compared with BOT: (1) The private should completely return the project to the public with no debt. (2) The private will charge fees from the government to recover the investment costs.
<i>PPP (Public-Private-Partnership)</i>	Cooperation of some sort of durability between public and private actors in which they jointly develop, construct the project and share risks, costs, and resources which are connected with the project (Graeme A. Hodge, 2007).	Compared with BOT: (1) Public to participate in the project management and operation of the latter part of the project. (2) Private to participate in the project early stage, like scientific research, set up the project.
<i>ABS (Asset-Backed Securitization)</i>	Issue bonds in the international securities market and then use the project asset income to repay the cost	(1) Rely on the project's future revenue. (2) Investors can not directly participate in the construction and operation of the project.

specific description of *PLR* mode's operating mechanism, and its comparison with *JD* is the focus of the paper. And it provides a case study of constructing the urban rail transit in Wuhan City, China to demonstrate the performance of *PLR*.

The *PLR* mode has unique advantages. It can well adapt to Chinese land policy, make full use of the land value increment to make up the gap in rail transit construction funds, establish a sustainable development of rail transit investment and financing mechanism, let the funds to achieve a virtuous circle. The *PLR* mode is promising in the mainland China to meet the requirements of the rapid development of urban rail transit, to ease the huge financial pressure on the government in rail transit construction.

2. Literature review

2.1. Land value capture

LVC theory suggests forcing the beneficiaries of land value increment to return either some or all of the added value from infrastructure investment through some “capturing” methods (Batt, 2001). There is a

long history of applying *LVC* theory and techniques in urban development policy and sourcing finance. It is based on neoclassical economic theory of David Ricardo (Proposed in 1817) that the unearned increment, resulting from public investment and/or market conditions should be returned to public by tax measures, etc. (Amborski, 2012a, 2012b). Henry George's land reform in the 19th century also made a significant contribution (Batt, 2001). Indeed, “*Land Value Capture*” had not been widely used in formulating the regulations and policy of town planning in any country until the 1970s (Cervero, 2004). In the 1970s, the U.S. Department of Transportation re-interpreted *LVC* theory, and defined the *LVC* as “the process of entirely or partially returning the land value increment that was attributed to social contribution, back to the society” (Zhao and Larson, 2011).

This capture can be realized by taxes or other financial means, or directly force beneficiaries (mainly real estate developers) to return the income essentially derived from the land value increment to public interest expenditure. Based on the previous research we integrated, *LVC* strategies can be divided into “indirect capture” and “direct capture”. Indirect value capture strategies rely on three broad categories of instruments: taxes, fees and regulatory. Fiscal tools (taxes and fees) require either a tax or fee to be paid by the private landowner to facilitate the capture of the value for returning to the public sector. Regulatory instruments, on the other hand, will lead to some form of public benefit that the landowner essentially provides from his

increased land values. This may be imposed through some type of “in kind” contribution by private landowners for the public benefit (Smolka and Amborski, 2007). Regarding taxes on property in general and land values in particular mainly include land tax, land value increment tax, house tax and vacant land tax etc. (Brown-Luthango, 2011). By definition, they are levied for the additional value of land occupied by the land users.

Direct capture strategies that are commonly used include *Special Assessments*, *Planning Agreement* and *Joint Development*, etc. *Special Assessments* refer to those property owners located within a designated geographic area, or “*Special Assessment District (SAD)*”, and require them to pay for special benefits accruing to their properties that are close to certain infrastructure improvement (Zhao and Larson, 2011). The use of *Special Assessments* reached its height during the period between 1900 and 1930, when there were both a critical need for the development of modern urban infrastructure and a rapid increase in property values. Today, all 50 states in U.S. authorize local authorities to use *Special Assessments* for financing local improvement projects (California Senate Local Government Committee, 2004; League of Minnesota Cities, 2008; Local improvement district manual,

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