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Funding China's Urban Infrastructure: Revenue Structure and Financing Approaches

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Executive Summary

This report concentrates on the revenue structure and financing approaches of China's urban infrastructure. First, this paper briefly reviews the history and contemporary literatures. Second, it provides a detailed discussion on the national trends and regional patterns of urban infrastructure funding and financing. Third, beyond the description, it also tries to frame the research question in five theoretical dimensions.

The study of China's urban infrastructure funding and financing is very important because of the insufficiency of revenue sources and the significance of urban infrastructure in economic growth. With the rapid growth of urbanization and in China's economy, higher-quality urban infrastructure has become increasingly important. Not only does it affect the welfare of the citizens but it also influences the progress of the society as a whole. Much literature has proved the positive relationship between economic growth and urban infrastructure. However, compared to the high growth rate of the economy and population, the provision of urban infrastructure is seemingly insufficient. Several major infrastructure projects, such as paved local roads and streets, grew at a much slower pace after the economic reform (1978) as opposed to before. One of the most important reasons for the slower infrastructure growth is low government spending on infrastructure, which is caused by limited resources of urban infrastructure funding [1]. Therefore, innovative mechanisms of funding are needed to provide a solid foundation for economic growth.

In this paper, infrastructure funding includes fiscal revenue and market financing. "Fiscal revenue" in this paper is more general and includes not only budgetary funds, but also extra budget, and land transfer fees. Therefore, fiscal revenue includes budgetary allocation, local earmarked taxes, fees and user charges, and land transfer fees. Market financing includes debt financing (domestic loans, and bonds) and equity financing (stock financing, self-raised funds, and foreign capital).

After the economic reform in 1978, China's infrastructure investment has experienced the transition from conventional budgetary funding to a much more diversified system—the government and market are playing equally significant roles in supporting urban infrastructure development. Further, the main source of fiscal revenue also converted from primarily budgetary allocation and local earmarked taxes to land transfer fees. By 2005, land transfer fees accounted for 11% of total urban maintenance and construction revenue. Also, domestic loans and self-raised funds have also increased faster than average.

The major findings of this paper include:

- The total amount of urban maintenance and construction revenue has increased dramatically in the past two decades. It increased 13 fold from 1990 to 2005 (constant 2000 Renminbi). Per capita funding increased from 33 Yuan in 1990 to 372 Yuan in year 2005.
- Generally, market financing grew faster than fiscal revenue from 1990 to 2005 (fiscal revenue: the average annual growth rate is 15.3%; market financing: 17.1%). Also, the proportion of market financing has increased from 18% in 1990 to 51% in 2005.
- In fiscal revenue, budgetary allocation accounts for only a small proportion. The significance of earmarked taxes decreased radically after 1990. The average annual

growth rate of 5.4% is much lower than fiscal revenue (15.3%) in total. Fees and user charges grew faster than total revenue, especially user charges. However, compared to other items, the amount of user charges is very small: per capita user charges were 19 Yuan in 2007, while total fiscal revenue was 293 Yuan. In addition, land transfer fees are the engine for the growth of fiscal revenue. It has an annual average growth rate of 54.3%, which is much higher than fiscal revenue. However, land transfer fees also fluctuated a lot in the past.

- Market financing includes debt and equity financing. Domestic loan is the source of growth in market financing: it accounts for a majority of market financing (50-60%); the average annual growth rate from 1990-2005 is 24.0%. Self-raised funds and foreign capital grew slower than market financing in total. Also, foreign capital has a relatively low proportion in total infrastructure funding, about 1-2%.
- Regionally, the municipality is the highest in almost every revenue source (per capita). The east has the highest reliance on land transfer fees and also higher per capita value than the municipality. The western area has the highest proportion of domestic loans in total infrastructure funding (2005). Obviously, majority nationally issued bonds flowed into municipality; municipality has a per capita value at 171.1 Yuan, while 1.9 for the west. In addition, the central provinces have the lowest access to urban infrastructure revenue sources.

In order to evaluate the above trends and patterns, this paper gives the following five theoretical dimensions:

- The role of government and market in infrastructure provision;
- The efficiency of central and local government in offering urban infrastructure;
- The choice among general revenue, special funds, and fees;
- The pros and cons of budgetary funding and debt financing;
- The desirable pricing level of user charges.

According to the five theoretical dimensions, this paper gives the following conclusions:

- The unique feature of Urban Development and Investment Company (UDIC), which serves as an intermediate between government and market, still gives the government the dominant power in urban infrastructure funding and financing.
- Since our dataset only includes the sources of funds for local urban infrastructure, it is hard to evaluate if current situation is consistent with the Correspondence Principle.
- Currently the proportion of budgetary allocation in total revenue is higher than local earmarked taxes while fees and user charges are the lowest. Therefore, fees and user charges are not fully used for efficient resource allocation. Especially in the central and west regions, fees and user charges should be further developed considering inadequate funding sources.

Chapter 1: Some phenomenon we observed has shown non-marginal pricing, which is also due to the monopoly power of UDIC.

1 Introduction

With the rapid growth of urbanization and China's economy, higher quality urban infrastructure has become increasingly important. Not only does it affect the welfare of the citizens but it also influences the progress of the society as a whole. Much literature has proven the positive relationship between economic growth and urban infrastructure. However, compared to the high growth rate of the economy and population, the provision of urban infrastructure is seemingly insufficient. Several major infrastructure projects, such as paved local roads and streets, grew at a much slower pace after the economic reform (1978) as opposed to before. One of the most important reasons for the slower infrastructure growth is low government spending on infrastructure, which is caused by limited resources of urban infrastructure funding [1]. Therefore, innovative mechanisms of funding are needed to provide a solid foundation for economic growth.

After the economic reform in 1978, China's infrastructure investment has transitioned from conventional budgetary funding to a much more diversified system—the government and market play equally significant roles in supporting urban infrastructure development. The main source of fiscal revenues was also converted from primarily budgetary allocation and local earmarked taxes to land transfer fees. By 2005, land transfer fees accounted for 11% of total urban maintenance and construction revenue. Also, domestic loans and self-raised funds have also increased faster than average.

Using the data from *Zhongguo chengshi jianshe tongji nianjian* from 2000-2008, this paper systematically describes the trends and patterns of each item of urban maintenance and construction revenue under a clearly defined categorization. This study concentrates on the following research questions. First, it clarifies the trend and regional pattern of infrastructure funding from 1990 to 2007. Second, this paper further discusses funding mechanisms from the perspective of government and market. Third, this paper will evaluate current trend and pattern based on the five theoretical dimensions.

This paper is composed of 5 sections. The first section above introduces some background information. The second section states the five theoretical dimensions used in infrastructure funding and financing. The third section describes the history of the development of urban infrastructure finance in detail. The fourth section reviews previous research concerning China's urban infrastructure. The fifth section discusses the data source and methodology of this study. The sixth section illustrates the trends and patterns of urban infrastructure funding in detail. The last section evaluates current situation in China based on the five theoretical dimensions and concludes.

2 Theoretical Framework

Before we examine the facts in China's urban infrastructure area, standards need to be established. Is it better for the government or market to provide urban infrastructure? In what way should the provider pay for these projects? If the user is charged for the use of urban infrastructure, what should be the price level? In order to answer these questions, we need to solve the following five theoretical questions.

The first question is about the role of government and market in infrastructure provision. There are two theoretical reasons for the government's provision of urban infrastructure. First, the nature of increasing returns to scale and natural monopoly causes market failure [2]. Therefore, the market provision of urban utilities will result in prices higher and quantities lower than the efficient level. Second, some urban infrastructures are public goods, which bear the property of being non-rival and non-exclusive. Because of the marginal social cost being zero for non-rival goods and the infeasibility of private companies to collect fees for the consumption of nonexclusive goods, these urban utilities could not be efficiently provided by private firms [3].

The second question is which is more efficient for offering urban infrastructure, central or local government. Wallace Oates's Correspondence Principle could help answer this question: each public good is provided in the smallest (that is, lowest level) government consistent with no externality [4]. On one hand, the variation in consumers demand and the concentration of similar demands in one area supports decentralized provision [3]. However, on the other hand, "free rider" problem will arise when the spatial distribution of the costs and benefits of government services is not confined to the jurisdiction boundaries of the providing government. This problem can be solved by internalizing the externalities—that is, bigger government jurisdictions [3].

The third issue focuses on the best choice among general revenue, special funds, and fees. The criterion of this choice is the user-pay-and-benefit principle (or benefit-received principle), which examines the extent to which users pay in proportion to their amount of use and to the costs they impose on the system [3]. Apparently, this criterion is based on the recognition of consumers and the extent of difficulty to collect user charges. On one hand, urban infrastructure for which consumers could not be recognized or charged is only possible supported by general revenue. On the other hand, to the projects for which consumers could be easily identified and charged, user charges are more attractive for the sake of fairness [5]. Two other potential advantages of user charges are that they are one way to have nonresidents pay for benefits they enjoy, and the perception of fairness from users paying may result in more public acceptance of state and local government provision of certain services [3]. Also, user fees could give cost and price signals and provide a measure of the demand for new capital investment [5]. However, there are also cons for user charges. Objection is raised on the grounds that some charges are expensive to collect although feasible [5].

The fourth issue concentrates on the pros and cons for budgetary funding and debt financing. First, debt financing is more desirable for the urban infrastructure that needs relatively large initial expenditure, which budgetary funding would not be able to provide. That is the case in a lot of projects of urban infrastructure. The initial investment of public utilities (water supply and drainage, ect.) and capital spending in municipal works (roads and bridges etc.) are always debt-financed, while budgetary funding is always applied to urban infrastructure maintenance

and basic level roads construction. Second, debt financing is more appropriate considering intergenerational equity. However, there are also some cons of debt financing. It is criticized sometimes as creating an incentive for overcapitalization by sub-national governments if the individual voters who approve projects do not perceive their future costs [3]. Such an incentive may be larger in jurisdictions where a greater fraction of the voters are temporary residents [3].

The fifth issue is about the desirable pricing level of user charges, which is an important signal to both consumers and investors. The same as other goods and services, setting the price at marginal cost is always Pareto efficient. However, more complexity is caused by the problem of public goods and natural monopoly when setting price level for urban infrastructures. For natural monopoly industries, it is impossible to have a single price equal to marginal cost and have the producer earn a profit [3]. Therefore, Government needs to subsidize the production, especially for the initial investment [3]. In addition, setting user charges at marginal cost level, which means charging higher to consumers far away from existing services and hence costly to serve and lower to those who are closer, would encourage more efficient land use because if average costs are charged, urban sprawl would be encouraged by subsidizing people in outlying areas [6].

3 History

The history of urban infrastructure funding is marked by a series of turns. Before 1978, it was a shortage period, including deficiency in both political and financial support. 1978 to 1994 established the foundation for significant growth in later years; this period started to form the revenue structure and financing approaches in China now. After 1994, the policy and political foundation established has driven urban infrastructure to the current level.

3.1 Before 1978

Before the economic reform in 1979, China's infrastructure funding was typically characterized as centrally planned. In fact, the whole fiscal system was characterized by the centralized revenue collection and fiscal transfers. All taxes and profits were collected by local governments, remitted to the central government and then transferred back to the provinces and municipalities according to their expenditure needs approved by Beijing [7].

For urban infrastructure, the central government, the Ministry of Construction in particular, had the authority to set investment goals, devise development strategies, review long-term plans, approve projects with foreign investment and limit the scope of operation of certain infrastructure facilities. All infrastructure projects needed to be reviewed by Ministry of Construction or provincial Department of Construction depending on the level of importance [7].

Under this central-local fiscal relationship, urban infrastructure construction was not sufficiently supported and developed. Between the 1950s through the 1970s, investment in urban construction totaled 12 billion RENMINBI, about 1.43% of nation's total fixed investment and 0.23% of GDP, which was far lower than other countries [8]. The first reason was that consumption and infrastructure investment were deemed as "non-productive" compared to industrial investment. The second reason was that the resources of local governments for urban infrastructure funding were very limited. For many years, the retention rates for municipal authorities was set very low by the central government and capital expenditure funding either in the form of grants or credit was largely unavailable to the service sector and directed mainly to the production sectors [7, 9]. The major source of funding, the Urban Maintenance and Construction Funds ("UMCF"), depended heavily on central budgetary allocations and a number of changing levies and fees determined by the central government (such as the Public Utility Surcharge ("PUS") established in 1963).

3.2 1978 to 1994

The central-local government relationship began to change after 1978, when fiscal decentralization was introduced and local government began to retain higher rates of revenue and allocated funds more freely [7]. In this new system, participating provinces and municipalities were allowed a share of the revenue and they retained all income collected in excess of the share. In exchange for being given a bigger proportion of revenue, they also were required to accept responsibility for most items of expenditure [7].

Additionally, during this period, the central government began to recognize the importance of urban infrastructure construction and tried to support faster urban development by a utilizing an improved funding system. Starting from the 1980s, China began to build the

legislative-administrative framework for urban construction. The Law of Urban Planning approved in 1989 served as a major milestone in formalizing city planning legislation. Later, in 1991, the first national urban land-use classification and planning standards were issued.

Consequently, the resources of funding urban infrastructure were broadened. Until 1979, an urban construction levy of 5 percent of industrial and commercial profits of domestic enterprises was introduced to 57 cities, later expanded to 150 cities in 1984 [8]. Following the conversion of enterprise profits to taxes (ligaishui reform), the levy was replaced by the Urban Maintenance and Construction Tax (UMCT) in 1985 [8]. The UMCT was the only earmarked tax in the fiscal system and became an important tool for infrastructure funding. Additionally in the 1980s, some cities began to implement user charges for promoting urban infrastructure revenues. For instance, wastewater treatment charges began to be collected in more than 30 cities in 1984 [8]. In the mid-1980s, Guangzhou and Foshan started requiring toll payment for vehicular use of their bridges [8].

“Infrastructure connection” fees on new construction and new in-migrants (the so-called zengrong fei, or fees for expanding capacity) were also allowed by the State Council in some cities in 1984 and became popular almost in all cities by the early 1990s. By early 1990s, this fee was charged on permanent migrants and new development by local governments [8]. In many places, this was combined with the sale of hukou, or urban residency rights. For instance, Anhui had sold 500 hukou since it started selling them in 1993, and most of the 1.5 million RENMINBI raised was to be used to finance urban construction [8]. By early 1994, 3 million urban resident household registration books had been sold to peasants throughout the country, generating revenue of 25 billion RENMINBI [8].

Land-use fees were first tried out in 1981 in Shenzhen on projects funded by foreign sources and later in Shanghai, Tianjin, Guangzhou, Xiamen and Fuzhou [8]. Then, two laws (The State Council 1988; The State Council 1990) were launched in 1988 and 1990, respectively, which have provided the legal foundation for land leasing as infrastructure funding tool by Chinese municipalities. By 1992, sale of land use rights had extended to individuals, foreign joint ventures, and domestic companies and also cover many cities [8]. By 1994, land-use right had been sold in all provincial units except Tibet [8].

3.3 After 1994

Although UMCT and PUS were instrumental in the controlled expansion of urban infrastructure funding, such approaches declined in importance in the 1990s. After the fiscal reform of 1994, fiscal decentralization was further improved. Taxes were reassigned between the central and local governments, with a shift from a negotiated system of general revenue sharing to a mix of tax assignments and tax sharing [11]. For the first time, local governments were assigned some taxes with significant revenue-generation capacity as local taxes. Related to urban construction, an urban land use tax, a real estate tax, and an urban maintenance and construction tax are now among the local taxes [10]. In 1994, the urban land use tax was renamed “land use tax” and changed into a local tax to stimulate local tax efforts [8].

4 Previous Research on Infrastructure Provision and Funding

There are three streams concerning current literatures. The first one is about the quantity and quality of urban infrastructure provision. The second one is about the categorization of urban infrastructure funding. The third is the major trends and patterns of urban infrastructure funding mechanisms.

The first topic of some literatures is the quantity and quality of urban infrastructure provision. Traditional infrastructures grew slower after the economic reform of 1978; while the high-tech infrastructures developed more rapidly after 1978 than before, the reason of which includes low government infrastructure spending, decreased incentives of investment of state enterprise, and diminished power of government in mobilizing rural resources [1]. In addition, the problems of unmet demand, deficiencies in cost recovery and inadequate maintenance are revealed. As examples of unmet demand, wastewater treatment and sewage were not sufficient in late 1990s; recycling program is not initiated. Also, the user charges are too low to fund the proper maintenance. For instance, low water price led to excessive demand; also because of the low price, sewerage and wastewater management contributed to insufficient revenue for the infrastructure sector [7]. Another problem of urban infrastructure provision is increasing provincial disparity [1]. Cities in the eastern region uniformly enjoy higher levels of services in all sectors, while in inland provinces, public transportation, roads, streets, water supply, waste treatment are in poor condition [10].

The second topic concentrates on the categorization of urban infrastructure funding. The most common categorization is done according to the nature of the funding. The resource of urban infrastructure revenue includes central and local budgetary allocation, local earmarked taxes, fees and user charges, borrowing, and self-raised funds [7, 10]. Most commonly, land-transfer fees are listed under “fees and user charges” because it is viewed as a significant source of local governmental revenue. However, some literature has made adjustments as they list the land-transfer fees in a separate category [12]. Another categorization emphasizes more on the entity that provides urban infrastructure funding. However, this categorization generally seems misleading and ambiguous. For example, projects sorted as direct budget, debt financing, and marketization were supported by urban development and investment companies [9]. However, the entities that provide the funds are not clear under this classification. “Within “debt financing”, the entity for those projects which are supported by the funds borrowed from nationally issued bonds is actually the central government because the repayment of these borrowings is always waived in the process of political negotiation.” [9] Also, borrowing from commercial banks, bonds and foreign capital should be separated.

The third topic is the patterns and trends of urban infrastructure funding. The urban maintenance and construction tax has accounted for a declining share of urban maintenance and construction revenue, from about 36.7% in 1985 to 18.6% in 1996. The importance of the collection of fees and user charges has increased, counts for 15-25% now. Also, borrowing and self-raised funds become significant sources of urban maintenance and construction revenue [10].

Although current literatures in some extent have clarified the main sources of urban infrastructure funds, they still have the following deficiencies. First, the categorization is not unified and clear enough. Second, the data used in these papers are not up-to-date. Some papers

only managed to describe the trends and pattern of urban infrastructure revenue before 2000; or even if data after 2000 are included, they only tried to compare the proportion of each item with that in 1990s and failed to clarify the trends of recent 10 years. Third, the description of trends and patterns in current literature barely includes the discussion of regional disparity. Finally, the patterns and trends described in current literature are not discussed in a theoretical framework, which is the basis of evaluation.

5 Data and Methodology

Infrastructure provides “basic services to industry and household” (Martini and Lee 1996), “key inputs to the economy” (Threadgold 1996), and “a crucial input to economic activity and growth” (Department of Foreign Affairs Canberra 1998). Generally, the activities of infrastructure investment include: Energy (power generation and supply); transport (toll roads, light rail systems, bridges and tunnels); water (sewerage, waste water treatment and water supply); telecommunications (telephones); social infrastructure (hospitals, prisons, courts, museums, schools and government accommodation) (Grimsey and Lewis 2000). The narrow definition, according to the one given by Ministry of Housing and Urban-Rural Development of China, which is also the authority for administrating urban infrastructure finance, includes public utilities (water supply and drainage, residential gas and heating supply, and public transportation), municipal works (roads, bridges, tunnels, dock, and sewerage), parks, sanitation and waste management, and flood control. Power, telecommunications and other transportation sectors (ports, airports and railway) are not counted as a part of urban maintenance and construction in China [7].

This paper will mainly talk about the urban infrastructure funding mechanisms; to be more specific, the urban maintenance and construction revenue, which is used for expenditure on fixed assets investment, maintenance, payment for domestic and international loans, taxes and fees, and other expenditures. First, this revenue includes part of the funds for rural construction. In central budgetary allocation, New Rural Construction (xin nongcun jianshe) funds are included. Also, Urban Maintenance and Construction Tax charges 5% in counties and towns (xian, xiang) and 1% for lower administrative units on the combined value of Value-Added Tax, product tax, and business tax, which also includes part of the funds coming from rural sectors. Second, funds for major projects are not included in the Urban Maintenance and Construction revenue. Actually, they are always listed in the general fiscal expenditures rather than urban construction funds [12]. In addition, funds for national-level major project are not included, for example, the Three Gorges Project is not listed in the Urban Maintenance and Construction revenue. Urban Maintenance and Construction revenue includes central and local budgetary allocation (zhongyang he difang caizheng bokuan), Urban Maintenance and Construction Tax (chengshi weihu jianshe shui), Public Utility Surcharge (gongyong shiye fujia fei), water resource fee (shui ziyuan fei), Infrastructure connection fee (shizheng gongyong sheshi zengrong peitao fei), user charges (shizheng gongyong sheshi youchang shiyong fei), land transfer fee (tudi churang zhuanrang jin), assets exchange revenue (zichan zhihuan shouru), domestic loans, foreign capital, bonds, stock financing, and self-raised funds (qishiye danwei zichou zijin).

In this paper, infrastructure funding includes fiscal revenue and market financing. “Fiscal revenue” in this paper is more general, with includes not only budgetary funds, but also extra budget, and land transfer fees. Therefore, fiscal revenue includes budgetary allocation, local earmarked taxes, fees and user charges, and land transfer fees. Market financing includes domestic loans, security market financing, self-raised funds, and foreign capital.

This paper uses the data from Zhongguo chengshi jianshe tongji nianjian, 2000-2008 while the data before 1999 comes from [10]. First, the paper describes the national trends and patterns by analyzing per capita level of each item in fiscal revenue and market financing. In order to remove the influence of inflation, the paper adjusts the urban maintenance and construction

revenue each year using price index of fixed assets (constant 2000 RENMINBI). Because the price index of fixed assets for 1990 is not available, we use the price index of 1991 for calculating the adjusted urban maintenance and construction revenue of 1990. Moreover, this paper assumes the price index of 1999 equals 100. Second, besides the national trends, it also clarifies regional patterns by analyzing per capita funding and the proportion of each item in total funding in municipality, east, central and west (year 2005). Because of the missing data problem in Xizang and Beijing, they are excluded from the west and municipality. Finally, we are going to evaluate the trends and patterns from the theoretical perspective.

6 Data Analysis: Urban Infrastructure Funding Mechanisms

The total amount of urban maintenance and construction revenue has increased dramatically in the past two decades. It increased 13 fold from 1990 to 2005 (constant 2000 RENMINBI). Per capita funding increased from 33 yuan in 1990 to 372 yuan in year 2005; also, urban maintenance and construction revenue as a percentage of GDP increased from 1.8% in 1999 to 2.9% in 2005. The average annual growth rate of fiscal revenue from 1990 to 2005 is 12.8%, while 17.1% for market financing; therefore, the proportion of market financing has been increasing in the past two decades, from 18% in 1990 to 51% in 2005. Regionally, the proportion of fiscal revenue is highest in the east, which is approximately 50% (the main reason for this is that land transfer fees in the east are much higher than other regions); municipality has the highest proportion of market financing (64%). However, both per capita and proportion of fiscal revenue and market financing in municipality are much higher other regions.

This section will first describe the trend and pattern of each item in fiscal revenue and market financing. Fiscal revenue includes central and local budgetary allocation, local earmarked taxes (“two-item fees”), fees and user charges (water resource fee, infrastructure connection fee, and user charges), and land transfer fee. Market financing includes domestic loan, security market financing, self-raised funds, and foreign capital. Central and local budgetary allocation come from general funds, while local earmarked taxes include Urban Maintenance and Construction Tax and Public Utility Surcharge, which is the only earmarked fiscal revenue for urban construction.

6.1 Fiscal Revenue

6.1.1 Central and Local Budgetary Allocation

Central budgetary allocation refers to the earmarked grants from the central government for urban maintenance and construction, which takes the form of fiscal transfer and special funds, namely irrigation works funds (Shuili jianshe jijin), road funds (Gonglu jijin), and rural construction funds (Xin nongcun jianshe); while local budgetary allocation always targets on big projects and major programs (Zhongda xiangmu), which takes the form of special grants [12].

The amount of central budgetary allocation is very limited compared to other resources. In 2007, it is 3 billion RENMINBI (constant 2000 RENMINBI), while the local budgetary allocation is 128.6 billion. Central budgetary allocation had increased from 1990 to 2000; per capita level increased 5 folds. However, it started to decrease from 2000. Per capita central budgetary allocation in 2007 was only 32% of 2001. In comparison, local budgetary allocation had dramatically increased 1990-2007 with an average annual growth rate of 17.3%, which is higher than fiscal revenue (15.3%). Therefore, local budgetary allocation is one source of the growth in fiscal revenue.

6.1.2 Local Earmarked Taxes—Two-item Funds

The two-item funds play an important role in urban infrastructure funding. UMCT is collected by local government as a surcharge on the combined value of Value-Added Tax, product tax, and business tax-7 percent in cities, 5 percent in towns and 1 percent elsewhere. A Public Utility Surcharge is a surcharge fee which is collected by local governments for such goods and

services, including industry and domestic uses, as electricity, water, natural gas supplies, public transportation, and local telephone service [13].

Although the earmarked local taxes played an essential role before 1990 (it accounted for 42% of total urban maintenance and construction funds in 1990), the importance has been decreasing after that. Per capita local earmarked taxes increased from 13.8 in 1990 to 45.0 in 2007 with an average annual growth rate of 5.4%, which is much smaller than fiscal revenue (15.3%) and market financing (17.1%). Therefore, the proportion of local earmarked taxes in total funding had been decreasing.

In addition, the two-item funds also have some problems. The rate is set by the central government and is low relatively to the need of many cities. The former is collected as a surcharge on three taxes levied on the output of industrial and commercial enterprises and incomes of enterprises in transportation, hotel, catering, and other service sectors. Therefore, it fluctuates with output levels of these enterprises and does not apply to public institutions (or *shiye danwei*), which is not desirable as a revenue source for infrastructure.

6.1.3 Fees and User Charges

Fees and user charges include water resource fee, infrastructure connection fee, and user charges. In our data, before 2001, infrastructure connection fee and land transfer fee are included in other sources rather than fees and user charges, which explain the huge gap of the amount of fees and user charges between years before 2001 and after. Also, it gives the reason for the dramatic decrease of other sources after 2001. For the same reason, the percentage of each item in fees and user charges are not listed before 2001.

Water resource fee refers to the fees that are charged to enterprises and public institutions (*shiye danwei*) for exploiting underground water resources in a programming zone of the city (*chengshi guihua qu*) [13]. The infrastructure connection fee (*shizheng gongyong sheshi zengrong peitao fei*) refers to the fees charged to enterprises, institutions or individuals who engage in construction projects (including construction and expansion of land use) in the programming zone of the city. The charges are levied according to the building area (*jianzhu mianji*) or amount of the investment, which would be used for urban infrastructure including roads, water, sewerage, gases, heating, public transportation, sanitation and parks [13].

The average annual growth rate of fees and user charges is 21.7%, which is higher than fiscal revenue and market financing. Furthermore, user charges are the one that increased the fastest. However, compared to other items, the amount of user charges is very small: per capital user charges were 19 Yuan in 2007, while total fiscal revenue was 293 Yuan. Also, these fees and user charges have some problems: some municipal authorities have included a multitude of infrastructure services in the fee collection and often have asked for exorbitant amounts of money [7, 10]. This is shown in the case of some 28 different fees imposed on various aspects of real estate development in Shanghai [6].

6.1.4 Land Transfer Fee

Land transfer fee is the most important source of urban infrastructure funding, which began to provide funds for urban infrastructure in 1980s. In this paper, land transfer fee infers to revenues from leasing land use rights and charging land use fees.

After introducing land leasing in 1980s, it has gradually become one of the most important revenue items for urban infrastructure for local government. Originally, the central government's share of land-leasing revenues was set at 60 percent. The split subsequently was modified to 40:60 for central and local government, respectively, then to 32:68 and 5:95. And by 1994, all land-leasing revenues were assigned to municipal governments [14, 8]. Land leasing is an important step towards fiscal decentralization because after the initiation local governments have found a revenue resource which is totally under their control.

As table 2 has shown, the data of land transfer fee starts from 2001. That is because this item is included in other sources before 2001. First, land transfer fee is the engine for the growth of fiscal revenue. It has an annual average growth rate of 54.3%, which is much higher than the one of fiscal revenue. Second, land transfer fee fluctuated a lot in the past 10 years. It increased dramatically starting from 2001; then experienced the bottom point at 2005 and increased again after that.

6.2 Market Financing

6.2.1 Debt Financing

Debt financing includes domestic loans and bond financing. Domestic loans include nationally issued bonds and bank loans. From 1998, Ministry of Finance began to increase nationally issued bonds and grant loans to provincial governments from that for the purpose of local economic and social development. The local governments are responsible for repaying capital with interests. Actually, borrowing from national bonds should have been used on environmental and other social projects unable to generate sufficient economic return; however, they are always invested to other economic development projects that preferred by the local governments. In addition, the repayment of these loans is always waived in the process of political negotiation with central government [9].

The most important part of domestic loans is bank loans, which account for over 80% of domestic loans. Because local governments are not allowed to borrow money directly from commercial banks, Urban Development and Investment Companies are established to justify this way of financing urban infrastructure. However, because the maturity period of commercial bank loans does not exceed 5-8 years during which the infrastructure investment projects cannot recover cost, local government chooses to roll over the loans rather than repay them. After the implementation of higher credit standards for commercial banks, local governments' political control over commercial banks has weakened and it becomes harder to gain loans from these banks [9].

Domestic loan is the source of growth in market financing: it accounts for majority of market financing (50-60%); the average annual growth rate from 1990-2005 is 24.0% while the growth rate of market financing is 17.1%.

6.2.2 *Equity Financing*

Equity financing includes self-raised funds, foreign capital, and stock financing. Self-raised funds refer to those come from the accumulated capital of enterprises and public institutions for the purposes of expanded reproduction [13]. Self-raised funds are not specifically authorized as a fee or fund [10, 11]. However, enterprises sectors are forced to take the fiscal burdens to finance public services [10]. For example, in Dongguan, Guangdong province, the local government created an energy and communications company to raise money from state, collective and private sources for the construction of roads and power plant. This company also is responsible for paying interests and repaying the capital by collecting user fees and tolls [10]. Another example of privately funded infrastructure is the small-scale secondary pipe networks for purified drinking water established in some cities in mid-1990s [10].

The average annual growth rate of self-raised fund is 14.3%, which is lower than the 17.1% of market financing. Estimated by [12], in self-raised funds, about 2/3 of them come from the direct investment of private enterprises.

Foreign capital includes FDI, foreign loans, and other foreign investment. After the economic reform and the implementation of opening policy in 1978, China has attracted investments from foreign companies. In order to encourage these investments, the central government offers a series of incentives to prospective investors, including tax advantages, customs duty exemptions, a wider variety of permitted activities, and relative operational autonomy [7]. Foreign investment usually takes the form of public-private partnerships, in which Chinese government provides the land and foreign companies provide the funds needed [6, 15]. Foreign capital has a relatively low proportion in total infrastructure funding, about 1-2%. The average annual growth rate 15.3% is also lower than 17.1% for market financing.

6.3 **Regional Disparity**

Regionally, per capita budgetary allocation in municipality is much higher than other regions; the east and west are lower; the central is the lowest. However, the west has the highest proportion in total infrastructure funding (20%), which indicates the highest reliance in the west on budgetary allocation. In addition, the central is lowest in both per capita and proportion. Also, municipality has the highest per capita local earmarked taxes, while the west has the lowest. In addition, the central has the highest reliance (13%, year 2005). The east has the highest reliance on land transfer fee, the proportion of which is 16%, the central 10%, the west and municipality even lower. Further, per capita land transfer fee in the east is higher than in municipality — the only item that the east has a higher per capita level than municipality. The western area has the highest proportion of domestic loans in total infrastructure funding (2005). Municipality has the highest per capita domestic loan. Obviously, majority nationally issued bonds flowed into municipality; municipality has a per capita value at 171.1 Yuan, while 1.9 for the west. In addition, municipality has the highest reliance on self-raised fund, the proportion of which is about 28% in 2005.

7 Conclusion

During the process of decentralization, local government has increased its ability in funding urban infrastructure both from widening revenue resources and diversifying financing approaches. Although budgetary allocation and two-item funds used to provide majority of urban infrastructure funds, the importance of domestic loans, land transfer fee has dramatically increased. Also, the funding approach has transitioned from government-leading mode dominated to diversified modes. In addition, the significant regional disparity is alarming: the municipalities and the east gained a much larger share in the total resources due to their political importance and economic advantages; the west, which used to be the area that developed the slowest, benefited from the central government's policy of prioritizing the development of the west in the recent decade; however, the central, although has higher per capita income than the west, has developed the slowest due to lack of policy and financial support.

These trends and patterns have raised the following questions: are these trends theoretically reasonable; or future mechanism predicted a theoretically more efficient one? To answer these questions, we will evaluate current infrastructure funding trends in all five theoretical dimensions.

According to the first theoretical dimension, government vs. market, China has a unique feature: Urban Development and Investment Company (UDIC), which serves as an intermediate between government and market, is playing a significant role in urban infrastructure construction. Urban Development and Investment Company (UDIC) was established in most cities at the end of the 1990s or even later when central government required that responsibility for asset and liability management should be taken away from municipal governments and placed in the hands of specialized local enterprises [9]. In addition, UDIC has to collect funds for the projects from the society, take the risk independently and recover the costs individually [12]. The main resources of UDIC funding come from domestic loans and land transfer fee. UDIC acts on behalf of the government to borrow funds from banks and other sources, issue bonds when allowed, enter into joint ventures with private companies for infrastructure development, sell local infrastructure assets, etc. Usually, the bank loans are guaranteed by local fiscal revenue, land revenue, or other fees and user charges. The loans are repaid by local fiscal revenue or operating revenue of the projects. The problem of bank loans as a way of financing urban infrastructure is that they are always constrained by credit policies implemented by central government [12, 16]. Also, urban infrastructure projects always need a relatively longer period to recover costs, which make local governments choose to roll over debts instead of repaying them. Consequently, the excessive debt ratio of local governments has become a public concern. Another main revenue resource for UDIC is land revenue. As a matter of fact, not all the lands could provide funds for urban infrastructure construction. Vast majority of land revenue come from the lands of commercial and living purpose because the cost of industrial land is close to or even higher than the price of the land, which makes industrial land leasing ceases being beneficial. The main way of local governments operating land is land expropriating -- infrastructure construction -- waiting for appreciation -- land leasing -- gaining the benefits. After leasing the land, part of revenue would be transferred to UDIC as funds for urban infrastructure construction [12].

It is hard to evaluate if current situation is consistent with the Correspondence Principle because our dataset only includes the sources of funds for local urban infrastructure. Projects of provincial and national level are not listed in our dataset.

Currently the proportion of budgetary allocation in total revenue is higher than local earmarked taxes while fees and user charges are the lowest. Therefore, fees and user charges are not fully used for efficient resource allocation. Especially in the central and west, fees and user charges should be further developed considering inadequate funding sources. The proportion of debt financing in total revenue has been increasing while budgetary funding decreased. From this perspective, the trend is theoretically feasible. However, the special case of land transfer fee in China has raised more complexity. First, land transfer fee is considered unstable and non-lasting. Second, land transfer fee is not generationally equitable. The revenue benefit of land transfer fee has encouraged the local governments to remain the real estate price at a high level. However, the high price will turn out to be the cost that current generation is paying for future ones. Third, frequent ups and downs of land leasing revenue are deemed as a factor that causes dramatic economic fluctuation. Therefore, how to constrain and substitute land leasing revenue by debt financing is still a big concern.

It is hard to say whether the level of user charges now DOES or DOES NOT equal to the marginal cost. However, some phenomenon we observed might point out some problems. The shortage of electricity happened during electricity-using summit might be better solved by adjusting the level of user charges—electricity fees rather than black-out in certain areas. In addition, setting the user charges at marginal cost relies on a competitive market or price regulation. However, although UDIC-leading mode is deemed as a marketized approach, the mere fact that UDIC is attached to or even an agent of the government makes it inevitable that UDIC has become a monopoly, who has no incentive to provide public goods and services at marginal cost level.

Compared to the current literature, this paper has the following contributions: first, it updates the data to the most recent available. Second, the analysis is based on a clear categorization; according to the provider of the urban infrastructure revenue, it is categorized into fiscal revenue and market financing. Third, in the discussion of regional disparity, we talk separate municipalities from other regions because of their special political and economic position; and the results prove that the pattern in municipality is quite different from other areas. Fourth, in addition to the description of trends and patterns, this paper also tries to evaluate the current situation from theoretical perspectives.

One of the limitations of this paper is the lack of data analysis while clarifying urban infrastructure funding mechanisms from the government and market perspective. That is because in the data of domestic loans, loans for private sectors are not separated from those provided to local government or UDIC. For this reason, we failed to illustrate the trends and pattern of the three different modes. In addition, because of the missing data problem for Beijing and Xizang, they are excluded from municipality and the west. However, they are considered representative in each region; therefore, some information is omitted due to the above reason mentioned. Based on the description provided by this paper, future research should concentrate on the reason of the distribution of funding mechanisms in different areas. Also, whether there is a correlation between the funding mechanism and expenditure mode is another question worth further research.

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Appendix A: Per Capita Urban Maintenance and Construction Revenue, National and Regional, 1990-2007

Table 1: Per Capita Urban Maintenance and Construction Revenue, 1990-2007 (Yuan/Person)

	1990	1993	1996	1999	2000	2001	2002	2003	2004	2005	2006	2007
Fiscal Revenues	19.2	23.3	26.4	45.5	49.4	82.3	101.1	132.5	182.4	164.6	211.7	293.0
Budgetary allocation	4.9	9.1	8.1	22.2	25.5	32.3	36.3	45.9	50.9	59.5	76.9	99.6
Central budgetary allocation	1.7	2.8	0.9	8.4	9.1	7.0	5.9	5.8	3.7	4.3	3.9	2.3
Local budgetary allocation	3.1	6.2	7.2	13.8	16.4	25.3	30.4	40.1	47.2	55.2	73.1	97.3
Local earmarked taxes	13.9	13.7	17.8	22.7	23.0	25.0	28.3	32.2	35.8	42.1	43.7	45.5
Maintenance and Construction Tax	10.3	10.3	13.2	17.6	18.7	21.1	24.5	28.0	31.6	38.2	38.5	40.2
Public Utility Surcharge	3.6	3.5	4.6	5.1	4.3	3.8	3.9	4.2	4.2	3.8	5.2	5.4
Fees and user charges	0.4	0.5	0.5	0.6	0.8	12.0	14.6	16.3	17.7	21.7	29.3	38.3
Water resource fee	0.4	0.5	0.5	0.6	0.8	0.9	1.0	1.2	1.5	1.7	1.7	1.8
Infrastructure connection fee	**	**	**	**	**	5.6	6.7	7.1	7.6	9.9	14.3	17.5
User charges ^b	**	**	**	**	**	5.5	6.9	8.0	8.7	10.1	13.4	19.0
Land transfer fee ^c	**	**	**	**	**	13.1	21.9	38.1	77.9	41.2	61.8	109.7
Market Financing	5.9	10.9	22.6	53.1	65.8	94.9	119.6	164.5	171.8	190.3	**	**
Domestic loans	1.4	4.7	8.0	30.1	32.8	57.9	67.6	100.2	102.4	115.8	**	**
Nationally issued bonds	**	**	**	**	**	9.9	5.1	2.8	2.4	10.6	**	**
Bank loans	**	**	**	**	**	47.9	62.5	97.5	100.0	105.2	**	**
Other bonds	**	**	**	**	**	0.5	0.2	1.2	0.0	2.4	**	**
Self-raised funds	4.1	4.8	10.0	19.1	26.3	32.0	46.5	57.9	63.8	65.6	**	**
Foreign capital	0.4	1.4	4.7	4.0	6.7	4.4	4.7	5.1	5.3	6.4	**	**
Stocks	**	**	**	**	**	0.1	0.5	0.0	0.2	0.1	**	**
Other sources^a	8.3	26.7	21.8	32.1	42.0	20.0	23.6	24.8	18.5	21.2	28.9	16.9
Total	33.4	60.9	70.8	130.7	157.1	197.2	244.2	321.9	372.6	376.1	240.7	310.0

Data sources: Wu (2008); China's Urban Construction Yearbook (2000-2008).

Note: ** for missing data.

All the data above has been adjusted by fixed assets index, 2000 constant price.

a. Other sources include infrastructure connection fee and land transfer fee before 2001. After 2001, other sources primarily include fees for temporary occupation of roads, roads destroying fee, and compensation fee for cutting down trees.

b. User charges include primarily toll on roads and bridges, water treatment fee, and garbage treatment fee.

c. Only data of year 2006 and 2007 is available for assets exchange revenue; therefore, it is combined with land transfer fee.

Table 2: Urban Maintenance and Construction Revenue, by Regions ^e, 2005

	Municipality			East			Central			West		
	Per Capita	% ^c	GR ^d	Per Capita	%	GR	Per Capita	%	GR	Per Capita	%	GR
Fiscal Revenue	547.9	34%	25%	291.6	50%	22%	82.7	39%	1%	96.4	37%	6%
Budgetary allocation	235.4	15%	48%	99.6	17%	24%	21.9	10%	-18%	52.7	20%	18%
Central budgetary allocation	30.9	2%	128%	2.5	0%	35%	2.5	1%	-13%	7.0	3%	-7%
Local budgetary allocation	204.5	13%	40%	97.1	17%	24%	19.4	9%	-19%	45.7	17%	24%
Local earmarked taxes	174.8	11%	44%	60.0	10%	31%	28.5	13%	9%	22.3	8%	5%
Maintenance and Construction Tax	173.3	11%	46%	52.6	9%	31%	25.2	12%	9%	20.3	8%	7%
Public Utility Surcharge	1.5	0%	-46%	7.4	1%	31%	3.3	2%	9%	2.0	1%	-10%
Fees and user charges	54.7	3%	-13%	39.4	7%	31%	11.8	6%	24%	11.0	4%	48%
Water resource fee	0.2	0%	398%	1.6	0%	4%	0.9	0%	84%	0.3	0%	-30%
Infrastructure connection fee	34.0	2%	12%	17.7	3%	29%	5.0	2%	38%	6.5	2%	89%
User charges ^b	20.5	1%	-37%	20.2	3%	37%	6.0	3%	10%	4.3	2%	18%
Land transfer fee	82.9	5%	-11%	92.6	16%	12%	20.5	10%	3%	10.4	4%	-42%
Market Financing	1029.4	64%	0%	255.9	44%	13%	113.5	53%	27%	154.5	58%	21%
Domestic loans	482.5	30%	-12%	164.9	28%	26%	68.4	32%	32%	106.5	40%	11%
Nationally issued bonds	171.7	11%	3903%	9.1	2%	200%	1.9	1%	-22%	2.0	1%	-15%
Bank loans	310.8	19%	-43%	155.8	27%	22%	66.6	31%	35%	104.5	40%	12%
Other bonds	59.4	4%		0.1	0.00%		0.1	0.05%		0.0	0%	
Self-raised funds	456.9	28%	1%	82.3	14%	-9%	39.4	18%	25%	43.8	17%	47%
Foreign capital	30.6	2%	-5%	8.6	1%	76%	5.3	2%	-14%	4.1	2%	76%
Stocks	0.0	0%		0.0	0%		0.2	0.09%		0.1	0.04%	
Other sources ^a	37.3	2%	-37%	35.5	6%	28%	18.4	9%	26%	13.3	5%	15%
Total	1614.6	100%	6%	583.0	100%	18%	214.6	100%	15%	264.2	100%	15%

Data source: China's Urban Construction Yearbook, (2006).

a. Other sources primarily include fees for temporary occupation of roads, roads destroying fee, compensation fee for cutting down trees.

b. User charges include primarily toll on roads and bridges, water treatment fee, and garbage treatment fee.

c. The proportion of each item in total revenue.

d. Growth rate.

e. Municipality includes Tianjin, Shanghai, and Chongqing; the east includes Hebei, Liaoning, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, and Hainan; the central includes Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan; the west includes Neimenggu, Guangxi, Sichuan, Guizhou, Yunnan, Shanxi, Gansu, Qinghai, Ningxia and Xinjiang.

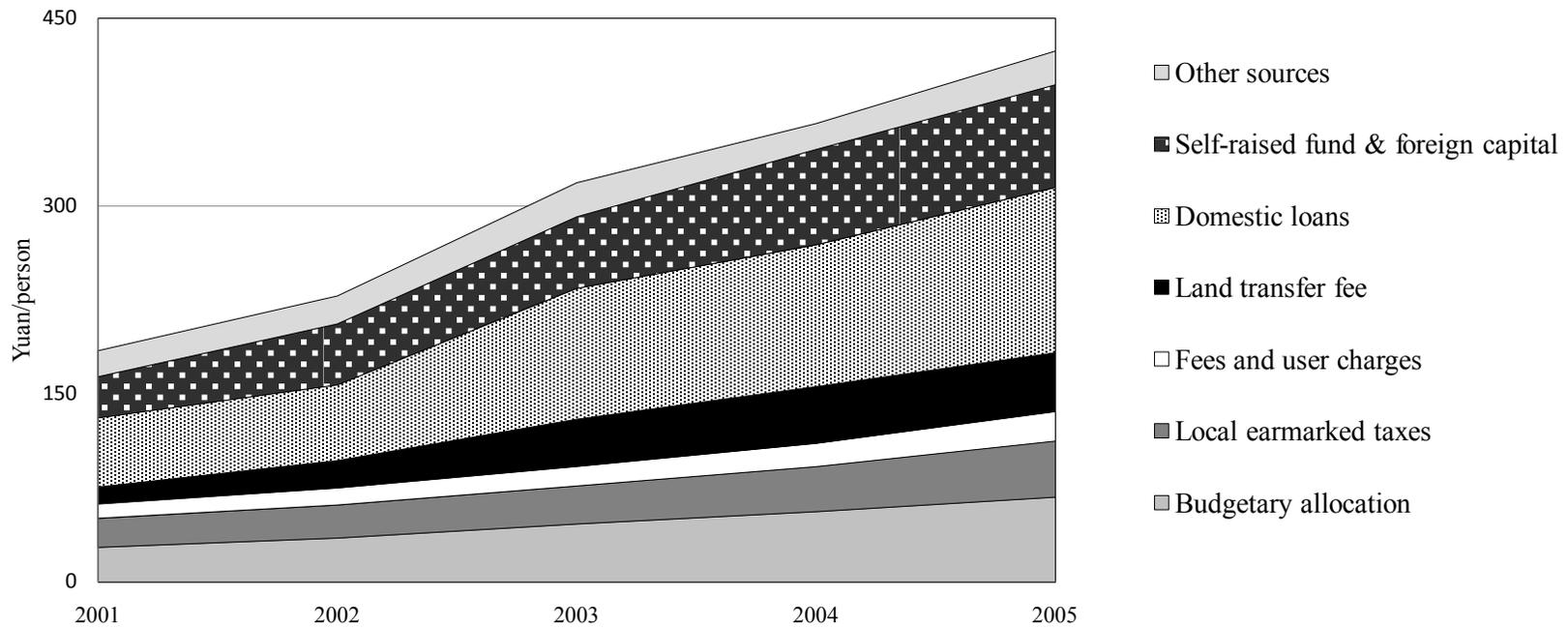


Figure 1: National Trends and Patterns of Urban Maintenance and Construction Revenue, 2001-2005

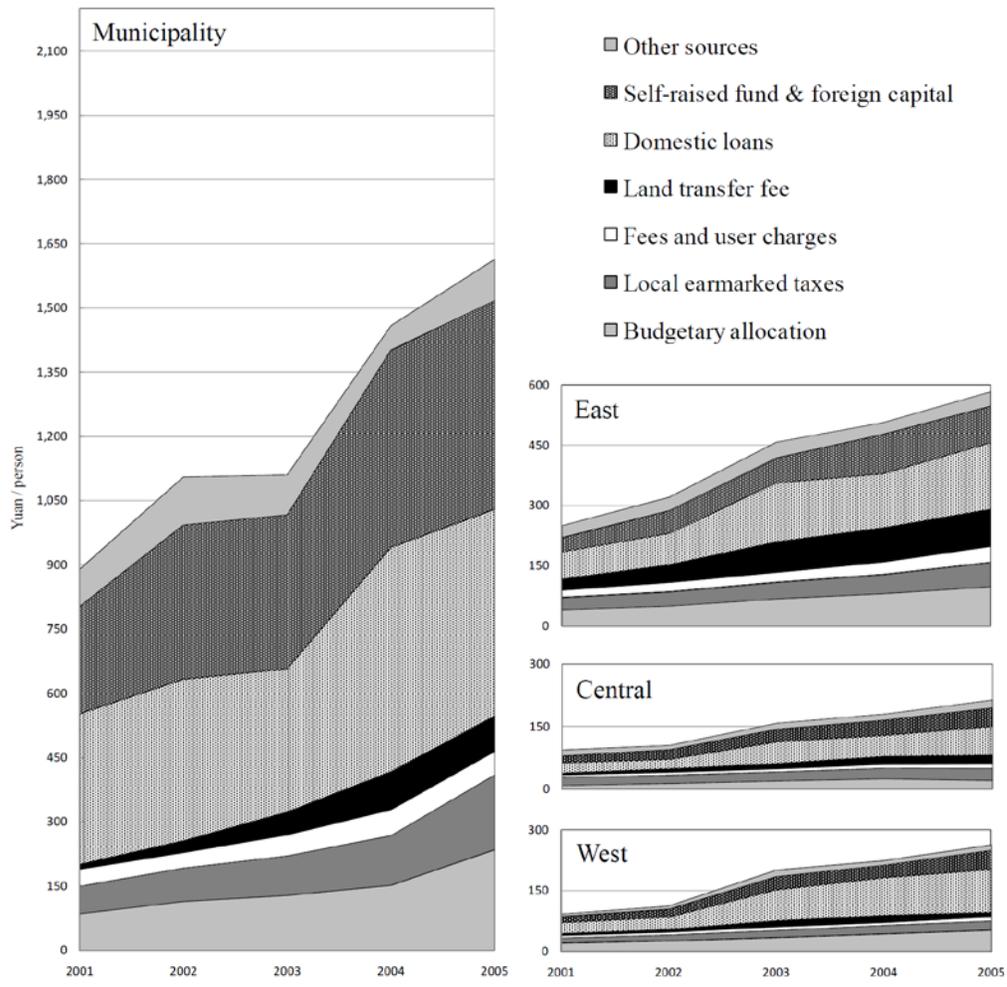


Figure 2: Regional Trends and Patterns of Urban Maintenance and Construction Revenues, 2001-2005