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Urban Management and China's Municipal Pattern

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***Abstract*—**Not only is municipal pattern the institution basement of urban management, but it also determines the forms of the management results. There's a considerable possibility of bankruptcy for China's current municipal pattern as it's an overdraft of land deal in fact. Based on the analysis of China's current municipal pattern, the passage proposed an assumption of a new pattern verified legitimacy by conceptual as well as econometric models. Conclusion is: the added supernumerary value of investment in public goods was not included in China's current municipal pattern, but hidden in the rising housing prices; we should set housing tax or municipal tax to optimize the municipal pattern, to correct the behavior of local governments and to ensure the regular development of China's urbanization.

***Keywords*—**Urban management; China's municipal pattern; land financial institution; housing tax; Public goods.

I. Introduction

LAND financial institution in China brought considerable urban construction overall by monopolizing the first degree land market. As a result, infrastructure in many large and medium-sized cities can compare favorably with those in developed countries [1].

However, with land revenue being the major income, local governments pay more attention to maximizing current income while ignoring the long-term development of urban public services. Hidden in the great deal of land transaction was an overdraft of urban public services in the next 50-70 years [2], as well as huge gaps widening between regions, urban and rural areas [3].

In January 2011, Chongqing and Shanghai began collecting housing tax to alleviate the excessive dependence on land finance. Figures indicated that, senior housing transactions in Chongqing were effectively constrained by housing tax, while the Shanghai market was little affected [4] [5]. And this year, housing tax becomes the focus again as everyone's concerned about whether it will be collected all over China. But all this is not the most important, the crux is, can housing tax replace land revenue and become the major income for local governments? What special logic is the current urban management following for? How to optimize China's municipal pattern?

The paper is composed by, (1) analyzing China's current municipal pattern, pointing out the gap between expectation and reality, (2) proposing an assumption of an ideal municipal pattern, and analyzing its economic special logic, (3) verifying the assumption by econometric models with appropriate factors and data of 35 large and medium-sized cities in China, (4) putting forward key points to optimize China's housing tax as well as municipal pattern.

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II. Analysis of China's Current Municipal Pattern

A. Municipal Pattern and Urban Management

Municipal pattern is the provision and operation of urban infrastructure and public utilities [6]. As urban management is the management of urban public goods and services, we can believe that, municipal pattern is just the operation pattern of urban public goods in its broadest sense.

A city is a collection of public goods, including education, health care, green space and transportation etc [7]. All this provided by governments together is often the most efficient way as it reduced the major transaction costs [8]. When urban economic factors can or at least relatively free flow, "voting by feet" [9] will come out, in this way, municipal operational efficiency is a very important factor affecting urban competitiveness.

Thus, in the narrow sense, municipal pattern is the institution foundation of urban management; meanwhile it decides the representation forms of urban management results, also the pricing methods of urban public goods.

B. Current Municipal Pattern in China

The following discussion of municipal pattern will emphasize the concept in its narrow sense. Before exploring an optimized method, we need to define current municipal pattern in our cities. As statistics in small cities are not perfect, the paper takes 35 large and medium-sized cities in China as the objects of observation. By analyzing the maintenance and construction data of sample cities in 2008, we summarize a basic municipal pattern in China[10].

Statistics showed that, urban maintenance and construction income (UR) of local governments is composed of three parts: urban maintenance and construction tax (UT); urban financial appropriation (UF); land transfer income (LT). Urban maintenance and construction expenditures (UE) are mainly

used for permanent assets investment (PI) and urban construction and maintenance (MC).
Accordingly, we can draw posture (1) and (2):

$$UR = UT + UF + LT \quad (1)$$
$$UE = PI + MC \quad (2)$$

Permanent assets investment (PI) is mainly used for current municipal construction, including those under construction and those in plan; municipal maintenance costs (MC) for the maintenance of the existing municipal stock.

If urban maintenance and construction funds can balance in payments, then UR = UE is feasible, and (1) (2) can be transformed into:

$$PI + MC = UT + UF + LT \quad (3)$$

Posture (3) is the current municipal pattern in China. In this pattern, urban construction tax (UT) and urban financial appropriation (UF) cannot pay for the massive amount of money in urban maintenance and constructions, so, land transfer income (LT) of local governments is almost used as urban maintenance and construction funds.

C. The Hidden Design Expectations

It is not difficult to find a more specific balanced relationship, "one-time revenues for one-time expenditures, sustained income pay sustained expenditure". And this is the hidden design expectations.

Thus, posture (3) can be decomposed as follows:

$$PI = LT \quad (4)$$
$$MC = UT + \text{the UF} \quad (5)$$

Posture(4) and (5) means: in urban construction and maintenance funds, land transfer income (LT) deals with permanent assets investment (PI), urban construction tax (UT) and the urban financial appropriation (UF) pay for municipal maintenance costs (MC).

If urban maintenance and construction funds can be that like posture (4) and (5), then, the current controversial land municipal pattern is a sensible and sustainable pattern. That is, even when land resources is depleted in future, or urban growth stagnates, even when local governments have no longer land transfer income to pay for the one-time municipal permanent assets investment, the city will still be able to keep the normal operation and maintenance of municipal public goods relying on the two sustained income urban construction tax (UT) and urban financial appropriation (UF).

D. Municipal Crisis in Reality

However, reality is far from expectations. Data show that, during all 30 large and medium-sized cities, 17 cities had land transfer income accounting for more than 50% in urban maintenance and construction funds (LT / UR), only seven cities could achieve balance between sustained income and sustained expenditure. In actual operation, the major source of urban maintenance and construction funds, one-time land transfer income (LT), was not only used for new permanent assets investment (PI), but also for a considerable part of municipal maintenance costs (MC). As a result, the land transfer income can be divided into two parts, corresponding with posture (4) and (5), we can get:

$$LT = LT_1 + LT_2 \quad (6)$$
$$PI = LT_1 \quad (7)$$
$$MC = UT + UF + LT_2 \quad (8)$$

In this case, if LT_2 draws a large proportion in municipal maintenance costs (MC), once land resources depleted or urban growth stagnates, the city cannot carry out new permanent assets investment anymore, and will have to face a huge municipal maintenance funds gap with the absence of LT_2. There is considerable municipal bankruptcy in the current municipal pattern.

III. Build a New Municipal Pattern

A. Seek a Sufficient Sustained Income

Follow the logic above: if land is inexhaustible and city can keep rapid growth all the time, then the current municipal pattern will always go on well. However, as municipal pattern is a basic institution, current pattern is not sustainable during actual operation.

The reasons are: ① there's technical difficulties to discount exactly the foreseeable and unforeseeable maintenance costs if the one-time land transfer income (LT_2) is used for the long-term maintenance of urban public goods; ② local governments are more concerned about current incremental investment with fewer reserve funds for future maintenance of public goods. ③municipal pattern performs as an overdraft of land transfer in the form. And the result is: it increase burden on the subsequent land with rising intensity of urban development; put urban municipal public goods in an insufficient state, and make current pattern reasonable.

The key issue above is: how to optimize our municipal pattern in existing conditions? According to posture (8), we can conclude: if we add a certain sustained income replacing the one-time land transfer income (LT_2), like housing tax in developed countries, to the current pattern, then all the problems will be solved. In other words, in the framework of the existing institution, if we try to learn from foreign housing tax system, what a new municipal pattern can we design?

B. Where does the Sustained Income Hide?

According to "input - output" model, the value of municipal input will not dissipate, but only perform in different forms. The core assumption of this article is: the sustained income replacing LT_2 is not in current municipal pattern, but hides in the rising housing prices; and the income is not a specific fund, but in decentralized transactions funds among a number of

housing merchant and purchaser residents, and that among residents.

Based on the conceptual model (Figure 1) below, the paper will simulate the dynamic process of urban development, and explain this sustained income that should have charged.

Environment of the model is supposed to be: ① In addition to ordinary residents, there's only one government representative and one housing merchant in the city; ② only four pieces of land, A, B, C and D, they are adjacent and homogeneous distributed; ③ A and C for real estate development, B and D for municipal public goods; ④ house owners needn't continuously pay for municipal services, and land transfer income is mainly used to construct and maintain public goods.

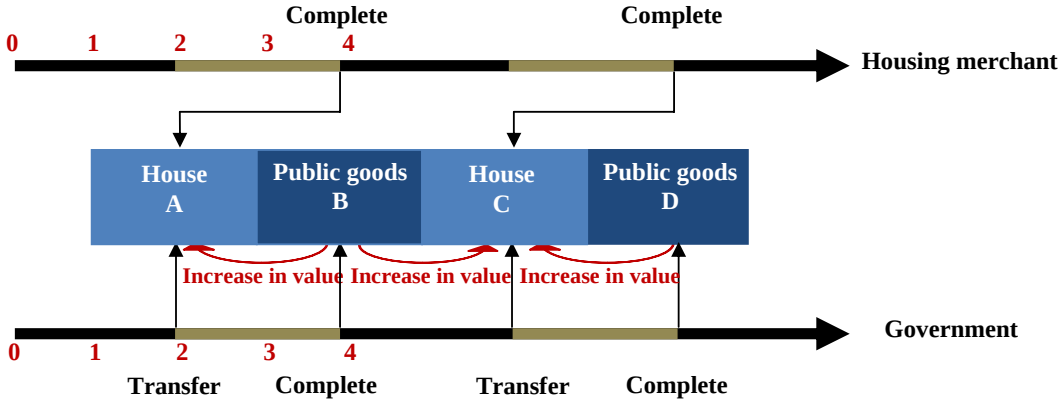

Fig. 1 A dynamic conceptual model of urban land development

Model operation: urban development process can be simplified into four stages with time goes on.

①Time point 1: Government transfers block A to merchant, and receive land transfer income LT_A, then pay LT_A for public goods in block B as PI_B. According to posture (7), $LT_A = PI_B$; at the same time, housing merchant begins to build houses once he accessed block A.

② Time Point 2: Block A and B are completed almost simultaneously. At this point, block B has positive externalities on block A and C by increasing value of land in C and value of houses in A.

③ Time point 3: Despite receives a higher LT_C, but the government needs to pay this income not only for maintaining the existing public goods in block B (MC_B), but also for constructing public goods in block D (PI_D), that is $LT_C = MC_B + PI_D$.

④Time point 4: By completion of public goods in block D, value of houses in A and C will be increased.

In reality, land management will hold on to keep municipal system smooth. So, a typical land development cycle is time"2-3" stage. Conclusion is: new land transfer income will be eventually translated into housing prices including those in new sales and being sold; (2) the value transferring medium is public goods, that is, value of real estate includes the current investment and maintenance costs of public goods, as well as the maintenance costs for future.

C. Analysis of Public Interest during Value Transferring

Public interest is the key point to judge whether the transferred value should be included in city revenue, and be a sustained income for governments.

①Land overdraft showed that current municipal pattern is land financial pattern essentially. Local governments are more concerned about operations at present and less care about future long-term maintenance. As a result, the greater the municipal public goods is, the greater the maintenance gap is.

②During total growth of public goods, the value of giant municipal input cannot be reflected appropriately, but converses into housing prices. A hidden background of houses transactions is, public goods and services around will last long with no extra costs. However no one is sure about this.

③ So, a considerable part of high rising housing prices is the loss of public interest in terms of municipal investment by government, and this is not conducive for urban municipal capacity development.

In summary, with housing prices continually rising, the loss of value in municipal public goods has largely affected urbanization and also expanded social disparities in a city. Therefore, levy housing tax or municipal tax, will effectively safeguard the public interests and correct behavior of local governments.

IV. Verify by Econometric Models

The assumption previously is: the value that public goods produced is not all included in current municipal pattern, but partially hidden in the rising housing prices, it's a loss of public interest in fact. Accordingly, if land transfer income in cities

has relationship only with current investment and stock maintenance of public goods, and if housing prices related not only to construction and maintenance of current public goods but also the future maintenance of it, then the assumption above is reasonable.

A. Model Design

Take city as a homogeneous whole, and public goods has no difference in it. As the independent variable involved can be characterized by numeric data, we choose multiple linear regression models: **Y = f (Xi)**, **Z = f (Xi, Y)**,Y is land transfer income, Z is the total sales of houses, Xi is construction , maintenance and other data of public goods in cities (i = 1, 2, 3 ...).

Change the model above into analytical model for a clearer relationship, as follows:

$$Y=\beta_{a0}+\beta_{a1}X_1+\beta_{a2}X_2+\beta_{a3}X_3+\beta_{a4}X_4+\ldots\ldots \quad (9)$$

$$Z=\beta_{b0}+\beta_{b}Y+\beta_{b1}X_1+\beta_{b2}X_2+\beta_{b3}X_3+\beta_{b4}X_4+\ldots\ldots \quad (10)$$

B. Data Selection

Owing to the availability of statistic, we study data of 35 large and medium-sized cities in China in 2008. The selected indicators are:

①Construction and maintenance indicators of public goods (CM): permanent assets investment (PI), municipal maintenance costs (MC), land transfer income (LT)

②Real estate related indicators (RE): total real estate sales (RS). The city added value brought by public goods can be reflected in both house sales volume and housing prices, we take total sales for convenience.

③Data of municipal public goods (PG): data on education, culture, medical treatment, green space, transportation, water, electricity, communications and so on. There's a need for further selected.

C. Model Process

① Factor selected and correlation analysis.

First, take all data into SPSS for correlation analysis to remove non-statistically significant factors and indicators, filter variables represented a same meaning. Observe trend from the variables and do pretreatment with independent variables.

Secondly, select the appropriate factor of public goods. Factors after selected contain education, health care, employment and green space; the more specific are number of general secondary schools in municipal districts (SN) , number of beds in hospitals (HN), the employment of state-owned units (EU), and park green space (PK).

②Multiple linear regression simulation

Take the data selected into SPSS multiple linear regression equation for simulation. Observe the statistical indicators generated by regression model; make sure the equation has a strong statistical significance by residual analysis, the strong point of diagnosis and multi-collinearity determination.

D.Model Results

①Linear regression model of land transfer income

The regression result is: **Y = -9.973 +0.849 MC +1.111 PI**

Among them, MC is city maintenance costs, PI is permanent assets investment.

This result above verified the previous assumption: in all construction and maintenance funds in cities, land transfer income has only relationship with maintenance costs and permanent assets investment, and maintenance expenses has greater influence on land transfer income. As the future maintenance factor is not involved in the final model although we took it during process, we can come to the conclusion that government pay more consideration on its current effect during land transfer.

TABLE I
LINEAR REGRESSION MODEL OF LAND TRANSFER INCOME

Model summary

model	R	R square	Adjusted R Square	Std. Error of the Estimate
1	.731a	.534	.499	33.98598

a. Predictors: (Constant), MC, PI.

Anovab

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	34459.617	2	17229.808	14.917	.000a
	Residual	30031.225	26	1155.047		
	Total	64490.842	28			

a. Predictors: (Constant), MC, PI.
b. Dependent Variable: LT

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-9.973	10.842		-.920	.366
	PI	1.111	.441	.353	2.520	.018
	MC	.849	.219	.544	3.879	.001

a. Dependent Variable: LT

②Linear regression model of real estate sales

The regression result is: **Z = -137.062 +1.213 MC +0.014 HN +0.031 PK**

TABLE II
LINEAR REGRESSION MODEL OF TOTAL HOUSING SALES

Model summary

model	R	R square	Adjusted R Square	Std. Error of the Estimate
1	.946a	.896	.885	143.01730

a. Predictors: (Constant), PK, MC, HN.

Anovab

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5266728.140	3	1755576.047	85.831	.000a
	Residual	613618.436	30	20453.948		
	Total	5880346.576	33			

a. Predictors: (Constant), PK, MC, HN.
b. Dependent Variable:RS

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-137.062	41.843		-3.276	.003
	MC	1.213	.584	.142	2.077	.046
	HN	.014	.002	.640	6.286	.000
	PK	.031	.011	.269	2.823	.008

a. Dependent Variable: RS

Among them, MC is city maintenance costs, HN is number of beds in hospitals in municipal districts, and PK is park green space.

Public hospitals and parks represented long-term maintenance costs of public goods in cities. It also verified the previous assumption: housing prices has relationships with not only the current construction and maintenance but also the long-term maintenance of public goods, and public goods has stronger effect on house sales.

V. CONCLUSION AND POLICY RECOMMENDATIONS

The argument in the paper is not very fresh as housing tax has been carried out in China. But through inference and validation of the relatively rigorous model, we come to the following conclusions on policy analysis and policy design:

①There is a large possibility of municipal bankruptcy in China's current municipal pattern. Once the high growth of the urban development stagnated, the city will then hardly put any new investment in public goods; meanwhile face a huge fund gap on municipal maintenance.

②China's current municipal pattern is an overdraft of land transfer in fact. The problem is: First, increase the burden on the subsequent land and come to a rising intensity of urban development; public goods in city are always in an insufficient state and usually overload.

③The added value of investment in public goods is not included in current municipal pattern, but hides in the rising housing prices, and come to a performance of decentralized transactions funds among a number of housing merchant and purchaser residents, also among residents. All this makes "latecomers pay" on public goods maintenance, and make the urbanization process unfair.

④Lack a certain sufficient sustained income in current municipal pattern and combined with the financial classification of local governments, all this brings out the short-term behavior of the two levels of governments, the city and the district (street, town). As a result, urban construction land is decreasing and land use is more extensive.

Compared with the huge maintenance costs of municipal public goods, housing tax token in Chongqing and Shanghai is only symbolic. In order to improve the current urban development system, to optimize the current municipal pattern, we should have a comprehensive collection of housing tax and do more on municipal area management and urban institution:

①Set small municipal areas according to basic public services. A small municipal area is the minimum division unit of urban public services, which can be combined with the school district, community etc, and the services is impartial in the same district. Once the housing tax is levied on the basis of small municipal district, fair competitions will be taken among different municipal areas and enhances the overall municipal public service level in the end.

②Take the quality of public service as standards of housing tax. This will not only completely change the over-reliance on short-term land financial behavior for governments, but also greatly promote the city government to a service-oriented one, and change the relationship between government and residents to a services provider and services payer.

③Establish an open transparent system on municipal public goods, services spending and budget. By the bottom-up approach, make the budget an effective means of restricting government to reduce apparent than real feat projects. It will also ensure the public supervision of municipal operations.

④Establish a sound levying "user pays" system. Except public rental housing and special groups, all houses including economic one should be in the scope of the collection. On the basis of compliance with relevant conditions, Family housing can apply for tax credits, housing subsidies or deferment.

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