

Analysis on the Effect of China's Urban Household Water Pricing: on the Perspective of Public Finance

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Abstract: Current pricing framework for China's urban household water service is non-full cost pricing, which embodies the quasi-public goods property of urban water supplying. Public finance should cover part of urban household water cost for three reasons: (1) the basic need of the public for water has to be satisfied; (2) urban water service is natural monopoly for its asset specificity and capital specificity; (3) the public own the right to access urban household water when they pay taxes. Compared with other public goods, China's urban water supplying cost is less covered by public finance while water shortage and water pollution are deteriorated. At the same time, the increase in urban water price has been unevenly loaded by the public. To form a more accurate signal for saving water and controlling water pollution, public demand and private needs have to be identified in China's urban water supplying cost, and water price should be adjusted to local conditions rather than determined uniformly.

Key Words: Urban household water; Pricing; Public Finance

1 Preface

The shortage of water resources has severely restricts the sustainable development of China. According to the statistics from the Ministry of Water Resources, by 2006, 551 of the 660 designated cities in China were perennially lack of water. Among them, 110 designated cities faced severe water scarcity, which in total summed up to 400 billion cubic meters of water. In order to break through the predicament of the shortage of water resources and water quality deterioration, General Office of the State Council of the People's

Republic of China issued Notice on Promoting the Reform of Water Prices to Promote Water Conservation, hoping to give full play to the market mechanism and price leverage in water resource allocation, water demand regulation and the prevention and control of water pollution, so as to build a water-saving society. The first goal is to adjust the water price reasonably, and rationalizes the structure of water price as soon as possible.

Meanwhile, the public of China are more and more focusing on the rising water price in cities across the country, especially on the water price level, water price structure, public participation, fairness and efficiency, etc. As a quasi-public goods, raising the price of urban water will no doubt affect the sustainability of social development, so its reasonable, effective and acceptable mode is worth discussing deeply.

According to the State Council documents, Chinese urban household water price is constituted by four parts, respectively water resource fee, water supply price by conservancy project, urban water supply price and sewage treatment fee. In terms of urban household water pricing methods, Shen Dajun et al (Shen Dajun, 2006) pointed out that, water resource fee refers to the cost concerning with the behavior to get water, which is often represented as scarcity rent of the resource. Pricing tools for water resource fee include the method based on the cost and the method based on market supply and demand. As water supply and sewage treatment services both belong to urban water services, the pricing tools for such services include marginal cost pricing method, average cost pricing method and Ramsey pricing method.

At present, OECD's pricing model includes a fixed fee system, a progressive fee system, a single measurement system and the accumulated charges refund system, etc. The water pricing methods and pricing models of urban household water price is based on market. So full cost pricing is the primary idea. Angela Arpke et al. (Angela Arpke, etc, 2006) asserted that not all the value associated with the water can be embodied in the market, such as environmental values, aesthetic value, value of ecosystem stability and so on.

The nonmarket value of water is associated with quasi-public goods. For example, a certain quantity of water is the public goods which satisfy the basic survival needs of the public, so does the disposal of wastewater. Timmons (Timmons, 2002) pointed out that water resource and water management policies base on the single market pricing model is often non-representative at reflecting water price activities.

Fu Tao et al (Fu Tao, 2007) maintained that, based on the inherent characteristics of urban water industry, a considerable parts of the investment, such as water source protection, pipeline construction and other investments belonging to non-operating assets, are hard to be measured and they need to be covered by fiscal budgets and other public forms of payment so as to reflect the social benefits. These parts of government investment should not be included into the base of return on investments. Additionally, some projects, such as pipeline systems, will have great influences in public aspects once constructed. These projects also need to be invested and constructed by the government so that the government can assume the role of coordination in terms of efficiency improvement.

In fact, most of the urban household water prices in China cities at present is not based on full-cost pricing. Otherwise, the water price could not stay at the current level, but a higher one. Therefore, the current water price in China is based on non-full cost pricing, of which the main consideration is the operating cost of water services. This pricing model has shown that water has the function to ensure the basic survival needs, so it is quasi-public goods rather than completely private goods. Many countries with serious water problems are simultaneously underdeveloped in public finances. For the funding of water supply and wastewater treatment services, the financial impact of water management policy is an important consideration and also the initial target of the water supply management agencies when water price policies are designated.

In light of the influence of public finances on urban water sectors, the

relationship between urban household water price and public finances is very important. On the one hand, water supply projects call for plenty of initial capital investments and guarantees for equipment operation and maintenance, which are often beyond the affordability of government and water sectors. On the other, lack of funds encountered by many water service sectors is frequently resulted from unreasonable water pricing policies that cannot help cover all the costs. Therefore, the analysis of the relationship between urban household water pricing and public finance is significant.

On the aspect of the way public finances invested into the supply of public goods provision and service sectors, David N. Hyman (David N. Hyman, 1990) suggested that, although the government does not supply goods and services for profit targets and facing no competition, it is also a political process which is obtained through a series of choices.

Similarly, the financial subsidies should not fully cover the costs of urban water services or is it defect proof. Yang Junchang et al (Yang Junchang et al, 2002) claimed that, in addition to the effect of distorting the allocation of resources by tax, the pricing methods that depend on subsidies often suffer from financial pressures, internal inefficiencies of water service sectors and distortions of decision-making.

Therefore, increase of China's urban household water prices cannot be simply attributed to rising costs. It should be considered whether water price is beyond the scope of public demands or the nature of public service is altered. In this case, how to make public finances in the urban water sector to play a role in public services while allowing water users in charge of the cost resulted from private demand becomes the key point of the urban household water pricing mechanism.

This essay analyses existing problems in the structure of China's urban household water price from these two aspects: the current water price levels of China cities and public financial investments of each provincial cities in water service sectors in China in 2008. On the above base, some recommendations

to improve residential water pricing are offered.

2 Structure of China urban household water prices

2.1 Elements of China urban household water price

China urban water price is composed of water resource fee, water transfer engineering price, urban water supply price, and wastewater treatment fee.

Water resource fee is charged by the owners of water resources from units and individuals who have direct access to groundwater, rivers, lakes and other surface water, in order to effectively realize protection of and monitoring, surveying, planning and management on water resources. In this way, water resources can be kept in a permanent state of balance and stability. In order to obtain the natural resource-based quasi-public goods which are individual profitable, resource compensatory, and reflecting the differential income characteristics, water users pay water fees to the government. So water resource fee can be understood as the charge for the use of quasi-public goods.

Water transfer engineering price is what the natural water users pay for the water conservancy facilities which are used by water supply operators to catch, storage, channel, and provide the water.

Urban water supply price is paid by the users for the water provide by urban water supply enterprises as they purify and disinfect the surface water and groundwater so as to produce water meeting national standards.

Wastewater treatment fee is charged by wastewater treatment units that have centralized sewage treatment facilities to provide sewage treatment for the polluters. Regular operation of the centralized sewage treatment plants is thus ensured.

Table 1 shows the decision makers for various elements of China urban household water price are not entirely the same. Water resource fee is formulated at the province level. Currently, most provinces have issued water

resource fees respectively with their own considerations. In comparison, the rights to decide water transfer engineering price, urban water supply price and wastewater treatment fee are mostly hold at the city level.

Table 1 Various elements of China urban water development authority charges

Various elements of water price	Rights to decide charge standard	Charge types
Water resource fee	Province level	Administrative charge
Water transfer engineering price	City level	Price
Urban water supply price	City level	Price
Sewage treatment fee	City level	Administrative charge

2.2 Water resource fee and wastewater treatment fee

Reasonable average profits for water supply and distribution enterprises account for 8%~10% of net assets. Specific profit level is decided by the city government price administrative agencies according to the different sources of funding. Therefore, for China urban household water price, water transfer engineering price and urban water supply price are formulated in accordance with established ratio. Such a pricing mechanism makes it available to the public, and as well, the costs afforded by public finance and water users can be fixed at a certain ratio. As a result, they are easy to identified in the water price hearing.

For water resource fee and wastewater treatment fee, although they are administrative charges, the two elements are included in urban water provision costs both for water producers and consumers. Due to the increasing scarcity of water resources, the rapid deterioration of water quality, and the increasing urban wastewater treatment facility construction costs, the corresponding water service construction costs have become a heavy burden on Chinese local governments. How to balance public finance investment and charges for household water users has become a joint focus of the government, water companies and water users.

As shown in Figure 1, the proportion of water resource fee and wastewater treatment fee in China urban household water prices are compared. It can be found that the water resource fee is far below wastewater treatment fee in current urban water prices. In the survey of 30 provincial capital cities (Lhasa City water resource fee and wastewater treatment fee data not available), only water resource fee of Beijing exceed wastewater treatment fee, with the ratio of 1.21. For the other 29 capital cities, water resource fee is lower than wastewater treatment fee. The ratio of the two indices is even as low as 0.01 in Nanchang.

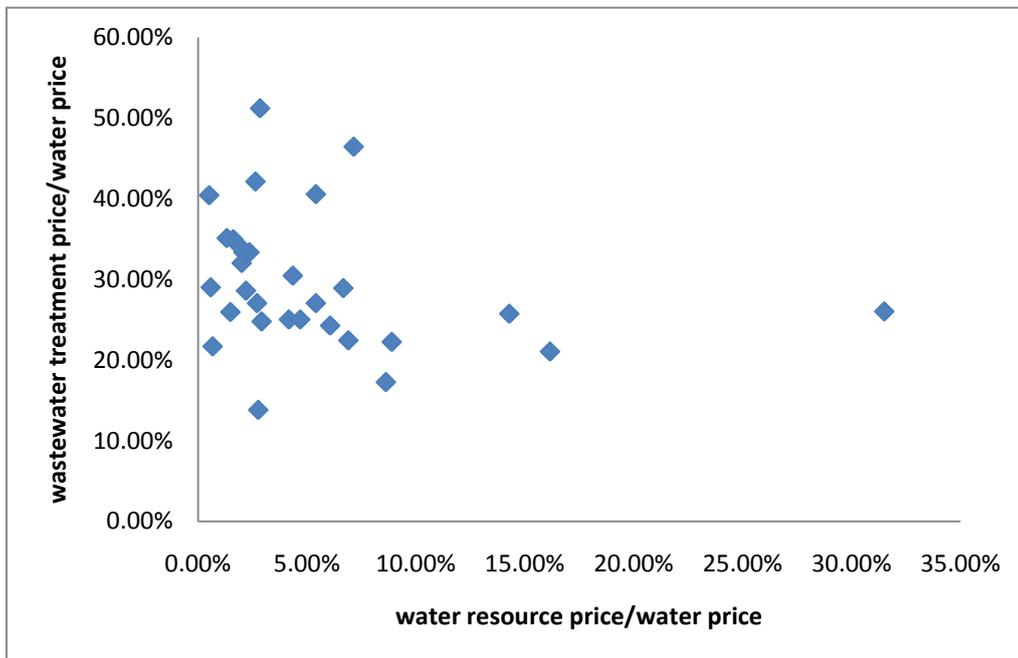


Figure 1 The proportion of water resource fee and wastewater treatment fee in China urban household water prices

The distribution of the proportion of water resource fee and wastewater treatment fee among 30 capital cities in China is listed in Table 2. The ratio for 22 capital cities is below the value 0.2, accounting for 73% of all the capital cities.

Moreover, water resource fees in China urban household water prices among capital cities is highly different, the maximum value 120 times higher than the minimum value. The standard deviations for the proportion of water

resource fee / urban household water price and wastewater treatment fee / urban household water price separately show that, the deviation of the former proportion is as high as 0.21, while the deviation of the latter is only 0.06.

Table 2 The distribution of water resource fee / wastewater treatment fee among China's capital cities

water resource fee / wastewater treatment fee	>1	0.5~1	0.2~0.5	0.1~0.2	≤0.1
Number of capital cities	1	2	5	8	14

Per capita water resources can be used to reflect the scarcity of water resources. However, as shown in Figure 2, the high differences in provincial water resource fees are not due to the scarcity of water resources. Per capita water resources of Beijing in 2008 were 205.53m³, and the water fee was 1.26 Yuan / m³. Compared with other provinces/cities, water resource fee and its proportion to household water price of Beijing are both the highest in China. However, per capita water resources of Beijing are not the lowest. Shanghai's per capita water resources in 2008 were 197.54 m³, lower than Beijing. But its water resource price is only 0.06 Yuan / m³, as low as that of Beijing's 1 / 21. According to the above, although there are huge differences in water resource fee between provinces in China, it is not caused by the scarcity of water resources.

The proportion data of water resource fee and wastewater treatment fee in urban household water price among 30 capital cities in China were taken into statistical analysis. It can be found that, the standard deviation is 0.15, lower than the standard deviation of water resources fee / water price proportion, indicating that the differences in the water resource fee are compensated to some extent by means of wastewater treatment fee.

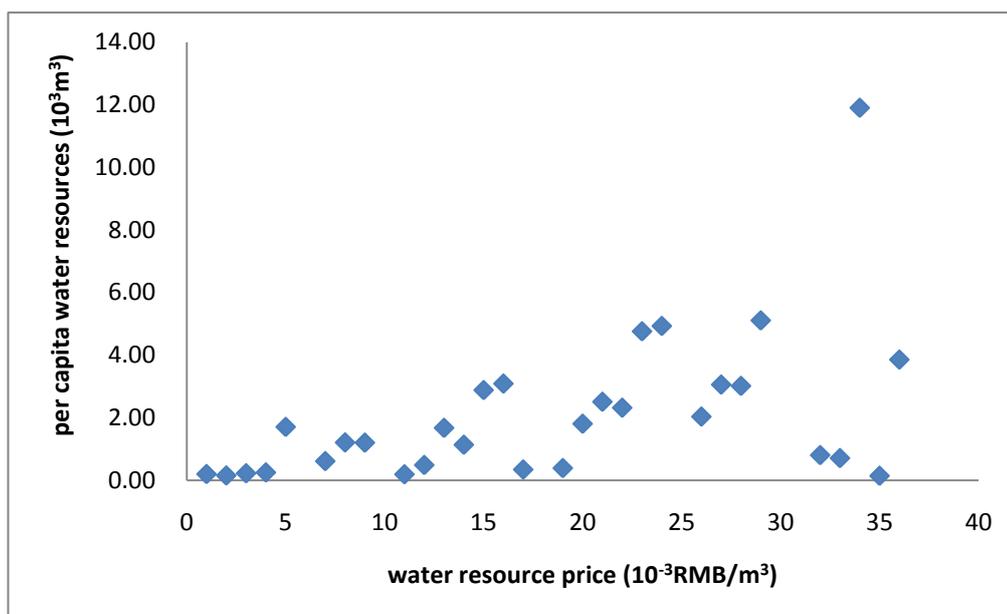


Figure 2 The relationship between China's urban water resource fee and per capita water resources

Still take Beijing as an example, Beijing's water resource fee is higher than wastewater treatment fee. However, the two elements together account for 57.50% of household water price of Beijing. Compared with Beijing, water resource fee of Shanghai is much lower. However, wastewater treatment fee accounted for 51.18% of water price in Shanghai, which is the highest proportion in China. Moreover, water resource fee and wastewater treatment fee together account for 54.03% of household water price in Shanghai, which is close to Beijing's level.

3 Effects of public finance on China urban household water price

3.1 Importance of public financial investment

Due to the large amount of funds, high precipitation of investment and the technique monopoly of water industry, as well as the tight connections between water industry and the public benefits and environmental protection, there is a need for public finance to invested into the water industry and take the dominant place. Both the financial funds and a variety of policy

investments are considered to be public finance. From this aspect, the increase of water price in China is obviously not aimed to solve the full cost problem, for it is impossible for water price to go high up to the level of covering the fixed assets.

From the perspective of increase in urban household water price, although the cost of water industry has been rising, it still contains part of public services. Thus, the cost should not be totally put onto the burden of the public. The public have already paid taxes, which are used by the governments to build water supply and wastewater treatment facilities. Take the city maintenance and construction tax for example, it is a kind of local tax collected according to Urban Maintenance and Constructions Tax Tentative Regulations of The People's Republic of China. Current collection method of it is under the tax base and in proportion of value-added tax, consumption tax and business tax actually paid by taxpayers. The tax is used for the urban maintenance and construction, which includes the maintenance and construction of water supply and wastewater treatment facilities.

3.2 Public finance income and investment in China urban water sectors

As shown in table 3, charges from fees such as water resource fee and wastewater treatment fee account for 5.14% of China's urban maintenance and construction fund in 2008. The water resource fee accounts for 0.45% and wastewater treatment fee for 2.19%. Therefore, the income for urban maintenance and construction mainly comes from government budgets at various levels or public revenues.

Table 3 China Urban Maintenance and Construction Fund in 2008

Item	Financial allocation from central government budget	Financial allocation from provincial government budget	Financial allocation from city government budget	Fees	Other public revenues	Total
Ratio	1.35%	1.59%	23.78%	5.14%	68.15%	100%

The allocation from central government and provincial governments take low percentages of the urban maintenance and construction fund in 2008, 1.35% and 1.59% respectively. At the same time, the ratio of municipal government allocation reaches as high as 23.78%. Such a result can be further used to explain the reason wastewater treatment fee is higher than water resource fee. As the pricing right of water resource fee is owned in the provinces, and the main function of water resource fee is mainly applied to water resource protection, municipal governments in fact do not share the right to determine water resource fee. In comparison with wastewater treatment fee, municipal governments have little enthusiasm on enhancing water resource fee.

Urban maintenance and construction investments and urban service facility investments in China are listed in table 4 (data of Shanghai is unavailable). The ratio of investments to total investments in wastewater treatment and reuse and water supply is not high, with the value of 3.33% and 2.15% in 2008. However, the expenditure of public transportation accounts for 8.01%. Of construction fund and fixed assets investment in urban service facilities, public transportation accounts for up to 14.08%. On these grounds, China's public finance investment on urban water sectors is comparably low.

Table 4 Expenditure of maintenance and construction fund and fixed assets investment in urban service facilities of China in 2008

Item	Total	Wastewater treatment and reuse	Water supply	Public transportation
Expenditure of maintenance and construction fund	100%	3.33%	2.15%	8.01%
Standard deviation	--	1.92%	1.87%	9.41%
construction fund and fixed assets investment in urban service facilities	100%	3.59%	4.01%	14.08%
Standard deviation	--	2.57%	2.10%	11.74%

From the aspect of costs loaded on water users in 2008, urban public

transportation consumer price index in China is 100.5, while water, electricity and fuel consumer price index is 106.4. In the perspective of the share between public finance and urban residents, the citizens have assumed more costs on urban water supply and wastewater treatment compared with other public goods such as public transportation.

4 Proposal for improvement in urban household water pricing of China

From the above analysis, urban household water price is actually a comprehensive price. It includes the price which is decided by market and the administrative fees charged. For different water price components, the pricing rights are not completely at the city level. From the perspective that public finance must be introduced into urban water service sectors, China is now facing the following problems:

(1) As water resource fee pricing right is owned at provincial level and wastewater treatment fee pricing right at municipal level, water resource fee is set very low and the differences between provinces are very large. Furthermore, too low water resource fee cannot reflect water scarcity among different provinces and cities. It is also easy to cause the waste of water and the lack of economic stimuli for water-saving in cities. Although the urban wastewater treat fee is high, it is mainly managed by local governments. Thus, it cannot be guaranteed that financial income through other channels can be used for water resource protection.

(2) Although financial expenditure and investment constitutes the largest parts in China water sectors for the time being, urban residents have to bear higher costs for water use than for other public goods such as public transportation. From the public financial investment perspective, urban water household water price is high. In this condition, water supply and wastewater treatment service cannot highlight the characteristics of public goods.

For resolving the problems in urban household water pricing in China, suggestions as follows are put forward:

(1) The pricing of urban household water should firstly safeguard the basic survival needs. Even it is necessary to price on water by different tiers, the first tier of the water price ladder should be generally consistent, and the public financial subsidies given priority to. At present, among China cities such as Beijing, Hefei and Tianjin, many have implemented tier pricing, with the differences in tier scale. If the pricing for the first tier fails to meet basic survival needs, cross subsidy or income increase for water sectors may come into being. As for the tiers above the first one, public services and private demand for private demands should be distinguished, and ask for higher water price for the part of private demand.

(2) Water resource fee should reflect water scarcity in a rational way. Currently, due to the public financial investment mechanism and pricing right differentiation among elements of urban household water pricing, water resource fee is set at a low level and difficult to effectively promote water conservation. Therefore, it is important to increase water resource fee so as to reflect water scarcity. Also, it is necessary to adjust current water price structure to make household water price more reasonable.

(3) Because of the introduction of public finance, urban household water price in China is not set up on the basis of full cost coverage. Under non-full cost principle, operating costs of water sectors should be the main consideration in urban water pricing, because public facilities maintenance expenditure and public facilities construction investment in fixed assets is basically covered by public finance.

(4) Relatively low finance invested into urban water sectors should be enhanced, so as to reduce the burden of urban residents in water services at current levels.

(5) In consideration of the difference in water quantity, water quality and economic development throughout China, the affordability of urban residents to pay for water services varies largely. In this case, the comprehensive urban household water price shall be adjusted to local conditions. Such a conclusion

can be inferred from urban wastewater treatment fee of China. Ministry of Housing and Urban-Rural Development has issued the guidance price for wastewater treatment fee as 0.8 Yuan/m³, but in fact it is different among China's capital cities, with average wastewater treatment fee 0.76 Yuan/m³ and standard deviation 0.24, far higher than the standard deviation for wastewater treatment fee/water price.

5 Conclusion

Even though China urban household water price differs from place to place, and notable distinctions actually exist among the components, each component keeps a high consistency when it is compared with comprehensive water price and public finance in urban water sectors. This is determined by China's water pricing framework and public financial revenue and expenditure systems. From the perspective of public financing, the inconsistency in pricing right among elements of water price leads to unreachable water protection and pollution control goals, especially at national and provincial levels. However, municipal governments have great power on water environment protection in terms of financial allocations, charging fees and so on. Despite that, public finance investment and expenditure on water supply and wastewater treatment are far less than other public goods, which will further intensifies urban water scarcity and water degradation in China.

Therefore, on public finance point, urban household water pricing reform should give an emphasis on increasing the public finance on urban water industry and ensuring basic survival needs, so as to release the pressures met when citizens pay for water services.

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