

Evaluation on the Efficiency and Fairness of Coordinating Public Goods Supply in Urban and Rural Areas

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Abstract By setting the urban-rural public goods supply model, this paper evaluates the effects of coordinating supply public goods on resource allocation and welfare from efficiency and fairness, and examines the necessity and possibility of coordinating public goods supply in urban and rural areas. The model assumes that the population size of urban and rural areas is different, and the population can not flow freely between urban and rural areas; there are different degrees of spillover in the public goods supply. Model results show that coordinating public goods supply in urban and rural areas is the result of optimizing resource allocation efficiency, but the residents' individual utility level will not necessarily improve, so residents' willingness to support coordinated urban-rural supply is different, and public goods spillover and different tax systems are the factors that affect the residents' utility level. Finally, this paper uses the practice of coordinating urban and rural compulsory education in Chengdu City to confirm the above conclusions.

Key words Public goods supply, Urban-rural coordination, Efficiency, Fairness

1 Introduction

Over a decade, China has established the basic strategy, policy system and institutional framework of coordinating urban and rural development, making a great stride on the road of urban and rural coordination. Decisions of CPC Central Committee on Several Major Issues concerning Building a Socialist Harmonious Society stressed the need to gradually achieve the equalization of basic public services, give priority of education development, and promote educational fairness. However, "urban-rural fragmentation" in reality is still serious, and urban and rural areas provide their own local public goods and public services of different types and particularly inefficient and inadequate supply of public goods in rural areas has widened the gap between urban and rural areas. The urban and rural public goods supply mechanism as well as expense bearing mechanism is not conducive to the promotion of urban and rural coordination, and the dual urban-rural supply of education is not conducive to achieving educational fairness goals. Since 2003, Chengdu City has "privately" taken the lead to carry out the reform of coordinating urban and rural areas in China, covering compulsory education, health care, social security, infrastructure, living environment, grassroots governance and other public goods and services. In this paper, taking the practice of coordinating urban and rural compulsory education in Chengdu City for example, this paper establishes the "two-sector model" to analyze the influence of coordinating public goods supply in urban and

rural areas on the allocation of resources and residents' welfare level, in order to confirm the necessity and possibility of coordinating public goods supply in urban and rural areas.

2 Literature review

Lu Hongyou (2004) believes that most urban households can have free or low-cost access to a variety of public goods provided by the government even if their income is not taxable, while the majority of farmers have to bear numerous non-taxes to township government for a variety of public goods consumed by them even after abolition of agricultural tax. Vojnovic (2000) studies the combination of Canadian cities and finds that many urban residents making business investment at urban and rural junction enjoy the city's public services, but pay taxes according to the lower tax rate in rural areas. Bradford and Oates also performed the empirical research on the suburbs development process of central city in their 1974 article, and made similar discussions and findings. The spillover of public goods here means that the public goods in one place spill over to other areas, but other areas do not bear the cost of spatial externalities, which will affect the efficiency of local governments' public goods supply. Under the Western democratic system of determining public goods supply policy by the votes, the voters generally do not consider the positive spillover of public goods, and the voting result leads to the inefficient public goods supply (Oates, 1999), or there is excess supply in the large and medium-sized cities while the supply is short in the small cities (Robert, 2008). The domestic studies rarely touch upon this issue, and only a small number of scholars study the spillover simply from public goods or rural education. Based on the analysis logic of the public choice school, Li Yufang (2008) believes that the externalities of government's public goods supply are closely related to dysfunction of public decision-making system and sub-

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ject lack of public decision-making behavior. Yue Changjun (2005) performs the empirical analysis of China's human capital spillover and income disparities and finds that there is spillover in the Chinese education. In addition, the empirical study of Zha Xianyou *et al.* (2006) shows that the spillover of higher education is not obvious. Zhu Changcun *et al.* (2009) improve the classic Lucas production function into the new production function covering urban and rural areas, and find that the outflow of rural human capital makes the spillover occur mainly in the cities. Li Shigang and Yin Heng (2012) use panel data of the county finance for empirical analysis and find that there is a significant negative correlation in fiscal expenditure on basic education between adjacent counties. Long Bao *et al.* (2012) use the survey data on one hundred villages in ten provinces to analyze the direction and size of the external effects of education level of farmers and conclude that there is spillover effect in rural education. Merged public goods supply by urban and rural areas is a measure to solve the spillover problem of urban and rural public goods, but the merging will have different effects for urban and rural residents, and rural residents will worry about their preferences and interests to be ignored, thus the original public goods supply but will reduced (Robert, 2008). Through the study on the merger in Ontario, Kushner and Siegel (2003) find that in a few years after the merger, the opposition of suburban residents is growing, because their tax has been greatly increased. Vojenovic (2000) discusses the case in Canada and believes that the merger does not address the unfair tax structure, and the urban residents enjoy a wealth of urban public services but the costs paid are shared by other residents to be merged. Li Tongbin (2006) thinks the difference in urban and rural public goods supply is a major obstacle to achieving rural prosperity. Cheng Yu (2009) points out that the focus of coordinating urban and rural public goods supply is to strengthen the supply of public goods in rural areas, improve the supply level, and further strengthen the government's investment responsibility in the supply of rural public goods. Lu Hongyou (2010) regards "supply coordination" as the negation of "one product, two systems" and legitimate regression of rights and interests of rural residents, and defines it as the choice of supply object and allocation of public financial resources in accordance with economic attributes or "commonality" degree of public goods.

3 The basic model setting

3.1 Research ideas Firstly, based on efficiency standards, we discuss the supply efficiency of urban and rural local public goods in two cases from the allocation efficiency of social public goods, and compare the optimal level of supply in different cases; secondly, based on standards of fairness, we discuss whether the urban and rural residents support coordinating public goods supply from social welfare changes and make a simple analysis of the reason from changes in residents' tax burden. Of course, there are some imperfections in some model hypotheses, and if putting aside the residents' non-flowing conditions and considering real estate

market factors (Calabrese, 2002), asymmetric information and financial transfer payment, the conclusion will be more convincing.

3.2 Model setting To simplify the analysis, we make the following hypotheses:

H₁ There is a society composed of two areas including city (C) and rural areas (R), and the main difference lies in the population size. The population size of the city is α_c , the population size of the rural areas is α_r , and $\alpha_r > \alpha_c$.

H₂ Residents are not free-flowing between urban and rural areas. Although in reality a lot of young labor forces in rural areas go into cities to work and live, they can not really integrate into city life and enjoy the same public goods as the urban residents due to constraint of household registration system. In addition to the household registration system, high transportation costs between urban and rural areas, rising housing prices in city and other economic factors pose barriers to rural residents' free integration into city.

H₃ The information costs are zero and there is spillover in the local public goods provided by urban and rural areas, that is, residents can enjoy the spillover of public goods from another region.

H₄ The residents in the same regions have similar preferences and same utility function, and the per capita utility of residents after enjoying the public goods provided by urban and rural areas is expressed respectively as follows:

$$\mu_c = \sqrt{g_c} + k_r \sqrt{g_r} - t_c \quad (1)$$

$$\mu_r = \sqrt{g_c} + k_c \sqrt{g_c} - e_r \quad (2)$$

where μ_c and μ_r are the per capita utility of urban and rural residents in public goods, respectively (quasi-linear function); g_c and g_r are the per capita public goods enjoyed by urban and rural residents in local areas, respectively; k_c is the degree of spillover of urban public goods to rural areas; k_r is the degree of spillover of rural public goods to urban areas, $k_c > k_r$, $k_c \in [0, 1]$, $k_r \in [0, 1]$; t_c is the per capita tax burden of urban residents; e_r is the per capita cost paid by rural residents.

H₅ The supply cost per unit amount of public goods in urban and rural areas is p . Here we do not consider financial assistance and private goods consumption and only consider the consumption amount and utility of public goods. Before coordinating public goods supply in urban and rural areas, the budget constraints of local public goods supply in two areas are as follows:

$$pg_c \alpha_c = t_c \alpha_c \quad (3)$$

$$pg_r \alpha_r = e_r \alpha_r \quad (4)$$

When coordinating public goods supply in urban and rural areas, the coordinated urban-rural budget constraints are as follows:

$$p(g_c \alpha_c + g_r \alpha_r) = t(\alpha_c + \alpha_r) \quad (5)$$

where t is the same level of tax burden after coordinating the supply, that is, all kinds of costs are abolished for rural residents and the same taxes are collected as urban residents.

4 Analysis of the public goods supply efficiency from the resources allocation of urban and rural public goods

4.1 The optimal supply of social public goods The optimal

supply of social public goods is the supply of urban and rural public goods under maximization of total social utility, respectively. So there is a need to first meet the conditions for maximization of the total social utility.

$$\begin{aligned} \underset{\substack{g_c, \alpha_c \\ s.t. pg_c \alpha_c = 1, \alpha_c \\ pg_r \alpha_r = e, \alpha_r}}{Max} U^s &= \underset{g_c, g_r}{Max} (U_c + U_r) = \underset{g_c, g_r}{Max} (\alpha_c u_c + \alpha_r u_r) \\ &= \underset{g_c, g_r}{Max} (\alpha_c \sqrt{g_c} + \alpha_c k_c \sqrt{g_r} - pg_c \alpha_c + \alpha_r \sqrt{g_r} + \alpha_r k_c \sqrt{g_c} - pg_r \alpha_r) \end{aligned} \quad (6)$$

Under this condition, the optimal level of urban and rural public goods supply is as follows:

$$\frac{\partial U^s}{\partial g_c} = 0 \Rightarrow g_c^s = \left(\frac{\alpha_c + \alpha_r k_c}{2p\alpha_c} \right)^2 = \left(\frac{1}{2p} + \frac{k_c}{2p} \cdot \frac{\alpha_r}{\alpha_c} \right)^2 \quad (7)$$

$$\frac{\partial U^s}{\partial g_r} = 0 \Rightarrow g_r^s = \left(\frac{\alpha_r + \alpha_c k_r}{2p\alpha_r} \right)^2 = \left(\frac{1}{2p} + \frac{k_r}{2p} \cdot \frac{\alpha_c}{\alpha_r} \right)^2 \quad (8)$$

From formula (7), (8), it can be found that when the urban and rural population ratio ($\frac{\alpha_r}{\alpha_c}$) is constant, the public goods supply level of two areas is proportional to the degree of spillover of local public goods (k), but inversely proportional to the unit cost (p), that is, the higher the degree of spillover of public goods, the more the public goods supply; the higher the unit cost of public goods supply, the less the public goods supply, and vice versa.

4.2 The optimal level of public goods supply when the urban and rural supply is not coordinated When the two areas do not coordinate the public goods supply, the optimal level of urban and rural public goods supply is determined by the utility maximization of residents:

$$\underset{\substack{g_c \\ s.t. pg_c \alpha_c = 1, \alpha_c}}{Max} U_c^a = \underset{g_c}{Max} \alpha_c u_c^a = \underset{g_c}{Max} (\alpha_c \sqrt{g_c} + \alpha_c k_r \sqrt{g_r} - pg_c \alpha_c) \quad (9)$$

$$\underset{\substack{g_r \\ s.t. pg_r \alpha_r = e, \alpha_r}}{Max} U_r^a = \underset{g_r}{Max} \alpha_r u_r^a = \underset{g_r}{Max} (\alpha_r \sqrt{g_r} + \alpha_r k_c \sqrt{g_c} - pg_r \alpha_r) \quad (10)$$

The optimal level of urban and rural public goods supply is derived as follows:

$$\frac{\partial U_c^a}{\partial g_c} = 0 \Rightarrow g_c^a = \left(\frac{1}{2p} \right)^2 \quad (11)$$

$$\frac{\partial U_r^a}{\partial g_r} = 0 \Rightarrow g_r^a = \left(\frac{1}{2p} \right)^2 \quad (12)$$

From formula (11), (12), it can be found that $g_r^a = g_c^a$, that is, when the two areas do not coordinate the public goods supply, the optimal per capita supply of public goods is the same, and not related to population size and degree of spillover of public goods, because the possible spillover when supplying public goods is not considered. By comparing (11) - (7) and (12) - (8), we get:

$$g_c^a - g_c^s = \left(\frac{1}{2p} \right)^2 - \left(\frac{\alpha_c + \alpha_r k_c}{2p\alpha_c} \right)^2 = \frac{(-\alpha_r k_c)(2\alpha_c + \alpha_r k_c)}{(2p\alpha_c)^2} \leq 0 \quad (13)$$

$$g_r^a - g_r^s = \left(\frac{1}{2p} \right)^2 - \left(\frac{\alpha_r + \alpha_c k_r}{2p\alpha_r} \right)^2 = \frac{(-\alpha_c k_r)(2\alpha_r + \alpha_c k_r)}{(2p\alpha_r)^2} \leq 0 \quad (14)$$

It indicates that when the urban and rural supply is not coordi-

nated, the optimal supply level of per capita public goods is lower than the optimal supply level of society for both urban and rural areas, that is, the allocation of urban and rural public goods is inefficient when the urban and rural public goods supply is not coordinated.

4.3 The optimal level of public goods supply when the urban and rural supply is coordinated When urban and rural areas coordinate the public goods supply, the optimal level of urban and rural public goods supply is also determined by the utility maximization of urban and rural residents:

$$\underset{\substack{g_c \\ s.t. p(g_c \alpha_c + g_r \alpha_r) = t(\alpha_c + \alpha_r)}}{Max} U_c^u = \underset{g_c}{Max} (\alpha_c \sqrt{g_c} + \alpha_c k_r \sqrt{g_r} - p(g_c \alpha_c + g_r \alpha_r) \alpha_c) \quad (15)$$

$$\underset{\substack{g_r \\ s.t. p(g_c \alpha_c + g_r \alpha_r) = t(\alpha_c + \alpha_r)}}{Max} U_r^u = \underset{g_r}{Max} (\alpha_r \sqrt{g_r} + \alpha_r k_c \sqrt{g_c} - p(g_c \alpha_c + g_r \alpha_r) \alpha_r) \quad (16)$$

The optimal level of urban and rural public goods supply is as follows:

$$\frac{\partial U_c^u}{\partial g_c} = 0 \Rightarrow g_c^u = \left(\frac{\alpha_r + \alpha_c}{2p\alpha_c} \right)^2 \quad (17)$$

$$\frac{\partial U_r^u}{\partial g_r} = 0 \Rightarrow g_r^u = \left(\frac{\alpha_r + \alpha_c}{2p\alpha_r} \right)^2 \quad (18)$$

The efficiency of coordinated regional public goods supply is compared with the efficiency of public goods supply required by society, and the optimal level of urban and rural areas at this time is compared with the optimal level of society, respectively, namely (17) - (7):

$$\begin{aligned} g_c^u - g_c^s &= \left(\frac{\alpha_r + \alpha_c}{2p\alpha_c} \right)^2 - \left(\frac{\alpha_c + \alpha_r k_c}{2p\alpha_c} \right)^2 \\ &= \frac{(\alpha_c(1 - k_c)[2\alpha_c + \alpha_r(1 + k_c)])}{(2p\alpha_c)^2} \geq 0 \end{aligned}$$

After coordinating public goods supply, the optimal supply of per capita urban public goods is more than the optimal supply of per capita social public goods, that is, the allocation efficiency of public goods is improved. It is also the same case for the supply of public goods in rural areas. Based on the previous conclusions, we get:

$$\begin{aligned} g_c^u &\geq g_c^s \geq g_c^a \\ g_r^u &\geq g_r^s \geq g_r^a \end{aligned}$$

From the above two inequations, it is found that by coordinating public goods supply in urban and rural areas, the allocation efficiency of public goods is higher than the socially optimal allocation for both urban or rural areas, and also higher than the allocation efficiency of public goods in urban and rural areas before urban and rural supply is coordinated. From the perspective of allocation efficiency of public goods, the coordinated public goods supply in urban and rural areas is the result of resources allocation optimization, and it will improve the level of per capita public goods supply in urban and rural areas to varying degrees.

4.4 Practice of coordinating urban and rural compulsory education in Chengdu City Chengdu City includes the rural

compulsory education into the overall balance system of urban and rural education, and strengthen the space integration of urban and rural education resources in terms of schools, teachers, and funding. Chengdu implements unified appointment, personnel and wage management on teachers, which lays the foundation for the rational distribution of educational human resources in urban and rural areas. In 2010, the percentage of school-age children at age 6 to 11 who enter school in Chengdu City reached 100% ; the rural primary school dropout rate was as low as 0.05% ; the secondary school enrollment rate, dropout rate and graduation rate were 99.77% , 0.28% and 95.16% , respectively; the ratio of primary school students to teachers in Chengdu City declined from 21.53 in 2004 to 18.1 in 2009, the ratio of junior high school students to teachers declined from 16.26 in 2004 to 15.4 in 2009, and the ratio declined greatly in rural areas, indicating that the quality of teachers was improved in the city and especially rural areas after the coordination of education. The rural compulsory education expenditure increased from 493.01 million yuan in 2005 to 510.6047 million yuan in 2010, an increase of 935.69% ; the expenditure per student at primary school and junior high school stages in Chengdu City increased from 2600 yuan and 4033 yuan in 2006 to 7159 yuan and 9030 yuan in 2010. Conspicuously, the coordina-

ted supply of urban and rural education can optimize the allocation of educational resources and increase the level of public goods supply for urban and rural areas to varying degrees. Table 1 shows that after coordinating the urban and rural education in Wuhou District of Chengdu City, the urban and suburban education expenses per student, public funds per student, land area per student and building area per student have been dramatically increased, which is mainly due to the increasing government financial investment in education, but from the distribution of cost in urban and rural areas, the gap between urban and rural areas is narrowed, and even under the preferential policies for rural areas, the optimization effect of resources allocation is obvious. Table 2 shows the changes in teachers in the area, and the teacher exchanges between urban and rural areas has also contributed to the optimal allocation of teacher resources. The urban outstanding teachers flow to suburban areas, and the teachers of special grade in urban areas are slightly reduced while the teachers of special grade in suburbs increase by a factor of two. The number of senior teachers and intermediate teachers is increased at different levels in urban and rural areas, and the teachers configuration is more reasonable in suburban schools.

Table 1 The indicators about urban and rural students in Wuhou District of Chengdu City in 2003 and 2008

Year	Urban area				Suburban area			
	Education expenses per student//yuan	Public funds per student // yuan	Land area per student//m ²	Building area per student // m ²	Education expenses per student//yuan	Public funds per student // yuan	Land area per student //m ²	Building area per student//m ²
2003	1609.35	375.54	12.82	9.26	487.51	126.23	10.53	4.37
2008	3572.52	880.8	10.05	7.49	4100.84	1480.42	15.69	8.35

Data source: The subject report on *Resource Allocation Experience of Coordinating Balanced Development of Urban and Rural Education*; <http://www.cdjky.com/content/208/652.html>, the same below.

Table 2 The urban and rural ordinary primary and secondary school teachers' titles in 2003 and 2008 in Wuhou District of Chengdu City

Year	Urban area			Suburban area		
	Teachers of special grade	Senior teachers	Intermediate teachers	Teachers of special grade	Senior teachers	Intermediate teachers
2003	14	64	610	3	24	436
2008	12	185	985	10	142	737

5 Analysis of fairness of coordinated urban and rural supply from the changes in social welfare

This section mainly examines whether the urban and rural residents are willing to support coordinating public goods supply in urban and rural areas, and if both urban and rural residents have the willingness, it is believed that the coordinating public goods supply in urban and rural areas is fair to urban and rural residents. And this willingness is determined by residents' personal utility level. If coordinating public goods supply in urban and rural areas, residents' personal utility is improved compared with the personal utility when the public goods supply is not coordinated, thus the residents are willing to support urban and rural coordination. When the public goods supply is not coordinated, the urban and rural residents' personal utility level is as follows:

$$u_c^\alpha = \sqrt{g_c^\alpha} + k_r \sqrt{g_r^\alpha} - t_c = \sqrt{g_c^\alpha} + k_r \sqrt{g_r^\alpha} - pg_c^\alpha = \frac{1 + 2k_r}{4p} \quad (19)$$

$$u_r^\alpha = \sqrt{g_r^\alpha} + k_c \sqrt{g_c^\alpha} - e_r = \sqrt{g_r^\alpha} + k_c \sqrt{g_c^\alpha} - pg_r^\alpha = \frac{1 + 2k_c}{4p} \quad (20)$$

$$u_c^\alpha - u_r^\alpha = \frac{1 + 2k_r}{4p} - \frac{1 + 2k_c}{4p} = \frac{2k_r - 2k_c}{4p} = \frac{k_r - k_c}{2p} < 0$$

When the public goods supply is not coordinated, the urban and rural residents' individual utility under the optimal supply of public goods hinges on the degree of spillover of public goods in urban and rural areas. When the degree of spillover of urban public goods is higher than that of rural public goods, the urban residents' personal utility is lower than the rural residents' personal

utility. When the urban and rural public goods supply is coordinated, the urban and rural residents' personal utility is as follows:

$$u_c^u = \sqrt{g_c^u} + k_r \sqrt{g_r^u} - t = \sqrt{g_c^u} + k_r \sqrt{g_r^u} - \frac{p(g_c^u \alpha_c + g_r^u \alpha_r)}{\alpha_c + \alpha_r} \quad (21)$$

$$u_r^u = \sqrt{g_r^u} + k_c \sqrt{g_c^u} - t = \sqrt{g_r^u} + k_c \sqrt{g_c^u} - \frac{p(g_c^u \alpha_r + g_r^u \alpha_c)}{\alpha_c + \alpha_r} \quad (22)$$

$$u_c^u - u_r^u = \frac{\alpha_r + \alpha_c}{2p\alpha_c} (1 - k_c) - \frac{\alpha_r + \alpha_c}{2p\alpha_r} (1 - k_r)$$

At this point, the urban and rural residents' personal utility depends on the urban and rural population size and degree of spillover of public goods, with uncertainty. Now we compare the utility when the urban and rural public goods supply is coordinated and not coordinated as the standard to judge whether the urban and rural residents are willing to coordinate public goods supply in urban and rural areas.

$$\begin{aligned} u_c^a - u_c^u &= \sqrt{g_c^a} + k_r \sqrt{g_r^a} - t_c - (\sqrt{g_c^u} + k_r \sqrt{g_r^u} - t) \\ &= \frac{\alpha_r \alpha_c - \alpha_r^2 - 2\alpha_c^2 k_r + \alpha_c^2}{4p\alpha_r \alpha_c} \end{aligned} \quad (23)$$

This formula is seen as the equation with $\frac{\alpha_c}{\alpha_r}$ and k_r as independent variables, and $u_c^a - u_c^u$ as the dependent variable, $\frac{\alpha_c}{\alpha_r} \in (0, 1)$, as shown in Fig. 1.

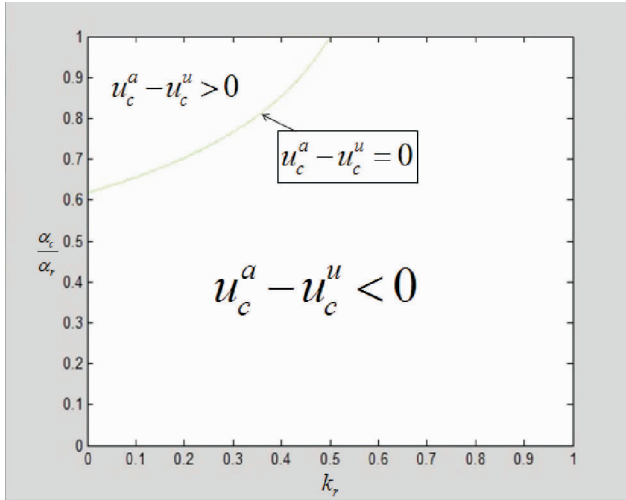


Fig. 1 Comparison of urban residents' personal utility when the urban and rural public goods supply is coordinated and not coordinated

As can be seen in Fig. 1, when $k_r \in (0.5, 1]$ or $\frac{\alpha_c}{\alpha_r} \in (0, 0.618)$, there is always $u_c^a - u_c^u < 0$, that is, when the public goods supply in urban and rural areas is coordinated, the urban residents' personal utility will be much higher, thus urban residents are more willing to support coordinated supply. When $k_r \in [0, 0.5]$, the value of $u_c^a - u_c^u$ is uncertain, and it also depends on the ratio of urban and rural population. When $k_r = 0.4$, if $\frac{\alpha_r}{\alpha_c}$

$\in (0.618, 0.854)$, then $u_c^a - u_c^u < 0$, and if $\frac{\alpha_r}{\alpha_c} \in (0.854, 1)$,

then $u_c^a - u_c^u > 0$. The change in rural residents' individual utility is similar. In summary, urban and rural residents' willingness to coordinate public goods supply in urban and rural areas depends on the degree of spillover of urban public goods and the ratio of urban and rural population.

6 Conclusions and recommendations

6.1 Conclusions By setting the urban-rural public goods supply model, this paper evaluates the effects of coordinating supply public goods on resource allocation and welfare from efficiency and fairness, and examines the necessity and possibility of coordinating public goods supply in urban and rural areas. The model assumes that the population size of urban and rural areas is different, and the population can not flow freely between urban and rural areas; there are different degrees of spillover in the public goods supply. Model results show that coordinating public goods supply in urban and rural areas is the result of optimizing resource allocation efficiency, but the residents' individual utility level will not necessarily improve, so residents' willingness to support coordinated urban-rural supply is different, and public goods spillover and different tax systems are the factors that affect the residents' utility level. Finally, this paper uses the practice of coordinating urban and rural compulsory education in Chengdu City to confirm the above conclusions.

6.2 Recommendations

6.2.1 Developing the equalized and integrated supply mechanism for urban and rural public goods with urban and rural coordination as strategic guidance. The public goods supply should be people-oriented. In terms of supply system design, based on urban and rural population, sex, age structure and other demographic characteristics, it is necessary to objectively make urban-rural public goods allocation decisions, determine the number and structure of public goods based on "quota", and ensure objective and fair coordination and arrangement in the distribution and consumption aspects.

6.2.2 Increasing the central government's financial transfer payments for local public goods supply and actively guide market forces to participate in local public goods supply. Based on the urban and rural public goods supply mechanism, it is necessary to calculate the expenditure and income gap in public goods supply according to "quota" method, use financial transfer payments to make up for this gap, and transfer private capital to supplement, in order to fully supply public goods to urban and rural residents, so that each citizen can enjoy equal treatment of public goods.

6.2.3 Promoting the tax reform and establishing a unified tax burden distribution system for urban and rural residents. Under different tax systems in urban and rural areas, it is necessary to establish the rural tax system characterized by income tax and value added tax, and prohibit all unreasonable fees and funds raised in rural areas, to ensure that urban and rural residents share the

equal cost for the same public goods.

6.2.4 Reforming the social security system, speeding up the connection of urban and rural social security system and build a social security system covering urban and rural residents. It is necessary to strengthen the basic public service system, implement the wage system of "equal pay for equal work", encourage mutual alliance between urban and rural areas, strengthen the interaction of health care resources and educational resources between urban and rural areas, get rid of the existing dual urban-rural profit allocation pattern, and exclude factors not conducive to unified urban and rural security.

6.2.5 Speeding up the household registration system reform so that farmers are no longer subject to "agricultural registered permanent residence" discrimination. When there is no census register restriction, rural residents can enjoy the city's public goods like urban residents, and freely choose to live in rural or urban areas with dignity. The social welfare level will be improved as the flow costs are reduced and public goods spillover problem is solved, thereby improving the willingness to support coordinating public goods supply in urban and rural areas.

References

- [1] Bradford DF, Oates WE. Suburban exploitation of central cities and governmental structure. In: Hochman, H. M. Peterson, G. E. (Eds.), *Redistribution through Public Choice*[D]. New York: Columbia University Press, 1974:43–49.
- [2] Kushner J, Siegel D. Citizens' attitudes toward municipal amalgamation in three Ontario municipalities[J]. *Canadian Journal of Regional Science*, 2003 (26):49–59.
- [3] Oates WE. An essay on fiscal federalism[J]. *Journal of Economic Literature*, 1999(37):1120–1149.
- [4] Robert Dur, Klaas Staal. Local public good provision, municipal consolidation and national transfers [J]. *Regional Science and Urban Economics*,

2008(38):160–173.

- [5] Vojnovic I. Municipal consolidation, regional planning and fiscal accountability: The recent experience in two maritime provinces[J]. *Canadian Journal of Regional Science*, 2000(23): 49–72.
- [6] CHENG Y. Study on the countermeasures of balancing urban and rural public goods [J]. *China State Finance*, 2009(11):61–63. (in Chinese).
- [7] LI TB. Balancing urban and rural public goods supply: A way to shorten the gap between urban and rural places [J]. *China Market*, 2006(31):60–61. (in Chinese).
- [8] LI SG, YIN H. An external analysis of the county-level expenditure on basic education: With an analysis of the effectiveness of the "county-based" system [J]. *Social Sciences in China*, 2012(11):81–97. (in Chinese).
- [9] LI YF. The formation mechanism of externality of government's public goods supply behaviors—Based on the process of the public choice theory [J]. *Journal of Jinan University*, 2009, 30(1):62–67. (in Chinese).
- [10] LU HY. The economic rationale for "one good, two systems"—and some comments on social justice in the sharing of cost and benefit of public goods [J]. *Research on Financial and Economic Issues*, 2004(10):50–54. (in Chinese).
- [11] LU HY. Study on the issues of balancing urban and rural public goods supply [M]. Beijing: Science Press, 2010; 8:1–4. (in Chinese).
- [12] WEI LB, SHI S, LIU ZB. The return rate and spillover effect of education in rural China [J]. *Journal of Zhejiang University (Humanities and Social Sciences)*, 2012, 42(6):27–35. (in Chinese).
- [13] Research Group of the School of Public Finance and Taxation, Southwestern University of Finance and Economics. Report on the effective supply of rural public goods in balancing urban and rural development: An empirical analysis of Chengdu [M]. Beijing: Economic Science Press, 2012:50–54. (in Chinese).
- [14] YUE CJ, WU SJ. The relationship between externalities of human capital and industrial income difference [J]. *Peking University Education Review*, 2005, 3(4):31–37. (in Chinese).
- [15] ZHA XY, DING SH. Empirical analysis on the externality of higher education in China [J]. *Economic Theory and Business Management*, 2006(1): 41–45. (in Chinese).
- [16] GAO PY, YANG ZG, MA J. Frontiers of the theoretical development of China; Public finance [M]. Beijing: Social Sciences Academic Press (China), 2011(4):102–118. (in Chinese).
- [17] ZHU CC, MA JZ. The generalized spillover of rural human capital and the urban–rural income gap [J]. *China Rural Survey*, 2009(4):37–46. (in Chinese).

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crops. Therefore, farmers have to purchase foreign seeds every year if they want to continue the cultivation. Both the directly imported grain and oil and indirectly imported fertilizers, agricultural hormones and seeds require high consumption of foreign currency, which damages state grain strategy. So, supporting key enterprises in grasping transgenic techniques through industry chain financing has great significance in guaranteeing basic grain security.

4.3 Improving the efficiency of state subsidy State subsidies on agro-products have increased year by year, which mainly focus on high-quality and specialized agro-products, green products and deeply processed agro-products. Subsidies in agricultural production areas mainly focus on middle to low income households in the main production areas of sensitive agro-products. Subsidies on agricultural inputs mainly focus on water and electricity in improved varieties and water-saving irrigation. It should be noticed that efficiency of agricultural subsidies in China is generally low with relatively limited funds. Some coordinating institutions and agricultural guilds assisting governmental departments in investigating and distributing subsidies is usually

lagging and non-pertinent. With urbanization and income increase of migrant workers, false planting for defrauding subsidies occurs. However, industry chain financing will attract specialists in related fields and different types of insurance and it also have standard regulation as well as strict supervision on the whole production, which can promote efficiency of state subsidies to the maximal degree.

4.4 Promoting domestic food safety and laying foundation for international competition Safety of agricultural products is the foundation of the existence of agricultural enterprises. In recent years, food safety crisis including milk powder affairs, the drug clenbuterol and the illegal cooking oil have seriously damaged the reputation of China's agriculture, which encourages domestic consumers to seek for imported foreign food. Industry chain financing can collect funds in the shortest term, establish trustworthy brands, resist the effect of agro-product price fluctuation in international market on the prices at home and restrain capital requirement caused by natural disasters, environmental protection as well as structure upgrading.