論 説

# PUBLIC VERSUS PRIVATE LAND OWNERSHIP AND URBAN ECONOMY

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**Abstract**

This paper examines the relationship between land ownership and urban economy. In particular, the behavior of landowners is explicitly considered in the setting of the public and private land ownership systems. The results indicate that in the equilibrium of the land market, public ownership has a higher possibility of excessive use of land or of overpopulation than the private one. And, from the welfare viewpoint of the whole urban economy, private ownership will result in a greater total surplus than the public one.

**Key Words:** land ownership, private ownership, communal ownership, state ownership, urban economy, land-use, total surplus

## 1. INTRODUCTION

All economic phenomena relate to economic ownerships. This is especially true for Japan and China, since many economic problems in those countries are closely related to their land ownership systems. For example, in urban Japan, land is privately owned by the general public, which leads the Japanese people to believe in a so-called land myth (*tochi no shinwa,* in Japanese) that land is the most valuable property in the world. As a result, most Japanese intend to keep on holding their own land, and the amounts of land supplied to the land market become very limited. For this reason, the private land ownership system in Japan is criticized for blocking the development of the urban public infrastruc-

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ture (NHK, 1987).

On the other hand, in Japan's most urban areas, there still exists a vast amount of land that is owned publicly by the state and/or some public organizations. Most of these areas are under-utilized or used very inefficiently, which causes the demand for land to exceed the supply, leading to an imbalance in the urban land market (Yamamoto, 1999). For this reason, the full use of publicly owned land has always been an important issue of the public policies on land in Japan (see Harada and Inoue, 1991; Ministry of Land, Infrastructure and Trasport, 2004). It seems that the question of which of the public and private land ownership systems is most appropriate to the urban economy is still open for further investigation in Japan.

Turning to China, the problem of land ownership appears more important with greater urgency. Since the start of economic reforms and an open-door policy in the late 1970s, the marketization of the Chinese economy has been going gradually forward. By now, various markets of products, land-use rights, and labor have appeared across the country, and the national economy has kept on growing at higher rates. However, the land of the country still remains publicly owned. According to the constitution of China, farmers collectively own the land of the rural areas, whereas the urban land belongs to the state, as it did in the pre-reform period (World Bank, 1993).

Of course, since the late 1980s, some changes have taken place in China's land ownership system. The most important one was the separation of public ownership and private user rights. Now in the countryside, farmers are granted the right to use the farmland and the local government retains other rights associated with the ownership of the land. In urban areas, the rights to use the land are transferred from the state to individual firms and households, and land ownership is still in the hands of the state. However, the land market is still faced with many problems to be solved. For instance, in the transferring of the rights to use land from the government to individuals, the government-led negotiation was the main method used, while bidding and auctions were not often conducted (Zheng, 1998). In this sense, the government has a great monopolistic power in the market of land (the market of land-use rights, to be exact). Owing to this monopoly, sometimes the land is supplied excessively, leading to a bubble in the real estate market, and sometimes there comes a shortage of land, giving rise to a deflation in the urban economy. Is such a land use and ownership system effective? Is the current public land ownership consistent with the adopted market economy system? The problem of land ownership in China is awaiting solutions.

Questions raised from the land ownership system and urban economy in Japan and China need an answer from urban economics. Unfortunately, however, the responses to date are not satisfactory. In modern urban economics, a theory on land use and urban aggregate has been well established in the late 1980s (see Fujita, 1989), which can be

traced back to the works done by Alonso (1964), Muth (1969), Mills (1972), Solow (1973) and Kanemoto (1980). Under this theory, land ownership is classified mainly into two systems. One is the public ownership system, which means that the public owns urban land and the rent from land is equally distributed to the urban residents. The other is the absentee ownership system, which assumes that the landlords who live outside of the city own urban land, and the rent from land also belongs to these absent landlords. Obviously, the latter system means the private land ownership, but the existing literature rarely makes it clear how these absent landlords behave, and whether or not they want to maximize the rent from land. This is the first weak point of the existing urban land-use theory. Secondly, in the absentee ownership system, it is assumed that the general public does not own land and the rent is also not distributed to them. For urban residents, land is owned as if it is publicly owned by a government who does not return the rent to them. Thus, this kind of absentee ownership implies, in effect, a public ownership. In this sense, the existing classification of the two land ownership systems in modern urban economics has not grasped the real meaning of the public and private land ownerships, which leaves an important subject for further study.

As an attempt to answer this real-world question, which has not been satisfactorily addressed by modern urban economics, this paper will examine the relationship of land ownership and urban economy. In particular, the behavior of landowners will be explicitly considered in the setting of the public and private ownership systems. These two land ownership systems will be compared with each other from the view points of the equilibrium of the land market, urban population density, the consumer's and total surpluses of the whole urban economy.

The results indicate that in the equilibrium of the land market, public ownership has a higher possibility of excessive use of land or of overpopulation than the private one. And, from the welfare viewpoint of the whole urban economy, private ownership will result in a greater total surplus than the public one.

The rest of the paper is organized as follows. In Section 2, a model of an urban economy will be built, with a number of assumptions on land ownership systems proposed. The equilibrium of the land market will be analyzed in Section 3 and the comparisons of public and private land ownership systems will be carried out in Section 4. Finally, Section 5 concludes the paper and suggests directions for further research.

## 2. AN URBAN ECONOMIC MODEL WITH LAND OWNERSHIP

Consider an urban economy that consists of a given number ($N$) of residents. Residents consume land and other goods so as to maximize their utility levels. The utility function of

a representative resident is assumed to be the CES (constant elasticity of substitution) type displayed below,

$$U=(Z^{\rho}+L^{\rho})^{\frac{1}{\rho}}\ (0<\rho<1) \tag{1}$$

where $L$ and $Z$ indicate the amounts of consumption of land and of other (composite) goods, respectively, and $\rho$ is a parameter.

The resident is given a certain income ($y$), and his budget constraint is written as follows,

$$y=pZ+RL \tag{2}$$

in which $p$ is the price of composite goods given from outside the city, and $R$ represents the rent of land.

Under the budget constraint, the resident is to maximize the utility level by choosing appropriate amounts of land and other goods, which could be expressed as,

$$\begin{cases} \max\limits_{(Z,L)} U=(Z^{\rho}+L^{\rho})^{\frac{1}{\rho}} \\ \text{s.t.}\ y=pZ+RL \end{cases} \tag{3}$$

It is supposed that the cost needed to secure the supply of land for the residents is technologically given as an increasing function of the amount of land supplied, i. e.,

$$C(L)=L^{c}\ (c>1) \tag{4}$$

where, $c$ is parameter. Given such a cost function, the land is assumed to be supplied in a way that is characterized by the land ownership system.

The paper divides land ownership into two systems, private and public. In the private ownership system, urban residents privately own the land, and supply it to the land market so as to gain the maximum return from the market. In the public ownership one, on the contrary, land is publicly owned by urban residents. But public ownership can be divided further into communal ownership, under which urban residents jointly own the land, and state ownership, under which the government acts as a representative of the residents to own the land, supplying it to the market on their behalf.

It should be noted that the above-mentioned three land ownership systems are based on the classical classification in the economics of property rights (see Demsetz, 1967). The new contribution to be made here is the addition of some assumptions regarding the profit-maximizing behavior of landowners, which will be stated and formularized in the following.

Firstly, concerning the private ownership, since urban residents privately own the land, it is reasonable to assume that they will supply it to the land market with a purpose to

maximize the profit from the land. If the profit can be written as $\pi_{po}=RL-C(L)$, the first-order condition of the maximization yields the following expression,

$$\frac{d\pi_{po}}{dL}=R-\frac{dC(L)}{dL}=0 \tag{5}$$

Secondly, under communal ownership, urban residents jointly own land and each individual decides the amount of land to supply to the market. It is conceivable that to gain the maximum return from the land, an individual will continue to supply the land until the average revenue equals the average cost. That is, the following equation holds,

$$R=\frac{C(L)}{L} \tag{6}$$

This is, in fact, the situation that HARDIN [1968] described as "the Tragedy of the Commons", in which the profit from the land runs out and the land is exhausted (see a similar expression made by Varian, 1990, pp. 552-555).

Thirdly, as regards the state ownership, because land is effectively owned by the government, it can be supposed that the government monopolizes the supply of land, which means that it could manipulate the price of land so as to maximize the profit from the supply. Generally, the purpose of the government's behavior is not to pursue the maximum profit. However, by observing closely the operations of Japan's land-development-related public corporations that have land ownership, and those of China's central and local governments that transfer the rights to use land to individuals, one realizes that the government or the public corporations put a high priority on returns in the supply of land in the real world. In this sense, the assumption that the government wants to have the profit from land maximized is not so far from reality. Thus, let the profit be defined as $\pi_{so}=RL-C(L)$, the monopolized profit could be made from the following condition,

$$\frac{d\pi_{so}}{dL}=\frac{dR}{dL}L+R-\frac{dC(L)}{dL}=0 \tag{7}$$

## 3. THE EQUILIBRIUM OF URBAN LAND MARKETS

To see the equilibrium properties of urban land markets, the demand function for and the supply function of land need to be derived at first, and then the equilibriums under the three different ownership systems can be compared.

### 3.1. *The demand functions of land*

From the utility-maximizing behavior of urban residents, expressed by (3), the per capita

demand function for land could be obtained as follows,

$$L^D=\frac{yR^{\frac{1}{\rho-1}}}{p^{\frac{\rho}{\rho-1}}+R^{\frac{\rho}{\rho-1}}} \tag{8}$$

Similarly, the per capita demand function for other composite goods can be calculated as,

$$Z^D=\frac{yp^{\frac{1}{\rho-1}}}{p^{\frac{\rho}{\rho-1}}+R^{\frac{\rho}{\rho-1}}} \tag{9}$$

Given the number of urban residents is $N$, the total demand function for land can be written as,

$$L^{TD}\equiv NL^D=\frac{NyR^{\frac{1}{\rho-1}}}{p^{\frac{\rho}{\rho-1}}+R^{\frac{\rho}{\rho-1}}} \tag{10}$$

Differentiation of the total demand function with respect to land rent yields,

$$\frac{dL^{TD}}{dR}=-\frac{NyR^{\frac{2}{\rho-1}}}{(1-\rho)(p^{\frac{\rho}{\rho-1}}+R^{\frac{\rho}{\rho-1}})^2}\left[\left(\frac{p}{R}\right)^{\frac{\rho}{\rho-1}}+(1-\rho)\right]<0 \tag{11}$$

which implies that the total demand for land is a decreasing function of land rent.

### 3.2. *The supply functions of land*

Depending on the three different land ownership systems, the supply functions of land also differ from one another. First of all, under the private ownership, using (4) and (5), the supply function can be obtained as follows,

$$L^S_{po}\equiv NL=N\left(\frac{R}{c}\right)^{\frac{1}{c-1}} \tag{12}$$

Second, for communal ownership, equations (4) and (6) yield the following supply function of land,

$$L^S_{co}\equiv NL=NR^{\frac{1}{c-1}} \tag{13}$$

Third, the supply function of land under state ownership can be written as follows, using (4) and (7),

$$L^S_{so}\equiv NL=N\left[\frac{1}{c}\left(\frac{dR}{dL}L+R\right)\right]^{\frac{1}{c-1}} \tag{14}$$

in which $\frac{dR}{dL}L$ can be expressed in the following form, using (10) and (11),

$$\frac{dR}{dL}L\equiv\frac{dR}{dL^{TD}}L^{TD}=-\frac{(1-\rho)(p^{\frac{\rho}{\rho-1}}+R^{\frac{\rho}{\rho-1}})^2}{NyR^{\frac{2}{\rho-1}}\left[\left(\frac{p}{R}\right)^{\frac{\rho}{\rho-1}}+(1-\rho)\right]}\frac{NyR^{\frac{1}{\rho-1}}}{p^{\frac{\rho}{\rho-1}}+R^{\frac{\rho}{\rho-1}}} \tag{15}$$

Substitution of (15) into (14) gives the following supply function of land under state ownership,

$$L_{so}^{S}=\frac{N}{c^{\frac{1}{c-1}}}\left[\frac{\rho p^{\frac{\rho}{\rho-1}}R}{p^{\frac{\rho}{\rho-1}}+(1-\rho)R^{\frac{\rho}{\rho-1}}}\right]^{\frac{1}{c-1}} \tag{16}$$

### 3.3. *Comparison of the land market equilibriums of different land ownerships*

On one hand, a comparison of the supply functions of land between the private and the communal ownership systems yields the following result, using (12) and (13),

$$L_{co}^{S}-L_{po}^{S}=N\left(\frac{R}{c}\right)^{\frac{1}{c-1}}(c^{\frac{1}{c-1}}-1)>0 \tag{17}$$

On the other hand, using (12) and (16), a result of comparison between the private and the state ownership systems can be obtained as follows,

$$L_{po}^{S}-L_{so}^{S}=N\left\{\frac{R}{c[p^{\frac{\rho}{\rho-1}}+(1-\rho)R^{\frac{\rho}{\rho-1}}]}\right\}^{\frac{1}{c-1}}\{[p^{\frac{\rho}{\rho-1}}+(1-\rho)R^{\frac{\rho}{\rho-1}}]^{\frac{1}{c-1}}-(\rho p^{\frac{\rho}{\rho-1}})^{\frac{1}{c-1}}\} \tag{18}$$

in which, the components of the second { } can be shown to be positive, since,

$$\Delta\equiv(p^{\frac{\rho}{\rho-1}}+(1-\rho)R^{\frac{\rho}{\rho-1}})-(\rho p^{\frac{\rho}{\rho-1}})=(1-\rho)(p^{\frac{\rho}{\rho-1}}+R^{\frac{\rho}{\rho-1}})>0 \tag{19}$$

This leads to the derivation of the following inequality,

$$L_{po}^{S}-L_{so}^{S}>0 \tag{20}$$

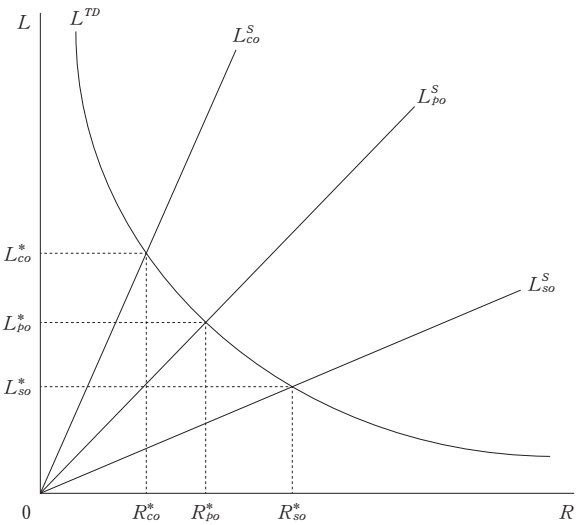
Combining the inequalities of (17) and (20) together gives,

$$L_{co}^{S}>L_{po}^{S}>L_{so}^{S} \tag{21}$$

which means that, when the land rent is given the same level, communal ownership will supply the most amount of land, state ownership the least, with private ownership between them.

Based on (21), and considering that the total demand for land is a decreasing function of land rent, the total demand function and the supply functions of land can be illustrated as in Figure 1. Here, the supply functions are represented using straight lines just for the sake of simplicity. From this figure, it can be easily confirmed that in the land market equilibrium, there exist the following relations regarding the equilibrium rents and quanti-

**Figure 1** Total Demand Function for and Supply Functions of Land




ties among the three different ownership systems,

$$R^*_{co} < R^*_{po} < R^*_{so} \tag{22}$$

$$L^*_{co} > L^*_{po} > L^*_{so} \tag{23}$$

That is, communal ownership supplies the most amount of land, at the lowest level of rents, state ownership provides the least amount of land, at the highest level of rents, and the amount of land supplied and the level of rents under private ownership fall between the two.

The reason why communal ownership supplies the most amount of land, at the lowest level of rents, is that under this ownership, urban residents jointly own the land and each individual will keep on supplying land until the average revenue equals (or drops below) the average cost. As a result, the equilibrium amount of land becomes larger than under the state and the private ownership systems, which also makes the level of rents lower than those of the other two systems. China in the early 1970s of the pre-reform period and the former Soviet Union saw phenomena of urban land use that were rather close to this (for a more detailed description of the land markets in China and Russia, see Malpezzi, 1999).

State ownership provides the least amount of land, at the highest level of rents, because under this ownership, the government monopolizes the supply of land, causing the amount of land supply to be less and the level of rents to be higher than those of the other two systems. The current urban land market in China after economic reforms, and some of Japan's urban land markets, where the government and public corporations own land,

could be examples of this reasoning, though further investigation and interpretations are needed to verify that conclusion. See Zheng (1998) for the Chinese case and Yamamoto (1999) for the Japanese case.

Finally, the conclusion that private ownership supplies an amount of land at a level of rents that fall between those of the other two ownership systems means that private ownership could bring about a relatively more moderate equilibrium for the land market than the other two public ownerships. Common sense always dictates that land rents or prices have a higher possibility to be soaring under private ownership than under publicly-owned systems. The unique division in this paper of the public ownership into the more detailed categories of communal and state ownership helps to reach the above different and interesting conclusion.

## 4. WELFARE COMPARISONS OF DIFFERENT LAND OWNERSHIPS

### 4.1. *Comparison of urban population density*

Before comparing the welfare of different land ownerships, the differences in urban population densities are investigated at first. By denoting the urban population density as $n^*$, it can be defined as a reciprocal of per capita consumption of land, i.e.,

$$n_i^* \equiv \frac{1}{L_i^*} \quad (i = co,\ po,\ so) \tag{24}$$

Since the inequality of (23) holds in equilibrium, an inequality regarding urban population densities can be easily obtained as follows,

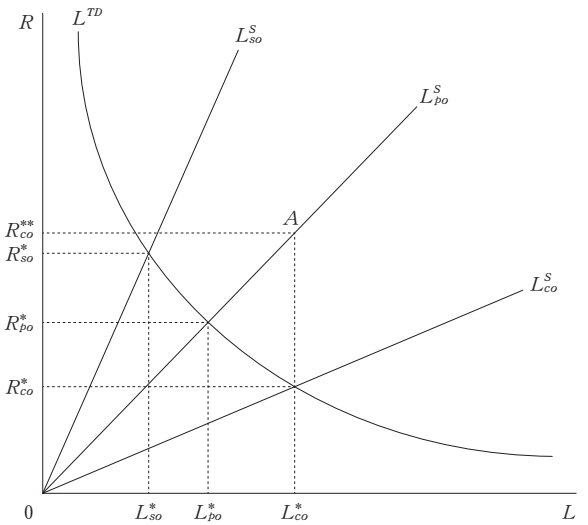
$$n_{co}^* < n_{po}^* < n_{so}^* \tag{25}$$

which indicates that the urban population density reaches the lowest level under communal ownership, and the highest level under state ownership, with the density level under private ownership in between. This is because communal ownership supplies the most amount of land, causing the population density to be at the lowest level, while state ownership provides the least amount of land due to the governmental monopoly of the land supply, leading the population density to be at the highest level.

### 4.2. *Comparison of the consumer's surplus*

To define the consumer's surplus, Figure 2 is drawn by simply exchanging the vertical and horizontal axes in Figure 1. According to the definition of consumer's surplus ($CS$), under the communal ownership we obtain the following definite integral,

**Figure 2** Consumer's Surplus and Total Surplus




$$CS_{co}=\int_0^{L^*_{co}}(L^{TD}-R^*_{co})dL \tag{26}$$

Similarly, the consumer's surplus under the state and private ownerships are written as follows, respectively,

$$CS_{so}=\int_0^{L^*_{so}}(L^{TD}-R^*_{so})dL \tag{27}$$

$$CS_{po}=\int_0^{L^*_{po}}(L^{TD}-R^*_{po})dL \tag{28}$$

The comparison of the areas in Figure 2, which are represented by the above definite integrals, yields the following inequality,

$$CS_{co}>CS_{po}>CS_{so} \tag{29}$$

which means that the consumer's surplus is the largest under communal ownership, smaller under private ownership, and the least under state ownership. The reason for this is that communal ownership supplies the most amount of land, while state ownership supplies the least, and the amount of land supplied by private ownership is between the two. This, given that the total demand function for land confronting the different ownerships is the same, leads to a level of equilibrium land rents at its lowest under communal ownership, and at its highest under state ownership, with the equilibrium level under private ownership in between. Such an order of rent levels makes the consumers under communal ownership to feel the happiest, those under state ownership the least happy, and those under private ownership to enjoy happiness to an in-between extent.

### 4.3. *Comparison of the total surplus*

The preceding comparison result of the consumer's surpluses concerned only the welfare of urban residents, or the demand-side for land. To see the welfare status of the whole urban economy, we must also take into account the supply-side of land, or the welfare of landowners. In fact, an important part of the whole welfare is the profit from the land supply, which belongs to the landowners and may be distributed to the residents, depending on the ownership system in place. To see the differences among the three ownership systems with regard to the whole welfare of urban economy, the total surplus ($TS$) will be compared, which is the sum of consumer's and producer's surpluses ($PS$).

While the consumer's surplus under the three different ownerships has been defined previously, to see the areas represented by the producer's surplus, the meaning of a curve, denoted as $L_{po}^{S}$ in Figure 2, is noteworthy. In that figure, $L_{po}^{S}$ implies the supply function of land under private ownership, which also means the marginal cost function ($MC$) of land supply for all three ownership systems. Using this interpretation, the producer's surpluses and thus the total surpluses can be easily defined, as follows.

First of all, under private ownership, the producer's surplus can be written as,

$$PS_{po}=\int_0^{L_{po}^*}(R_{po}^*-L_{po}^S)dL \tag{30}$$

Summing up (28) and (30), the total surplus of the private ownership can be expressed by,

$$\begin{aligned} TS_{po}&=CS_{po}+PS_{po}\\ &=\int_0^{L_{po}^*}(L^{TD}-R_{po}^*)dL+\int_0^{L_{po}^*}(R_{po}^*-L_{po}^S)dL\\ &=\int_0^{L_{po}^*}(L^{TD}-L_{po}^S)dL \end{aligned} \tag{31}$$

Second, for state ownership, the producer's surplus and the total surplus are presented as follows, respectively,

$$PS_{so}=\int_0^{L_{so}^*}(R_{so}^*-L_{po}^S)dL \tag{32}$$

$$\begin{aligned} TS_{so}&=CS_{so}+PS_{so}\\ &=\int_0^{L_{so}^*}(L^{TD}-R_{so}^*)dL+\int_0^{L_{so}^*}(R_{so}^*-L_{po}^S)dL\\ &=\int_0^{L_{so}^*}(L^{TD}-L_{po}^S)dL \end{aligned} \tag{33}$$

The definition of the area represented by the producer's surplus under communal ownership system seems to be a little complicated. On Figure 2, we draw a vertical line from $L_{co}^*$, which intersects the curve $L_{po}^S$ at point $A$, and then we draw a horizontal line

from $A$ to the vertical axis at $R_{co}^{**}$. $R_{co}^{**}$ is then the marginal cost when the supply of land reaches $L_{co}^{*}$. Using the meaning of $R_{co}^{**}$, the producer's surplus of communal ownership can be written as,

$$\begin{aligned} PS_{co} &= \int_0^{L_{co}^*} (R_{co}^{**} - L_{po}^S)dL - \int_0^{L_{co}^*} (R_{co}^{**} - R_{co}^*)dL \\ &= \int_0^{L_{co}^*} (R_{co}^* - L_{po}^S)dL \end{aligned} \tag{34}$$

Then, the total surplus of communal ownership is given by,

$$\begin{aligned} TS_{co} &= CS_{co} + PS_{co} \\ &= \int_0^{L_{co}^*} (L^{TD} - R_{co}^*)dL + \int_0^{L_{co}^*} (R_{co}^* - L_{po}^S)dL \\ &= \int_0^{L_{co}^*} (L^{TD} - L_{po}^S)dL \end{aligned} \tag{35}$$

The following are the comparisons of those three total surpluses, $TS_{so}$, $TS_{po}$ and $TS_{co}$. To begin with, using Figure 2, $TS_{po}$ of (31) can be expanded in the following way,

$$\begin{aligned} TS_{po} &= \int_0^{L_{po}^*} (L^{TD} - L_{po}^S)dL \\ &= \int_0^{L_{so}^*} (L^{TD} - L_{po}^S)dL + \int_{L_{so}^*}^{L_{po}^*} (L^{TD} - L_{po}^S)dL \end{aligned} \tag{36}$$

Since

$$\int_{L_{so}^*}^{L_{po}^*} (L^{TD} - L_{po}^S)dL > 0 \tag{37}$$

we obtain

$$TS_{po} > \int_0^{L_{so}^*} (L^{TD} - L_{po}^S)dL = TS_{so} \tag{38}$$

Similarly, using Figure 2, $TS_{co}$ of (35) can be rewritten as,

$$\begin{aligned} TS_{co} &= \int_0^{L_{co}^*} (L^{TD} - L_{po}^S)dL \\ &= \int_0^{L_{po}^*} (L^{TD} - L_{po}^S)dL + \int_{L_{po}^*}^{L_{co}^*} (L^{TD} - L_{po}^S)dL \end{aligned} \tag{39}$$

in which

$$\int_{L_{po}^*}^{L_{co}^*} (L^{TD} - L_{po}^S)dL < 0 \tag{40}$$

Thus,

$$TS_{co} < \int_0^{L_{po}^*} (L^{TD} - L_{po}^S)\, dL = TS_{po} \tag{41}$$

Inequalities (38) and (41) indicate that the total surplus under private ownership is larger than either the state or communal ownership systems. In other words, the total surplus under private ownership is greater than that of both forms of public ownership.

The results of this welfare analysis are very interesting and important. Based on the comparison of the consumer's surpluses, private ownership is superior to state ownership but inferior to communal ownership. However, from the viewpoint of the total surplus, it is shown that private ownership is superior to both forms of public ownership. This also means that under state ownership, even if the government distributes all the profit earned from its monopolistic supply of land to urban residents, state ownership is still inferior to private ownership in terms of the total surplus.

Furthermore, the results correspond to the fundamental theorem of welfare economics that if an economy is competitive, it is Pareto efficient. This is because under private ownership, marginal revenue is equal to marginal cost in the supplying of land, which is an important necessary condition of perfect competition. On the other hand, under state ownership, the land market is not perfectly competitive because the government monopolizes the supply of land. And, under communal ownership, urban residents jointly own land and each individual continues to supply land to the market until the average revenue from land supply is equal to the average cost for the supply. This is inconsistent with the perfect competition. In this way, under these two public ownership systems, the land resource cannot be allocated as efficiently as under private land ownership.

Finally, it should be noted that, while the above-mentioned results sound like a mere application of the fundamental theorem of welfare economics into the land ownership affair, such an application seems to have not yet been attempted in modern urban economics (e. g., Henderson and Thisse, 2004; Duranton, Henderson and Strange, 2015) or in the economics of property rights (e. g., Pejovich, 2001). Moreover, those results appear applicable to investigating the relationship between land ownership and urban economy in the real world, and to solving those urban problems in Japan and China as mentioned in the introduction of this paper.

## 5. CONCLUSIONS

This paper investigated how land ownership systems and urban economic welfare relate to each other, using a theoretical urban model. In particular, the behaviors of landowners under public and private ownership systems were explicitly considered, and the two

different systems were compared in terms of the equilibrium of the land market, urban population density, and the consumer's and total surpluses. The main results from the comparisons are as follows.

In the equilibrium of the land market, the public ownership has a higher possibility of excessive use of land (to be exact, under communal ownership), or has a higher possibility of overpopulation (under state ownership) than the private ownership.

In terms of the consumer's surplus, private ownership is superior to state ownership, but inferior to communal ownership. But, from the viewpoint of the total surplus of the whole urban economy, private ownership is proved to be superior to the both forms of public ownership. These conclusions can serve as a useful reference for solving problems regarding Japan's land use system and China's institutional reforms of land ownership systems.

The further research that remains for the future includes the application of more general function forms, rather than the CES type attempted in this paper, to show a more general result that does not depend on the functional forms used. Further detailed study of the current situations and problems of land ownership and land utilization systems in Japan and China will also be worth pursuing, which will hopefully lead to the development of further practical and operational theories on land ownership and urban economy. It is also worth noting that there have been several papers published, such as Zheng (2003), which attempted to apply morden urban economics to other problems in China's transitional economy.

## REFERENCES

Alonso, W. (1964) *Location and Land Use*. Harvard University Press, Massachusetts.

Fujita, M. (1989) *Urban Economic Theory: Land Use and City Size*. Cambridge University Press, Cambridge.

Demsetz, H. (1967) Toward a theory of property rights. *American Economic Review* (*Papers and Proceedings*), Vol. 57, pp. 347–359.

Duranton, G., J. Henderson and W. Strange (eds.) (2015) *Handbook of Regional and Urban Economics*. Vols.5A-5B, Elsevier, The Netherlands.

Harada, Y. and H. Inoue (1991), *Tochi Jutaku No Keizaigaku* (*The Economics of Land and Housing*). Nippon Hyoronsha, Tokyo. (In Japanese)

Hardin, G. (1968) The tragedy of the commons. *Science,* Vol. 162, pp. 1243–1248.

Henderson, J. and J.-F. Thisse (eds.) (2004) *Handbook of Regional and Urban Economics*. Vol. 4 (Cities and Geography), Elsevier, The Netherlands.

Kanemoto, Y. (1980) *Theories of Urban Externalities*. North-Holland, Amsterdam.

Malpezzi, S. (1999) Economic analysis of housing markets in developing and transition economies. in: P. Cheshire and E. S. Mills (eds.), *Handbook of Regional and Urban Economics*. Vol. 3 (Applied Urban Economics), pp. 1791–1864, North-Holland, Amsterdam.

Mills, E. S. (1972) *Studies in the Structure of the Urban Economy*. The Johns Hopkins Press,

Baltimore.

Ministry of Land, Infrastructure and Transport (2004) *Tochi Hakusho* (*White Paper on Land*). National Printing Bureau, Tokyo. (In Japanese)

Muth, R. F. (1969) *Cities and Housing*. University of Chicago Press, Chicago.

NHK (Japan Broadcasting Corporation) (1987) *Tochi Wa Dareno Mono Ka* (*Whose is the Land*). NHK's Special Report, NHK, Tokyo. (In Japanese)

Pejovich, S. (ed.) (2001) *The Economics of Property Rights*. Vols. 1-2, Edward Elgar Publishing Limited, Cheltenham.

Solow, R. M. (1973) On equilibrium models of urban locations. in: J. M. Parkin (ed.), *Essays in Modern Economics,* pp. 2-16, Longman, London.

Varian, H. R. (1990) *Intermediate Microeconomics: A Modern Approach,* Second Edition, W. W. Norton & Company, New York.

World Bank (1993) *China: Urban Land Management in an Emerging Market Economy*. World Bank, Washington DC.

Yamamoto, S. (1999) *Tochi Kaihatsu Kosha: Siozuke Yochi To Jichitai No Furyo Saiken* (*The Land Development Corporation: Salinized Land and the Municipalities' Bad Debts*). Tsukiji-Shokan, Tokyo. (In Japanese)

Zheng, X.-P. (1998) Chugoku No Fudosan Toshi No Genjo To Tenbo (Present state and perspectives of China's real estate Investment). *Kikan Fudosan Kenkyu* (*Quarterly Journal of the Real Estate Research*), Vol. 40, pp. 4-15. (In Japanese)

Zheng, X.-P. (2003) A note on the equilibrium and optimum of a transitional urban economy: the case of China. *Papers in Regional Science,* Vol. 82, pp. 137-146.