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The Effects of the Inheritance Tax and a Realized Capital Gains Tax on Land Prices and Land Use

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In spite of many achievements of urban economics with respect to the effects of the land taxes on land use, little had been done to examine the effects of the inheritance tax and a capital gains tax could have on land use. Using an overlapping-generations model, Yamazaki (1999a) showed that when a lower valuation of land in the inheritance tax assessment exists, the inheritance tax leads to inefficient land use. In this paper, focusing on the effects of a realized capital gains tax on land, we examine the effects of the inheritance tax and a realized capital gains tax on land use, land prices and land development. We show that under asymmetric valuation, a realized capital gains tax on land leads to inefficient land use, causes a higher land price, and impedes land development. Under asymmetric valuation, a realized capital gains tax on land amplifies the effects of the inheritance tax. We may say that under asymmetric valuation, the inheritance tax on land amplifies the effects of a realized capital gains tax on land.

Key words : efficiency, a lower valuation of land, the inheritance tax, a realized capital gains tax

1. Introduction

In Japan, the sluggish conversion of agricultural land into residential land in the Urbanization Promotion Area and extraordinary appreciation of land prices, especially, in the late 1980s, have drawn the attention of many economists. It has been verified that inefficient land use and appreciation of land prices are caused by

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the property tax and the capital gains tax on land. However, as Yamazaki (1999a) says, the effects of the inheritance tax on land use had not been sufficiently verified. Using an overlapping generations model, Yamasaki (1999a) verified the effects of the inheritance tax on land use, land prices, and land development.

Two distinctive characteristics should be pointed out concerning the Japanese inheritance tax system. First, there is a substantially favorable treatment for land in the inheritance base. In assessing land for the purpose of inheritance taxation, the assessed value is less than the market value, while other monetary assets are valued at their fair market value. There is even more favorable treatment for farmland in the inheritance tax base (Yamazaki (1999a), Nishimura. et al. (1999), Asada et al. (2002)). Nishimura. et al. (1999) says that in the Tokyo metropolitan area, the assessed value of the farmland was 0.7% of the market value in 1995. Second, by postponing realization until death, the capital gains go entirely untaxed. Under the Japanese tax code, the basis of the appreciated land value is the acquisition value of the decedents. Thus, if the heirs sell the land, the capital gains accrued by the decedents are subject to a capital gains tax. However, when the heirs do not sell the land, a capital gains tax is not imposed on the heirs. The capital gains are pass on to the heirs (Kaneko (1996), Sibuya (2002), Nakasato (2002), Stigliz (2014)).

When each individual receives an income and wealth according to their contribution to the society, we say that equity is attained. In most cases, capital gains on land are not the fruit of landowners' efforts, but rather the unearned increment of land value due to public investment. In addition, when landowners seek capital gains on land, the steady state land prices become higher (Aono (1976), Stigliz (2015)). Since the capital gains tax on land improves equity, it is a desirable tax if it does not impede efficiency (Iwata (1977), Yamazaki (1999a), Stigliz (2014)).

It has been verified that a realized capital gains tax on land has a lock-in effect, resulting in a distorted allocation of land. However, it has not been verified that under a lower valuation of land in the inheritance tax assessment, whether a realized capital gains tax on land causes a distortion in land use or not.

As for the effects of the inheritance tax, using an overlapping-generations model, Yamazaki (1999a) showed that under the assumption of no rental market for land, a lower valuation of land in the inheritance tax assessment causes a distortion in land use, raises land prices and impedes land development. His conclusion crucially depends upon the asymmetry in the inheritance tax. If a realized capital gains tax on land does not alter the behavior of landowners, nothing could be added to his conclusion by integrating a realized capital gains tax on land. But, as we show in this paper, under asymmetric valuation, a realized capital gains tax on land amplifies the effects of the inheritance tax. We may say that under asymmetric valuation, inheritance tax on land amplifies the effects of a realized capital gains tax on land.

The purpose of this paper is to examine the effects of a combination of the inheritance tax and a realized capital gains tax on land use, land prices and land development. For this purpose we examine the effects of such a taxation system on land use and land development. We show that under asymmetric valuation, a realized capital gains tax on land amplifies the effects of the inheritance tax. The rest of the paper is organized as follows. Section 2 presents the basic assumptions and explains how a realized capital gains tax on land is incorporated into our model. We further derive basic equations. Section 3 examines the effects of a combination of the inheritance tax and a realized capital gains tax would have on land use, land prices and land development. Section 4 summarizes our findings along with some remarks on the limitations and discusses their policy implications.

2. A model

1) Basic Assumptions

In line with Yamazaki (1999a), we use an overlapping-generations model. The basic assumptions are as follows :

Assumption 1 : Land supply is fixed and is essential for production and for residential use. Each generation lives for two periods, a “young” and an “old” period. The economy consists of an old and a young generation. While the probability of death for the young is assumed to be $\pi (< 1)$, the probability for the old is unity. Land is held as an asset, and owned by both the old and the young. There exist two forms of land use at each point in a particular period. In period s , the old and the young exist, at the beginning of period $s+1$, the old from period s die, and the young from period s become the old. Thus, in period $s+1$, the economy consists of a new old and a new young generation.

Assumption 2 : Land owned by the old is expected to yield imputed rent R_s^O , land owned by the young is expected to yield imputed rent R_s^Y , respectively, in period s . The law of diminishing returns holds here. The time profile of the old and the young is depicted in Figure1 (see Yamazaki (1999a) p. 150).

Assumption 3 : Land use is specific to each generation. The young have a more productive technology for land use than the old do. The old landowner cannot change the land use that was adopted when he was young. When land is transferred to the young, the land use can be changed to produce a higher rent. There is no transfer of wealth during a life time.

Assumption 4 : There is a competitive asset market for land ; on the other hand, there is no rental market for land. Land is converted from old uses to new uses only when the land is inherited or sold to the young. For simplicity, the young can change the land use without development costs. From Assumption 1, there exist

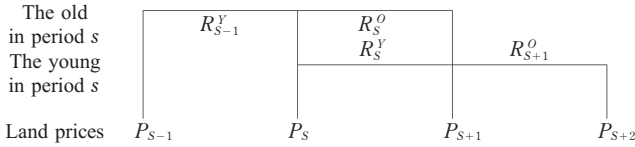


Figure1. Time Profile of the old and the young

two forms of land use at each point in the period, and based on Assumption 4, the young can change the land use without development costs. These Assumptions (Assumption 1 and Assumption 4) enable us to set the equilibrium price of land for old uses equal to that for new uses.

Assumption 5 : There exist only two kinds of assets ; land and other monetary assets. In assessing land for the purpose of inheritance taxation, the assessed value is less than the market value, while other monetary assets are valued at their fair market value. These two assets have the same risk properties.

Assumption 6 : A realized capital gains tax is imposed on land. When the landowner sells the land in period s , and dies at the beginning of period $s + 1$, the realized capital gains tax is imposed at the beginning of period $s + 1$. It is worth noting that when the land owner sells the land in period s , the realized capital gains tax is imposed on the land based on the market value in period s , but the tax is imposed at the beginning of period $s + 1$.

Assumption 6 : Decedents contemplate the after-tax wealth to be bequeathed to their heirs. There exist only two kinds of taxes ; the inheritance tax and a realized capital gains tax on land.

2) Derivation of the Basic Equations

Let us derive the basic equations which examine the effects of a combination of the inheritance tax and a realized capital gains tax on land use and land development.

We first consider the portfolio selection of the old between land and other monetary assets. The old at the beginning of period s have to choose whether they should sell their land at P_s and buy other monetary assets or continue to hold onto their land until death. If the old sell their land at P_s at the beginning of period s , they have to pay a realized capital gains tax $\theta(P_s - P_{s-1})$, where θ is the capital gains tax rate, P_s is the price of land at the beginning of period s , and, P_{s-1} is the price of land at the beginning of period $s-1$. P_{s-1} is assumed to be the acquisition value of land. In addition to the capital gains tax, the inheritance tax is imposed on the other bequeathed monetary assets of value $(1+r)P_s$ as evaluated at the beginning of period $s+1$, where r is interest rates. On the other hand, if the old continue to hold onto their land until death, the inheritance tax is imposed on the bequeathed land at the beginning of period $s+1$. From Assumption 4, the assessed value of land is less than the market value. The ratio of assessment value to the market value of land is indicated by $\alpha(<1)$.

Denoting the inheritance tax rate as γ , the heirs have to pay the inheritance tax at the beginning of period $s+1$. Portfolio equilibrium requires that the net value of other monetary assets bequeathed at the beginning of period $s+1$ is equal to the after-tax value of land bequeathed at the beginning of period $s+1$. Thus the following equation holds for the old in portfolio equilibrium :

$$(1+r)(1-\gamma)\{P_s - \theta(P_s - P_{s-1})\} = (1-\gamma\alpha)(R_s^o + P_{s+1}). \quad (1)$$

where P_{s+1} is the expectation of land prices at the beginning of period $s+1$, P_{s-1} is the acquisition value of land. The left hand side of (1) indicates the after-tax value bequeathed at the beginning of period $s+1$ when the old sell their land and buy other monetary assets at the beginning of period s . It should be noticed that in the case where the old sell their land in period s , the realized capital gains tax $\theta(P_s - P_{s-1})$ is imposed on land at the beginning of period s . The right side of

(1) indicates the after-tax value bequeathed at the beginning of period $s+1$ when the old continue to hold onto their land until death. Under the Japanese tax code, if the heirs sell the land owned by the decedents, capital gains accrued by the decedents are subject to the capital gains tax. However, if the heirs do not sell the land, the capital gains tax is not imposed on the heirs. By postponing realization until death, the capital gains go entirely untaxed. It is assumed that decedents do not sell the bequeathed land. We also assume that the landowner reinvests the land rent R_s^O in land.

Next, we consider the portfolio selection of the young between land and other monetary assets at the beginning of period s . Since the young's probability of death in this period is assumed to be π , the effective inheritance tax rate on the other bequeathed monetary assets is $\pi\gamma$, and on land is $\pi\alpha\gamma$. In addition to the inheritance tax, the capital gains tax is imposed on land, and the effective rate of the capital gains tax is $\pi\theta(1-\gamma)$. In portfolio equilibrium, the following equation holds for the young :

$$(1+r)(1-\pi\gamma)\{P_s - \theta(P_s - P_{s-1})\} = (1-\pi\gamma\alpha)(R_s^Y + P_{s+1}). \quad (2)$$

The left hand side of (2) indicates the investment value evaluated at the beginning of period $s+1$, when the young buy other monetary assets at the beginning of period s considering the probability of their death. The right hand side of (2) indicates the end-of-period value when the young hold land and claim the rent of R_s^Y in period s .

We assume that there is a constant technical progress at the rate of q . This means that

$$R_s^Y(L_s^Y) = (1+q)R_{s-1}^Y(L_{s-1}^Y); \quad (3)$$

$$R_s^O(L_s^O) = (1+q)R_{s-1}^O(L_{s-1}^O). \quad (4)$$

Where L_s^Y is the amount of land owned by the young in period s , and R_s^Y is imputed rent in period s . Owing to the law of diminishing returns, R_s^Y is a decreasing function of L_s^Y , and R_s^O is a decreasing function of L_s^O .

3. The Effects of the Inheritance Tax and a Realized Capital Gains Tax

1) The Effects on Land Use

In this section, we shall examine the effects of a combination of the inheritance tax and a realized capital gains tax on land use, land prices and land development. We first examine the effect on land use. Using (3) and (4), we obtain the old's demand price of land from (1) under the convergence condition $r > q$:

$$P_s^O = \frac{(1-\alpha\gamma)R_s^O}{\{(1-\gamma)(1+r)(1-\theta q) - (1-\alpha\gamma)(1+q)\}}. \quad (5)$$

By a similar procedure, we get the young's demand price of land from (2):

$$P_s^Y = \frac{(1-\pi\alpha\gamma)R_s^Y}{(1+r)(1-\pi\gamma)(1-\theta q) - (1-\pi\alpha\gamma)(1+q)}. \quad (6)$$

From Assumption 1 and 4, the equilibrium demand price for the old land use is equal to the demand price for the young land use under the assumption of no development cost. Letting (5) equals (6), we obtain the following relationships:

$$R_s^Y = (1+\beta)R_s^O, \quad (7a)$$

where

$$\beta = \frac{(1-\pi)\{\gamma(1+r)(1-\alpha)(1-\theta q)\}}{(1-\pi\alpha\gamma)\{(1-\gamma)(1+r)(1-\theta q) - (1-\alpha\gamma)(1+q)\}}. \quad (7b)$$

Differentiating (7b) with respect to θ , γ , α and π , we get

$$\frac{\partial \beta}{\partial \theta} > 0, \quad \frac{\partial \beta}{\partial \gamma} > 0, \quad \frac{\partial \beta}{\partial \alpha} < 0, \quad \frac{\partial \beta}{\partial \pi} < 0. \quad (7c)$$

The equation (7a) is interpreted as follows. From (7b), if there is no asymmetric valuation under the inheritance tax ($\alpha = 1$) and no capital gains tax ($\theta = 0$), the land rent for the old uses is equal to the land rent for the young uses ; that is, $R_s^Y = R_s^O$. From (5) and (6), a decrease in the ratio of the land valuation to the market value ($\alpha < 1$) increases both the old's demand price of land and the young's demand price of land. However, the decrease in α has a greater effect on the land price for the old than on that for the young, since the old's probability of death is higher. The old's higher probability of death induces the old to hold more land than the young would. Under the assumption of the law of diminishing returns, this means that when $\alpha < 1$ and $\theta = 0$, the equilibrium rent for the old uses becomes lower than that for the young uses ; that is, $\beta > 0$. The introduction and the increase in a realized capital gains tax on land (θ) increases both the old's demand price of land and the young's demand price of land. The increase in θ has a greater effect on the land price for the old than on that for the young, since the old's probability of death is higher. This induces the old to hold more land than the young would hold. This means that when the asymmetry in the inheritance tax exists ($1 > \alpha$) and $\theta > 0$, the equilibrium rent for the old uses becomes lower than that for the young uses, which induces the old to own more land for the old land uses ; that is, $\beta > 0$.

The equation (7b) and (7c) show that the introduction and the increase in the rate of the realized capital gains tax on land reduce the equilibrium rent for the old

uses, and increase the equilibrium rent for the young uses. Therefore, when $\beta > 0$, a realized capital gains tax increases the difference between rent for the old uses and rent for the new uses. This encourages the old's incentive to hold more land for the old uses. Yamazaki (1999a) showed that a lower valuation of land in the inheritance tax assessment leads to inefficient land use. The equation (7b) and (7c) show that when the asymmetry in the inheritance tax exists ($1 > \alpha$), a realized capital gains tax on land has a negative effect on efficient land use and leads to inefficient land use.

Comparing (5) with (6), we can explain as follows. Under the assumption of $q > 0$, a rise in the rate of the realized capital gains tax increases both the old's demand price of land and the young's demand price of land. Under the Japanese tax code, if landowners do not sell the land, the capital gains tax is not imposed. Therefore, by postponing realization until death, the capital gains go entirely untaxed. Under a rise in the rate of the realized capital gains tax, a higher expected rate of increase in the land price q increases the demand price of land. The reason why a higher realized capital gains tax rate increases the old's demand for land relative to the young is that the old's probability of death is higher than the young. As a result, a rise in the realized capital gains tax rate causes the old to hold more land and discourages new land use.

Let us consider the relationship between a realized capital gains tax and the inheritance tax on land. When an asymmetry in the inheritance tax exists ($1 > \alpha$), the inheritance tax discourages the young's incentive to hold land for new land use, and causes inefficient land uses. The realized capital gains tax on land also causes the old to hold more land and discourages new land uses, and doing so, leads to inefficient land uses. When a lower valuation of land in the inheritance tax assessment exists, the inheritance tax causes inefficient land use. The introduction and the increase in a realized capital gains tax on land (θ) amplify the effect of the

inheritance tax, that is, amplify the effect of inefficient land use.

2) The Effects on Land Prices

We shall now examine the effect of the realized capital gains tax on land prices. A higher realized capital gains tax rate increases the old's demand for land relative to the young, which decreases the amount of available land for the young and increases the rent for new land uses.

Differentiating (6) with respect to θ and considering $dR_s^Y/d\theta > 0$, we get

$$\frac{dP_s}{d\theta} > 0. \quad (8a)$$

The above shows that a rise in the realized capital gains tax in accordance with the increase in the rent for new land uses causes a higher land price. Under asymmetric valuation, a higher inheritance tax rate or a decrease in the valuation of land increases not only the old's, but also the young's demand for land, which increases the rent for new land uses.

Differentiating (6) and considering $dR_s^Y/d\gamma > 0$, $dR_s^Y/da < 0$, we get

$$\frac{dP_s}{d\gamma} > 0, \quad \frac{dP_s}{da} < 0. \quad (8b)$$

The above shows that a higher inheritance tax rate or a decrease in the valuation of land in accordance with the rise in rent for the new land use causes a higher land price.

3) The Effects on Land Development and land rent

We shall now examine how a realized capital gains tax affects the dynamic path of land development and land rent. Using (3), (6) and (7b), the rate of change in

the rent for the young in period s is rewritten as follows :

$$\begin{aligned}\hat{R}_s^Y &\equiv \frac{R_{s+1}^O - R_s^Y}{R_s^Y} = \frac{R_{s+1}^Y - R_s^Y + R_{s+1}^O - R_{s+1}^Y}{R_s^Y} \\ &= q - \frac{\beta(1+q)}{(1+\beta)}.\end{aligned}\tag{9}$$

Differentiating (9) with respect to θ , γ and α , we get the following results :

$$\frac{d \hat{R}_s^Y}{d\theta} < 0, \quad \frac{d \hat{R}_s^Y}{d\gamma} < 0, \quad \frac{d \hat{R}_s^Y}{d\alpha} > 0.\tag{10}$$

The above shows that a rise in the rate of a realized capital gains tax on land induces the old to own more land and impedes land development. A rise in the rate of the inheritance tax induces the old to hold land, and impedes land development. The decrease in the valuation of land for the purpose of inheritance taxation induces the old to hold onto land and causes the old to deter the land development.

The equation (10) can be interpreted as follows. The lower evaluation of land in the inheritance tax ($\alpha < 1$) creates an incentive not only for the old, but also for the young to hold land. While the probability of death for the young is π (< 1), the probability for the old is unity. Such an asymmetry creates a greater incentive for the old to hold onto land. It is easily verified that under the assumption of $\pi < 1$, as long as $P_s^O > 0$, the rate of growth of rent is less than the constant growth of q (see (5) and (7b)). The decrease in α and the increase in θ or γ induce a lower growth rate of rent and cause a lower rate of change in land use. In other words, under asymmetric valuation, a higher realized capital gains tax (a higher inheritance tax rate) or a decrease in the valuation of land impedes land development. If there is no asymmetric valuation in the inheritance tax, the inheritance tax does not impede land development.

4. Concluding Remarks

Using an overlapping-generations model, we have examined the effects of the inheritance tax and a realized capital gains tax on land use, land prices, and land development. Yamazaki (1999a) had showed that when a lower valuation of land in the inheritance tax assessment exists, the inheritance tax leads to inefficient land use, causes a higher land price, and impedes land development. In this paper, we have showed that under asymmetric valuation, a realized capital gains tax on land leads to inefficient land use, causes a higher land price, and impedes land development. Under asymmetric valuation, a realized capital gains tax on land amplifies the effects of the inheritance tax. We may say that under asymmetric valuation, inheritance tax on land amplifies the effects of a realized capital gains tax on land.

When each individual receives the income and the wealth according to his or her contribution to the society, we say that equity is attained. As for the inheritance tax, decedents contemplate the after-tax wealth to be bequeathed to their heirs. Therefore, a higher inheritance tax rate improves equity. In most cases, capital gains on land are not the fruit of landowners' efforts, but the unearned increment of land value due to public investment. Therefore, a higher realized capital gains tax rate on land improves equity. On the other hand, we showed that under asymmetric valuation, the inheritance tax leads to inefficient land use, causes a higher land price, and impedes land development. We also showed that a realized capital gains tax on land amplifies the effects of the inheritance tax.

Is there any way to improve the trade-off between equity and efficiency with respect to the inheritance tax and a realized capital gains tax? We proposed a combination of the inheritance tax and "a realized capital gains tax at the time of death" on land. Using an overlapping-generations model, Aono (2016) examined

the effects of a combination of the inheritance tax and “a realized capital gains tax at the time of death” on land use, land prices and land development. We showed that even if there is a lower valuation of land in the inheritance, such a new taxation system can increase the efficient use of land, encourage land development and reduce land prices. A new taxation system can be used not only for promoting efficiency, but also for improving equity.

The extensions of our model are being considered. We disregard the effects of a combination of the inheritance tax and a realized capital gains tax at the time of death (or a realized capital gains tax) on savings and interest rates (the rate of return on capital). Using a simple neoclassical model, we have showed that when the landowner seeks capital gains on land and consumes out of the capital gains on land, the following results are obtained; ① The rate of return on capital must exceed the rate of economic growth on the steady state growth path. ② The steady state price of land is higher than that of noncapital gains-seeking economy. ③ a capital gains-seeking economy impedes capital accumulation (Aono (1976) and Stiglitz (2015)). The above results imply that the effects of a combination of the inheritance tax and “a realized capital gains tax at the time of death” (or a realized capital gains tax) on savings and interest rates (the rate of return on capital) are an interesting research topic for the future.

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