Absentee Ownership, Land Taxation, and Surcharge *

by

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Abstract

This paper studies the efficiency of land taxation in a system of jurisdictions with absentee ownership of land. The government of a jurisdiction exploits absentee owners and overtaxes land. Hence, even if land taxation does not distort the use of land, it distorts the allocation of resources between the private and public goods, creating an efficiency loss. If individuals choose their land ownership by trading it in the asset market, they do not necessarily choose an efficient ownership. The government of a jurisdiction also imposes an absentee owner surcharge, reducing the return to absentee ownership and eliminating absentee ownership. Surcharges thus improve the efficiency of land taxation in the long run.

Keywords land taxation, absentee ownership, surcharge, efficiency

JEL Classification H2, H7, R1, R8

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1. Introduction

It has long been understood that the supply of land is perfectly inelastic and land taxation does not distort the use of land. As a result, land taxation is efficient.[1] This led Henry George (1912) to conclude that a land tax is the only tax necessary to finance public services. The purpose of this paper is to examine the efficiency of land taxation in an economy with multiple jurisdictions.

When land taxation is considered in a system of multiple jurisdictions, two observations can be made. First, land in a jurisdiction is owned by its residents and absentee owners as well. Second, jurisdictions have implemented surcharges on absentee owners, as will be discussed below. Building on these two observations, the paper studies the efficiency of land taxation and the role of surcharges when individuals choose land ownership by trading it in land markets. Absentee ownership of land gives a jurisdiction the incentive to inefficiently overtax land in an attempt to exploit absentee owners even when it does not discriminate against absentee owners and absentee owners pay the same tax rate as its residents. Surcharges on absentee owners make absentee owners pay a higher tax rate than its residents, and may appear to worsen the inefficiency of land taxation, as surcharges reinforce the incentives of a jurisdiction to exploit absentee owners. However, surcharges induce absentee owners to sell their land in foreign jurisdictions and own more in their home jurisdictions, reducing absentee ownership and hence the incentives to overtax land. Surcharges thus could potentially improve the efficiency of land taxation.

The practical importance of land taxes cannot be overemphasized. Property taxes are the major source of local tax revenues. According to the Tax Policy Center, local property taxes account for more than 70%, and more than 80% in some years, of total local tax revenues since 1977.[2] Property taxes include taxes on land and building/structure. However, as discussed below, land in this paper is interpreted as land itself and a building/structure on it for the purpose of analyzing the effects of absentee ownership, as the key to the analysis is that some fixed factor, whether it is called land or land plus structure, is owned by absentee owners. If land taxes are considered separately from taxes on buildings, no data on the share of land tax revenues out of total local tax revenues appears to be available. The value of a

[1] In a dynamic setting land taxation may be inefficient, because investors change their portfolio toward nonland assets, or because land taxation alters the timing of land development (Feldstein, 1977; Bentick, 1979; Mills, 1981).

[2] Tax Policy Center, Urban Institute and Brookings Institution, 2016, Local Property Taxes as a Percentage of Local Tax Revenue 1977. to 2014, available at http://www.taxpolicycenter.org/statistics/local-property-taxes-percentage-local-tax-revenue [accessed September 20, 2017].

building on a parcel of land may exceed that of land itself in some locations, and the opposite may hold true in other locations. As the tax rate on land and the tax rate on buildings are the same in most jurisdictions, land tax revenues alone would still constitute a significant portion of local tax revenues. However, land taxes have not received much attention, and this paper attempts to add to the literature on land taxation by studying the role of absentee ownership and surcharges.

In the model, land in a jurisdiction may be owned by residents of other jurisdictions, absentee owners, as observed in practice. This is particularly true in the case of nonresidential land, the focus of the present paper. The government of a jurisdiction cares about the welfare of its residents, and does not consider the external effect of its tax on absentee owners in determining the land tax rate to finance the public good for the jurisdiction. As a result, it sets the land tax rate at a level higher than the socially efficient level that takes into account the external cost imposed on absentee owners. Land taxation thus results in an inefficient allocation of resources between the private good and the public good with the public good overprovided.

Even if policymakers of a jurisdiction have a lump-tax or any non-distortionary tax at their disposal, land is still taxed and land taxation results in inefficiency. The reason is that due to absentee owners, the tax burden of raising a given amount of tax revenues on its residents is lower for the land tax than for the lump-sum tax. The land tax is thus superior to the lump-sum tax from the jurisdiction's perspective, and the policymakers of the jurisdiction tax land.

As the inefficiency of land taxation arises from the existence of absentee owners, it is natural to ask if individuals of a jurisdiction choose to own the land only in their own jurisdiction so that land taxation becomes efficient and hence they enjoy a higher level of utility. However, they do not necessarily choose to own the land only in their own jurisdiction. The reason is that individuals trade land ownership in the asset market until the net return to land per unit price in one jurisdiction equals that in another jurisdiction. Hence, individuals are indifferent to ownership of land, and the trading of land ownership does not eliminate absentee ownership. As a result, land taxation remains inefficient even when individuals are allowed to endogenously choose their land ownership.

In addition to the land taxes, the governments of jurisdictions have considered or have imposed absentee owner surcharges on land taxes. In many US cities, the property tax rate on homestead (owner-occupied) properties is much lower than the rate on commercial properties and apartment buildings (Lincoln Institute of Land Policy, 2016). To the extent that commer-

cial properties and apartment buildings are more likely to be owned by absentee owners, this preferential treatment of homestead properties may be viewed as an implicit absentee owner surcharge. As an example of an explicit surcharge, Victoria, a state in Australia, implemented a 1.5% surcharge on Victorian land owned by absentee owners. As another example, in Summit and Wasatch counties in Utah, primary residents enjoy a 45%-discount on their property taxes, relative to second-home and investment property owners.[3] As the latter group of owners are mainly absentee owners who reside outside the counties, the discount to the residents is equivalent to the surcharge on absentee owners. New York considered a property tax surcharge, ranging from 0.5% to 4%, on expensive properties owned by non-New Yorkers.[4]

The surcharges appear to have been an attempt to raise tax revenues in a more politically acceptable manner, as the surcharges do not increase the tax burden of the residents who have voting power. However, the surcharges may have efficiency consequences. A surcharge of a jurisdiction reduces the return to the land in the jurisdiction for absentee owners, inducing them to sell the land in the jurisdiction and to buy land in their home jurisdictions to avoid the surcharge. Absentee ownership will then be eliminated.[5] The surcharge then would make land taxation efficient, given that the inefficiency of land taxation arises from absentee owners. However, the elimination of absentee ownership induced by the surcharge has no effect on the inefficiency of land taxation. The reason is that the cost of purchasing land cancels out the return to land in the asset market equilibrium. Thus, the elimination of absentee ownership does not affect the choice of the land tax rate by the government of a jurisdiction that cares about the welfare of its residents. However, the land tax still affects the welfare of its residents through their endowed land ownership. As long as absentee owners owned land in a jurisdiction before the surcharge, the government of the jurisdiction still has an incentive to tax land more than the socially efficient level to exploit absentee owners. As a consequence, the surcharge eliminates absentee ownership, but it does not necessarily eliminate the inefficiency of land taxation. However, economic conditions change over time, and the governments of jurisdictions adjust their land taxes in response to such changes in the future. As current land ownership without absentee ownership will become the basis of land taxation in the future,

[3]Easy Guide to Utah Real Estate Taxes. Park City Real Estate Guide, February 5, 2008, available athttp://blog.parkcityrealestateguide.com/how-to-estimate-your-utah-real-estate-taxes/ [accessed September 20, 2017].

[4]New York Considers Special Property Surcharge for Nonresidents. Tax Foundation, September 26, 2014, available at http://taxfoundation.org/blog/new-york-considers-special-property-surcharge-nonresidents/ [accessed September 20, 2017].

[5]Some residents of a jurisdiction may still own the land in another jurisdiction despite the surcharge, for example, due to emotional attachment to a parcel of land in another jurisdiction (Needham and de Kam, 2004; Hong 2007), and absentee ownership would still exist, as discussed below.

land taxation becomes efficient. An implication is that surcharges tend to make land taxation efficient in the long run.

Land taxation has been rarely analyzed in models of jurisdictional interaction, and a few papers have considered land taxation in such models . However, they focus on different issues. Hoyt (1991) demonstrates in a model without absentee owners that both capital and land should be taxed when the public good is a publicly-provided private good, subject to congestion, even if all jurisdictions could benefit from switching to land taxation. Wildasin and Wilson (1998) and Lee (2003a) explain why uniform taxation of land and capital may be more efficient than separate taxation. In Wildasin and Wilson (1998), individuals of a jurisdiction own land in other jurisdictions to diversify the risk associated with uncertain returns to land, but the desire of a jurisdiction to exploit absentee owners eliminates the efficiency gains from diversification. Uniform taxation gives jurisdictions an incentive to lower the tax rate in an attempt to attract mobile capital, restoring some of efficiency gains from diversification. Lee (2003a) argues that since jurisdictions tend to overtax land in the presence of absentee ownership while undertaxing mobile capital to attract it, uniform taxation can alleviate the inefficiency arising from the overtaxation of land and the undertaxation of capital. However, these papers do not address endogenization of landownership or absentee owner surcharge, the main focus of the present paper.

Another strand of literature has considered tax exporting. When a good produced in a jurisdiction is demanded by its residents and non-residents as well, the jurisdiction can export taxes to other jurisdictions by taxing the good (Arnott and Grieson, 1981; Wildasin, 1986, 1987). Braid (1993) extends the analysis by adding a spatial structure. This literature studies the same topic of shifting tax burdens to non-residents. However, the literature concerns the effects of tax exporting on the marginal cost of raising tax revenues. In particular, taxes will distort the demand for the good, resulting in inefficiency and increasing the cost of raising tax revenues. Land taxes, by contrast, do not affect the marginal cost of raising tax revenues.

The plan of the paper is as follows. The next section presents a simple model in an economy with multiple jurisdictions. Section 3 analyzes the efficiency of land taxation in the presence of absentee owners. Section 4 considers land taxation when a nondistortionary tax is available to finance the public good. Section 5 studies the effects of absentee owner surcharge. Section 6 endogenizes land ownership by allowing individuals to trade their land ownership in the asset market. Section 7 discusses the role of surcharges in determining the efficiency of land taxation when land ownership is endogenized. Section 8 studies absentee owner surcharge for a single jurisdiction, and the last section offers a conclusion.

2. Setup

The economy consists of two jurisdictions, denoted by subscript $i = 1, 2$.[6] Each jurisdiction has many identical residents, and the number of residents in each jurisdiction is normalized to unity. Jurisdiction i employs land m_i and other factors such as labor and capital to produce a single output that serves as a numeraire according to a linear homogeneous production function $f_i(m_i)$. As the focus is on land, other factors are suppressed in the production function. The output may be used as a private good or transformed into a public good. It is assumed that land can be owned by absentee owners while other factors are not. Other factors may be owned by absentee owners, but it suffices to assume absentee ownership of land only, given the topic of this paper. To simplify the analysis, all factors are assumed immobile throughout the paper. If some factor such as capital is assumed mobile, it has no effect on the result below on the inefficiency of land taxation qualitatively.[7]

The production function deserves more explanation. In some industries such as mining and agriculture, land is a main input, along with labor and capital, so the formulation of the production function above $f_i(m_i)$ is suitable. In other industries, land and structure together (called building) such as a factory plant is an input, and the production function may be formulated to include building as another input in addition to land, along with labor and capital. Alternatively, a jurisdiction may be assumed to have different production functions for different industries. However, it is the standard assumption that production of a jurisdiction is represented by one production function, and buildings are treated as land.[8] Nevertheless, even if a more general production function with land and buildings as separate inputs is considered, it does not alter the results in any important way. The reason is that the goal of this paper is to demonstrate that the taxation of a fixed factor, land or buildings or immobile capital, is inefficient when the factor is owned by absentee owners. The results thus depend on the presence of absentee owners, but not on which factor is owned by absentee owners, not on the shape of the production function or the number of production functions.

To model absentee ownership of land, let θ_{ij} denote the fraction of the land in jurisdiction j owned by the residents of jurisdiction $i, i, j = 1, 2$. It is assumed that ownership of factors is vested in the residents of the economy, and the ownership parameters θ's must

[6] The number of jurisdictions does not matter to the results qualitatively, as discussed below.

[7] Lee (2003b) and Braid (2005) study tax competition for mobile capital with absentee ownership of land.

[8] This way, the production function can incorporate residential buildings, namely houses, although the focus is on nonresidential land/properties. That is, treating a house as land in the production function, an owner of a house earns rents from the house (imputed rents for an owner-occupier and market rents for an absentee owner).

satisfy

$$0 \leq \theta_{ii} \leq 1;\ 0 \leq \theta_{ij} \leq 1;\ \theta_{ii} + \theta_{ji} = 1, i, j = 1, 2. \tag{1}$$

With absentee ownership of land in jurisdiction i, $\theta_{ji} > 0$ and $\theta_{ii} < 1$.

A resident of jurisdiction i has the utility function $U_i(x_i, z_i)$, where x_i and z_i are private good consumption and public good consumption, respectively. The utility function is assumed to satisfy the usual Inada conditions, $lim_{x\to 0} U_i^x(x_i, z_i) = \infty$ and $lim_{z\to 0} U_i^z(x_i, z_i) = \infty$, with superscripts in U_i^x and U_i^z denoting partial derivatives such as $U_i^x = \partial U_i / \partial x_i$. In addition, both x and z are assumed normal. Letting $MRS_i(x_i, z_i) \equiv U_i^z(x_i, z_i)/U_i^x(x_i, z_i)$ denote the marginal rate of substitution between the private and public goods, normality of x and z implies

$$MRS_i^x(x_i, z_i) \equiv \frac{\partial MRS_i(x_i, z_i)}{\partial x_i} > 0, \quad MRS_i^z(x_i, z_i) \equiv \frac{\partial MRS_i(x_i, z_i)}{\partial z_i} < 0. \tag{2}$$

Factor markets are competitive, and each factor is paid its marginal product, $m_i f_i'(m_i)$ for land and $f_i(m_i) - m_i f_i'(m_i)$ for other factors. The public good z_i is financed by imposing a unit tax on land in jurisdiction i, denoted τ_i. The cost of providing the public good z is assumed to be simply z in terms of the private good. The budget constraint for the government of jurisdiction i is then written as

$$z_i = \tau_i\, m_i, i = 1, 2. \tag{3}$$

Private good consumption of a resident of jurisdiction i consists of the incomes from factors net of taxes she owns, so that

$$x_i = f_i - m_i f_i' + \theta_{ii} m_i (f_i' - \tau_i) + \theta_{ij} m_j (f_j' - \tau_j), i, j = 1, 2, \tag{4}$$

where the argument of the production function, m_i and m_j, is suppressed for simplicity. In (4), $f_i - m_i f_i'$ represents other factor incomes, and the remaining terms show the factor incomes from the land in jurisdiction i and jurisdiction j she owns.

3. Efficiency of Land Taxation

The government of jurisdiction i makes a tax policy to maximize the utility of a resident of jurisdiction i, $U_i(x_i, z_i)$. Since x_i depends on τ_i and τ_j in (4), the tax rates of two jurisdictions are determined jointly and Nash equilibrium tax rates are considered. That is, the government of jurisdiction i selects its tax rate τ_i to maximize $U_i(x_i, z_i)$, taking τ_j as given, $i \neq j, i, j = 1, 2$. This Nash equilibrium approach is common to the analysis of jurisdictional interaction such

as tax competition, as will be discussed below.[9] Tax competition models focus on the taxation of capital that moves between jurisdictions. The main argument is that capital is taxed at a rate lower than the socially efficient level. By contrast, the mobility of capital is not the focus of the present paper. However, the present paper shares the basic setup with tax competition models in the sense that jurisdictions interact and the interaction is modelled in the same fashion, as discussed below.

The government of each jurisdiction of course takes land ownership as given, and let $(\theta^o_{ii}, \theta^o_{ij}, \theta^o_{ji}, \theta^o_{jj})$ denote initial (or endowed) land ownership.[10] The first-order condition (FOC) for an interior maximum of $U_i(x_i, z_i)$ with respect to τ_i reads as

$$\frac{dU_i}{d\tau_i} = U^z_i(x_i, z_i)m_i - U^x_i(x_i, z_i)\theta^o_{ii}m_i = 0 \implies MRS_i = \theta^o_{ii} \leq 1, i = 1, 2. \tag{5}$$

These two conditions for two jurisdictions in (5) determine the Nash equilibrium tax policies. The second-order condition is satisfied, as

$$\frac{d^2U_i(x_i, z_i)}{d\tau_i^2} = m_i[(U^{zz}_i - U^{xz}_i\theta^o_{ii}) - (U^{xz}_i - U^{xx}_i\theta^o_{ii})\theta^o_{ii}] < 0 \tag{6}$$

due to the normality of x and z in (2).

The condition (5) leads to the following result:

Proposition 1. *$MRS_i(x_i, z_i) = \theta^o_{ii} \leq 1$ (the land tax rate is too high relative to the efficient level.)*

As one unit of the private good x can be transformed into one unit of the public good z, the efficient land tax rate should result in $MRS_i(x_i, z_i) = 1$. However, $MRS_i = \theta^o_{ii} \leq 1$ in the proposition, and the land tax rate is too high and the public good is overprovided as long as there are absentee owners ($\theta^o_{ii} < 1$).

The result in the proposition stands in contrast with the standard result that land taxation does not distort the use of land and hence is efficient. The difference from the standard result stems from absentee ownership of land. The literature on land taxation, mentioned in the Introduction, has not considered absentee ownership. Other strands of local public economics literature such as tax competition models, mentioned above and discussed below, have rarely considered absentee ownership. They typically do not even explicitly model land in order to focus on mobile capital.

The intuition of the proposition is that in determining the land tax rate and hence the

[9] A large literature has studied tax competition, and for recent surveys, see, for example, Wilson and Wildasin (2004), Devereux and Maffini (2007), Baskaran and Lopes da Fonseca (2013), and Karmakar and Martinez-Vazquez (2014).

[10] Land ownership will be endogenized later.

public good level of a jurisdiction, the jurisdiction considers the benefit its residents enjoy and the taxes they pay. Since the land tax acts as a head tax, the public good in a jurisdiction would be efficiently provided if there were no absentee owners in the jurisdiction. With absentee owners, the cost of the public good in a jurisdiction is borne by its residents and absentee owners as well. An increase in τ_i by one unit thus increases the tax burden on the residents by $\theta^o_{ii} m_i$, but it increases the public good level by m_i. As a consequence, jurisdiction i has an incentive to provide the public good beyond the efficient level it would without absentee owners, leading to the overprovision of the public good.

The proposition can be interpreted from a different angle by relating it to tax competition models. When jurisdiction i sets its land tax rate τ_i, it considers the effect of the tax only on its residents. However, if it increases the tax rate τ_i, it also increases the tax burden on those absentee owners, the residents of jurisdiction j who own the fraction θ^o_{ji} of the land in jurisdiction i. Since jurisdiction i does not consider this external cost it imposes on absentee owners in jurisdiction j when setting its land tax rate τ_i, it sets the tax rate at a level higher than the socially efficient one that takes into account the external cost. That is, the socially efficient tax rate τ_i maximizes the social welfare,[11]

$$W \equiv U_i(x_i, z_i) + U_j(x_j, z_j),$$

and the FOC for a maximum of W with respect to τ_i includes the term $-U^x_j \theta^o_{ji} m_i < 0$, in addition to (5). This negative additional term implies that the equilibrium tax rate τ_i chosen by the government of jurisdiction i according to (5) is higher than the socially efficient level.

In tax competition models, the opposite result holds. In particular, a jurisdiction sets its capital tax rate at a level lower than the socially efficient one. The reason is that if a jurisdiction increases its capital tax rate, it moves productive capital to other jurisdictions and benefits them, but the jurisdiction does not consider this external benefit it confers on other jurisdictions. Thus, the capital tax rate set by the jurisdiction is lower than the level that considers the external benefits on other jurisdictions. Both inefficiency of land taxation in this paper and inefficiency of capital taxation in tax competition models arise from the externalities land taxation creates here and capital taxation creates in tax competition models. However, the sources of externalities differ, as absentee ownership is the source here while the mobility of capital is the source in tax competition models. Thus, inefficiency arises even in the absence of the mobility of factors although the mobility of factors is a common source of inefficiency in the literature.

[11]The tax rates that maximize the social welfare W are second-best efficient, as lump-sum taxes are not available.

The result that land taxation leads to the overprovision of the public good does not depend on the number of jurisdictions in the economy. In fact, as the number of jurisdictions increases, it tends to exacerbate the inefficiency associated with the overprovision of the public good. To see this in a simple manner, consider $n > 2$ symmetric jurisdictions. The residents of a jurisdiction then own $1/n$ of the land in all jurisdictions, and $\theta_{ii}^o = 1/n$. As the number of jurisdictions increases, this fraction becomes smaller. This means that the cost of the public good in jurisdiction i borne by the residents of jurisdiction i decreases, as the number of jurisdictions increases. As a result, jurisdiction i has a greater incentive to overprovide the public good.

The government of a jurisdiction is assumed to make the tax policy in the interest of its residents. While this assumption is standard in the literature, absentee owners in a jurisdiction may have some political power to influence the policies of the jurisdiction. For example, they may lobby in order to affect the policies of the jurisdiction.[12] The present paper does not model lobbying by absentee owners. Rather it simply points out that the government of a jurisdiction may consider the welfare of absentee owners in making its policies. Absentee owners in jurisdiction i may want to maximize the net return to land they own in jurisdiction i. The government of jurisdiction i then chooses τ_i to maximize a welfare function $Q_i = U_i(x_i, z_i) + \mu_i u_i(\theta_{ji} m_i(f_i^m - \tau_i))$ with μ_i denoting a weight given to the utilities of absentee owners, $u_i(.)$. Since $u_i(.)$ is decreasing in τ_i, the consideration of absentee owners tends to counteract the incentive of jurisdiction i to overtax land and hence overprovide the public good. The public good in a jurisdiction thus may be either underprovided or overprovided, depending on the magnitude of μ_i and on the shape of the utility functions. The point is that even in such a model with the welfare of absentee owners taken into account, land taxation in general would still result in an inefficient level of the public good.

4. Land Taxation with a Lump-Sum Tax

The model has assumed that only the land tax is available, but suppose that policymakers have both the land tax and a lump-sum tax at their disposal. The paper does not argue that lump-sum tax is available to policymakers in practice. Rather, the lump-sum tax here represents a non-distortionary tax other than the land tax, and the goal of this section is to show that the government of a jurisdiction still wishes to tax land and set the land tax rate at an inefficiently high level even in the presence of a non-distortionary tax such as the lump-sum tax here. For this reason, the lump-sum tax is considered in this section only.

[12] A body of research has studied lobbying, and lobbying models have been used to explain the formation of various policies (for instance, Grossman and Helpman, 1994, 1995).

With the lump-sum tax of jurisdiction i, L_i, the private good and the public good that a resident of jurisdiction i enjoys are written as

$$x_i = f_i - m_i f_i' + \theta_{ii}^o m_i (f_i' - \tau_i) + \theta_{ij}^o m_j (f_j' - \tau_j) - L_i, \quad z_i = \tau_i \, m_i + L_i, i, j = 1, 2. \tag{7}$$

The government of jurisdiction i now chooses (L_i, τ_i) to maximize $U_i(x_i, z_i)$, taking L_j and τ_j as given. The FOCs for an interior maximum of $U_i(x_i, z_i)$ are

$$\frac{dU_i(x_i, z_i)}{dL_i} = U_i^z - U_i^x = 0, \tag{8}$$

$$\frac{dU_i(x_i, z_i)}{d\tau_i} = U_i^z m_i - \theta_{ii}^o U_i^x m_i = 0. \tag{9}$$

As (8) and (9) both cannot hold, a corner solution occurs. Suppose first that (8) holds. Evaluation of (9) at $\tau_i = 0$ results in

$$\left.\frac{dU_i(x_i, z_i)}{d\tau_i}\right|_{(\tau_i=0)} = (U_i^z - U_i^x \theta_{ii}^o) m_i = U_i^x (1 - \theta_{ii}^o) m_i \geq 0, \tag{10}$$

where the equality uses (8). Thus, $\tau_i \geq 0$ and land is taxed even when the lump-sum tax is chosen optimally. Suppose alternatively that (9) holds. Evaluation of (8) at $L_i = 0$ results in

$$\left.\frac{dU_i(x_i, z_i)}{dL_i}\right|_{(L_i=0)} = U_i^z - U_i^x = U_i^x (\theta_{ii}^o - 1) \leq 0. \tag{11}$$

Thus, $L_i \leq 0$. Since the public good should be positive and $z = \tau_i m_i + L_i > 0$ due to the Inada condition, it must be that $\tau_i > 0$ and land is taxed, given $L_i \leq 0$. The inequalities in (10) and (11) are strict with absentee ownership or $\theta_{ii}^o < 1$, and these results can be stated as:

Proposition 2. *Even if a lump-sum tax is available, $\tau_i > 0$ and land is taxed when there are absentee owners.*

The result in the proposition stands in contrast with the known result that a lump-sum tax obviates the need for any distortionary tax.[13] The key to the proposition is that the lump-sum tax is inferior to the land tax with absentee owners from a jurisdiction's point of view. That is, a one-dollar increase in the tax revenues through the lump-sum tax in jurisdiction i increases the tax burden on the residents of jurisdiction i by one dollar. But, the same one-dollar increase in the tax revenues through the land tax increases the tax burden on the

[13]The only other exception to the known result appears that when wages are uncertain, a proportional wage tax is still used in the presence of lump-sum taxation (for example, Eaton and Rosen, 1980a, 1980b). The reason is that a proportional wage tax acts as insurance although it distorts the supply of labor. By contrast, lump-sum taxation does not serve as insurance, justifying the use of the distortionary wage tax with uncertainty. However, there is no uncertainty in the present model, yet lump-sum taxation does not obviate the need for distortionary land taxation.

residents by $\theta^o_{ii} < 1$ dollar. As a result, the government of jurisdiction i desires to use the land tax more than the lump-sum tax, and will set the land tax rate at $\tau_i = f_i'$, or a maximum possible level. At the same time, the government will set the lump-sum tax rate at $L_i < 0$ and transfer some of the land tax revenues to the residents. Thus, the government of jurisdiction i relies solely on the land tax to finance the public good.

However, perhaps more realistically, suppose that the lump-sum tax is constrained to be nonnegative, for example, because the land tax revenues are not sufficient to provide lump-sum transfers, or because there may be a political constraint on the maximum land tax rate. Then, it is clear that $L_i = 0$ or a minimum possible rate, as the government of jurisdiction i has the incentive to use the superior land tax more than the inferior lump-sum tax. As a consequence, land is taxed in equilibrium regardless of whether the lump-sum tax is constrained to be nonnegative or not.

5. Absentee Owner Surcharge

This section considers the effects of a land tax surcharge for absentee owners, mentioned in the Introduction. Under the surcharge policy, the government of jurisdiction i imposes a surcharge of s_i on per unit of land in jurisdiction i resident j owns, and the surcharge is assumed to be used to provide the public good z_i. With the surcharge, (s_i, s_j), private good consumption and public good consumption that a resident of jurisdiction i enjoys are modified as

$$x_i = f_i - m_i f_i' + \theta^o_{ii} m_i (f_i' - \tau_i) + \theta^o_{ij} m_j (f_j' - \tau_j - s_j), \quad z_i = \tau_i \, m_i + s_i \theta^o_{ji} m_i, i, j = 1, 2. \quad (12)$$

The government of jurisdiction i chooses (τ_i, s_i) to maximize $U_i(x_i, z_i)$, taking (τ_j, s_j) as given. The FOC with respect to τ_i is identical to (5). Since $U_i(x_i, z_i)$ increases in z_i, the government sets s_i at a politically feasible maximum level, denoted $\tilde{s}_i$. Although the choice of the surcharge s_i results in a corner solution $\tilde{s}_i$, it has no effect on the subsequent analysis, as will be clear.

The question concerns the efficiency of the surcharge (that is, the effect of the surcharge on the social welfare $W = U_1(x_1, z_1) + U_2(x_2, z_2)$). The effect, evaluated at (τ_i, s_i) chosen above, reads as

$$\frac{dW}{ds_i} = U_i^z \theta^o_{ji} m_i - U_j^x \theta^o_{ji} m_i = (U_i^z - U_j^x) \theta^o_{ji} m_i, i, j = 1, 2. \quad (13)$$

Since τ_i satisfies (5), $dW/ds_i < 0$ at least for one i. Formally, suppose that $dW/ds_1 = (U_1^z - U_2^x)\theta^o_{21} m_1 > 0$ and hence

$$U_2^x < U_1^z = \theta^o_{11} U_1^x. \quad (14)$$

The last equality uses (5). The effect of s_2 on the social welfare is

$$\begin{aligned}\frac{dW}{ds_2} &= (U_2^z - U_1^x)\theta_{12}^o m_2 \\ &= (\theta_{22}^o U_2^x - U_1^x)\theta_{12}^o m_2 \\ &< (\theta_{22}^o \theta_{11}^o U_1^x - U_1^x)\theta_{12}^o m_2 \leq 0. \end{aligned} \tag{15}$$

The second equality comes from (5), and the next inequality uses (14). In addition, with symmetric jurisdictions ($U_i(x,z) = U_j(x,z) = U(x,z), f_i = f_j = f, m_i = m_j = m, \theta_{ij}^o = \theta_{ji}^0 = \theta^o$), (13) becomes

$$\begin{aligned}\frac{dW}{ds_i} &= U_i^z \theta_{ji}^o m_i - U_j^x \theta_{ji}^o m_i = (U^z - U^x)\theta^o m \\ &= ((1-\theta^o)U^x - U^x)\theta^o m \leq 0, i = 1, 2. \end{aligned} \tag{16}$$

Observe that the welfare effects of the surcharge s_i above do not depend on the magnitude of s_i, so the effects hold true for $\tilde{s}_i$ or any s_i.

These results are summarized as:

Proposition 3. *(i) $dW/ds_i < 0$ for $i = 1$ or/and $i = 2$ (a surcharge of at least one jurisdiction decreases the social welfare.)*
(ii) With symmetric jurisdictions, a surcharge decreases the social welfare.

The welfare effects of a surcharge can be seen from a different perspective. As both jurisdictions impose a surcharge in equilibrium ($\tilde{s}_1 > 0$ and $\tilde{s}_2 > 0$), consider the effects of a change in both s_1 and s_2 on $U_1(x_1, z_1), U_2(x_2, z_2)$ and W. The effects of an increase in s_1 and s_2 by the same amount ds on $U_1(x_1, z_1), U_2(x_2, z_2)$ and W are, respectively,

$$dU_1(x_1, z_1) = \theta_{21}^o m_1 U_1^z ds_1 - \theta_{12}^o m_2 U_1^x ds_2 = (\theta_{21}^o m_1 U_1^z - \theta_{12}^o m_2 U_1^x)ds, \tag{17}$$

$$dU_2(x_2, z_2) = \theta_{12}^o m_2 U_2^z ds_2 - \theta_{21}^o m_1 U_2^x ds_1 = (\theta_{12}^o m_2 U_2^z - \theta_{21}^o m_1 U_2^x)ds, \tag{18}$$

$$dW = dU_1(x_1, z_1) + dU_2(x_2, z_2) = [\theta_{21}^o m_1 (U_1^z - U_2^x) + \theta_{12}^o m_2 (U_2^z - U_1^x)]ds. \tag{19}$$

Using the same steps that established (i) of Proposition 3, it is easy to check that either $dU_1 < 0$ or/and $dU_2 < 0$, so an increase the surcharge of both jurisdictions makes at least one jurisdiction worse off. That is, the FOC (5) implies that if $dU_1 > 0$, then $dU_2 < 0$. In an analogous manner, with symmetric jurisdictions $dW < 0$, and an increase the surcharge of both jurisdictions decreases the social welfare. Since the welfare effects of the surcharges again do not depend on the magnitude of the surcharges, a decrease in the surcharge (starting from any level) improves the social welfare. Thus, it is efficient to not impose a surcharge.

It is worth considering social-welfare maximization in the presence of surcharges. Suppose that a social planner that cares about the social welfare W has both the land taxes and the surcharges at his disposal. The FOCs for a maximum of W with respect to τ_i and s_i are

$$\frac{dW}{d\tau_i} = U_i^z m_i - U_i^x \theta_{ii}^o m_i - U_j^x \theta_{ji}^o m_i = 0, i = 1, 2, \tag{20}$$

$$\frac{dW}{ds_i} = U_i^z \theta_{ji}^o m_i - U_j^x \theta_{ji}^o m_i = 0 \implies U_i^z = U_j^x, i = 1, 2. \tag{21}$$

Substitution of (21) into (20) gives

$$\begin{aligned} U_j^x m_i - U_i^x \theta_{ii}^o m_i - U_j^x \theta_{ji}^o m_i &= U_j^x (1 - \theta_{ji}^o) m_i - U_i^x \theta_{ii}^o m_i \\ &= (U_j^x - U_i^x) \theta_{ii}^o m_i = 0 \implies U_j^x = U_i^x, i = 1, 2. \end{aligned} \tag{22}$$

It follows from (21) and (22) that $U_1^z = U_1^x = U_2^z = U_2^x$. As a result, the surcharges enable the planner to achieve the first-best efficient outcome. That is, if the planner chooses (x_1, z_1, x_2, z_2) to maximize $W = U_1(x_1, z_1) + U_2(x_2, z_2)$ subject to $x_1 + z_1 + x_2 + z_2 \leq f_1 + f_2$, the solutions satisfy $U_1^z = U_1^x = U_2^z = U_2^x$. Intuitively, surcharges serve as lump-sum transfers between jurisdictions, resulting in the first-best efficient outcome. This discussion shows that surcharges are beneficial if chosen appropriately, and the inefficiency of surcharges in equilibrium in Proposition 3 stems from jurisdictions' behavior not from the surcharges per se.

6. Absentee Owner Surcharge and Endogenous Land Ownership

The previous sections have shown that the land tax or the absentee owner surcharge results in an inefficient allocation of resources as long as there are absentee owners. The question concerns if rational individuals choose their land ownership, by trading land ownership in the asset market, that would lead to an efficient allocation, namely $\theta_{ii} = \theta_{jj} = 1$. To answer the question, this section endogenizes land ownership, and the ownership parameters θ's are now chosen to maximize the utilities of the residents in the asset market. A simple model of asset market with a bond and land is considered. The price of the bond is unity, and the bond pays a fixed gross return r. An individual lives for two periods. In the first period, the governments of jurisdictions set the land tax rates and the surcharges, and individuals purchase bonds and land from their endowments. In the second period, they enjoy the returns from the assets, bonds and land, they purchased and the public good provided by the government.[14]

Letting b_i denote bond holdings by a resident of jurisdiction i, she chooses $(b_i, \theta_{ii}, \theta_{ij})$ to

[14]The approach here follows the standard capital asset pricing models (for example, Fama and Miller, 1972), except that the public good is included.

maximize the modified utility[15]

$$W_i \equiv V_i(c_i) + U_i(x_i, z_i) \tag{23}$$

subject to

$$\begin{aligned} c_i &= e_i^o - b_i - \theta_{ii} p_i m_i - \theta_{ij} p_j m_j, \\ e_i^o &\equiv y_i^o + b_i^o + \theta_{ii}^o p_i m_i + \theta_{ij}^o p_j m_j, \\ x_i &= r b_i + f_i - m_i f_i' + \theta_{ii} m_i (f_i' - \tau_i) + \theta_{ij} m_j (f_j' - \tau_j - s_j), \\ z_i &= \tau_i m_i + s_i \theta_{ji} m_i, i, j = 1, 2. \end{aligned} \tag{24}$$

c_i is first-period consumption of the resident, her endowments e_i^o minus the cost of purchasing assets with p_i denoting the price of land in jurisdiction i. Her endowments consist of endowed income y_i^o and endowed assets $(b_i^o, \theta_{ii}^o m_i, \theta_{ij}^o m_j)$ with 'superscripts o' indicating endowment. The second-period utility $U_i(x_i, z_i)$ is the same as that in the previous sections, except that the returns to bonds, rb_i, are included. The first-period utility $V_i(c_i)$ is introduced to model asset transactions.

The FOC for an interior maximum of W_i with respect to b_i is

$$r U_i^x(x_i, z_i) = V'(c_i). \tag{25}$$

Using the condition (25), the FOCs with respect to θ_{ii} and θ_{ij} are

$$\frac{dW_i}{d\theta_{ii}} = U_i^x[(f_i' - \tau_i) m_i - r p_i m_i] = 0, \tag{26}$$

$$\frac{dW_i}{d\theta_{ij}} = U_i^x[(f_j' - \tau_j - s_j) m_j - r p_j m_j] = 0. \tag{27}$$

As (25) holds for a resident of jurisdiction j, the FOCs for an interior maximum of W_j with respect to θ_{ji} and θ_{jj} are[16]

$$\frac{dW_j(x_j, z_j)}{d\theta_{ji}} = U_j^x[(f_i' - \tau_i - s_i) m_i - r p_i m_i] = 0 \tag{28}$$

$$\frac{dW_j(x_j, z_j)}{d\theta_{jj}} = U_j^x[(f_j' - \tau_j) m_j - r p_j m_j] = 0. \tag{29}$$

It is immediate from (26) and (28) that both equalities cannot hold, so it cannot be both $\theta_{ii}^* \in (0, 1)$ and $\theta_{ji}^* \in (0, 1)$ with 'asterisk' denoting the utility-maximizing solutions. Since

[15]The second-period utility is not discounted for simplicity, but it has no effect on the results below.

[16]As (26) and (27) hold for $i, j = 1, 2$, (26) and (27) can be used to explain the two analogous conditions for a resident of jurisdiction j. However, to avoid any possible confusion, the conditions for the resident of jurisdiction j are explicitly written below.

$\theta_{ii} + \theta_{ji} = 1$, only corner solutions are possible. To simplify the exposition, the maximization problem above did not consider the inequality constraints, $\theta_{ii} \in [0, 1]$ and $\theta_{ji} \in [0, 1]$. However, with the constraints, it is straightforward to show $\theta^*_{ii} = 1$ and $\theta^*_{ji} = 0$, as in the Appendix. In addition, (26) holds as the equality and the land price p^*_i satisfies $(f'_i - \tau_i)/p^*_i = r$, an arbitrage-free condition under which the return to land per unit price equals the return to bonds per unit price, r. The same is true for a resident of jurisdiction j. These results can be stated as:

Proposition 4. *When land ownership is chosen,* $\theta^*_{ii} = 1, \theta^*_{ji} = 0$, *and* $p^*_i = (f'_i - \tau_i)/r$, $i, j = 1, 2$ *(there is no absentee ownership, and the land price equates the return to land with the return to bond).*

The result has a simple intuition. Since the surcharge s_i decreases the return to the land in jurisdiction i when a resident of jurisdiction j owns, the surcharge gives the resident of jurisdiction j an incentive to own land in jurisdiction j. In particular, the return to the land in jurisdiction i for the resident of jurisdiction j per unit price, $(f'_i - \tau_i - s_i)/p^*_i = r(f'_i - \tau_i - s_i)/(f'_i - \tau_i)$, is lower than the return to the land in jurisdiction j per unit price, $(f'_j - \tau_j)/p^*_j = r$. The resident of jurisdiction j thus does not own land in jurisdiction i and $\theta^*_{ji} = 0$.

Without the surcharge, a system of the four conditions, (26) through (29), is underdetermined, and land ownership is indeterminate even if individuals choose their land ownership in the land market. This occurs because an individual is indifferent between owning land in jurisdiction i and owning land in jurisdiction j due to the equilibrium land prices that reflect the arbitrage-free condition. Endogenization of land ownership alone thus does not necessarily eliminate absentee ownership. Rather, it is the combination of the surcharge and the choice of land ownership that eliminates absentee ownership in the proposition. As no absentee owners exist and the surcharge is imposed only on absentee owners, the surcharge has no effect once land ownership is endogenized. This does not say that the surcharge results in an efficient allocation, because the land taxes turn out to be still in general inefficient, as discussed below.

The proposition shows that there will be no absentee ownership with the surcharge and land ownership endogenously determined. This result is a logical outcome of the model, but there may be other reasons for absentee ownership that the model does not consider. Land owners sometimes have emotional attachment to a particular parcel of land (Needham and de Kam, 2004; Hong 2007), making it difficult to trade land ownership in the land market. This may occur, for instance, when a land owner and her family or relatives or friends have been in a particular place for a long time. The surcharge thus in general tends to reduce absentee

ownership, but not necessarily eliminate it, when land ownership is endogenously determined.

Turning to the tax policies, the government of jurisdiction i chooses (τ_i, s_i), taking (τ_j, s_j) as given, to maximize W_i subject to (24) with $\theta^*_{ii} = 1$ and $\theta^*_{ji} = 0$. The FOC with respect to τ_i reads as[17]

$$\begin{aligned}\frac{dW_i}{d\tau_i} &= \left[U_i^x r - V_i'\right] \frac{\partial b_i^*}{\partial \tau_i} + V_i'(\theta^o_{ii} - 1) m_i \frac{\partial p_i^*}{\partial \tau_i} \\ &\quad + U_i^z m_i - U_i^x m_i \\ &= -V_i'(\theta^o_{ii} - 1) m_i \frac{1}{r} + U_i^z m_i - U_i^x m_i \\ &= -U_i^x(\theta^o_{ii} - 1) m_i + U_i^z m_i - U_i^x m_i \\ &= U_i^z m_i - \theta^o_{ii} U_i^x m_i = 0. \end{aligned} \tag{30}$$

The first equality uses the FOC (25), and $p_i^* = (f_i' - \tau_i)/r$, so $\partial p_i^*/\partial \tau_i = -1/r$. The next one uses again the FOC (25). (30) is identical to (5), and the following result can be stated:

Proposition 5. *When land ownership and the taxes are chosen,* $MRS_i(x_i, z_i) = \theta^o_{ii} \leq 1$ *(the land tax rate* τ_i *is too high relative to the efficient level).*

The proposition shows that land taxation is still inefficient even though individuals choose land ownership and no absentee owners exist. The choice of land ownership by individuals thus has no effect on the land tax rate chosen by the government that maximizes the utility of its residents. To see the intuition, note that an increase in τ_i by one unit decreases the price of land in jurisdiction i by $1/r$ (that is, $\partial p_i^*/\partial \tau_i = -1/r$) and decreases the marginal utility cost of purchasing land in jurisdiction i to a resident of jurisdiction i in the first period by $V_i' \theta^*_{ii} m_i / r = V_i' m_i / r$. The same increase in the tax rate τ_i decreases the net return to the land by one unit and hence decreases the marginal utility benefit or return from the land in the second period by $U_i^x \theta^*_{ii} m_i = U_i^x m_i$. These two quantities, $V_i' m_i / r$ and $U_i^x m_i$, cancel out in the asset market equilibrium due to (25) and $p_i^* = (f_i' - \tau_i^*)/r$.

The endowed or initial land ownership $(\theta^o_{ii}, \theta^o_{ij})$ in the first-period utility, however, still matters in determining the tax rate, and the government that cares about the utility of its resident has the same incentive to exploit the endowed absentee ownership, as it did in Section 3. That is, the value of land endowment held by the resident of jurisdiction i depends on the land price $p_i^* = (f_i' - \tau_i^*)/r$, which in turn depends on the tax rate τ_i^*. Thus, an increase in the land tax rate τ_i^* by one unit decreases the land price by $1/r$ and hence the value of endowment

[17] The choice variables, $(b_i^*, \theta^*_{ii}, \theta^*_{ij})$, are functions of the taxes $(\tau_i, s_i, \tau_j, s_j)$, but the effects of the taxes on those choice variables can be ignored due to envelop results. However, the effect of the taxes on b_i^*, namely $\partial b_i^*/\partial \tau_i$, is included in the FOC (30) in order to compare the FOC (30) to another FOC for the surcharge below.

by $\theta^o_{ii} m_i/r$, decreasing her first-period utility by $V_i' \theta^o_{ii} m_i/r = \theta^o_{ii} U^x_i m_i$. The increase in the land tax rate by one unit, however, increases the public good by m_i, increasing her utility by $U^z_i m_i$. Since the land tax rate balances the decrease in her utility from the land tax and the increase in her utility from the public good, it satisfies the FOC (30). The government thus sets the land tax rate at a level higher than the socially efficient level, as in Section 3.

As for the surcharge s_i, it affects only b^*_i, as the surcharge is relevant only to absentee owners and no absentee owner exists in equilibrium. However, even the effect on b^*_i vanishes due to the envelope result. That is, $dW_i/ds_i = [U^x_i r - V_i'] \frac{\partial b^*_i}{\partial s_i} = 0$ for all s_i by (25). The surcharge is thus indeterminate. There are two differences from the land tax rate τ^*_i that explain why the surcharges are indeterminate. First, the surcharges have no effect on the value of land endowment held by the resident of jurisdiction i and hence on her first-period utility, because the value of land endowment depends on the equilibrium land price and the land price $p^*_i = (f_i' - \tau^*_i)/r$ is independent of s_i. Second, the surcharge raises the tax revenues from absentee owners, but no absentee owners exist in equilibrium, so the surcharge revenues equal zero $s^*_i \theta^*_{ji} m_i = 0$ and the surcharge has no effect on the public good z_i and hence on the resident's second-period utility, either. As a result, any change in the surcharge has no consequence, and the surcharge is indeterminate.

Suppose that a resident of jurisdiction i trades her land ownership in the asset market but still holds land in jurisdiction j for the reason mentioned above such as attachment to a particular parcel of land. Assume $\theta^*_{ii} \in (0,1)$ and $\theta^*_{ji} \in (0,1)$. The FOC for the land tax rate in (30) is modified as

$$\begin{aligned}
\frac{dW_i}{d\tau_i} &= [U^x_i r - V_i'] \frac{\partial b^*_i}{\partial \tau_i} + V_i'(\theta^o_{ii} - \theta^*_{ii}) m_i \frac{\partial p^*_i}{\partial \tau_i} \\
&\quad + U^z_i m_i - \theta^*_{ii} U^x_i m_i \\
&= -V_i'(\theta^o_{ii} - \theta^*_{ii}) m_i \frac{1}{r} + U^z_i m_i - \theta^*_{ii} U^x_i m_i \\
&= -U^x_i(\theta^o_{ii} - \theta^*_{ii}) m_i + U^z_i m_i - \theta^*_{ii} U^x_i m_i \\
&= U^z_i m_i - \theta^o_{ii} U^x_i m_i = 0. \qquad (31)
\end{aligned}$$

The only difference from (30) is that the term $(\theta^o_{ii} - 1) m_i$ in the first-period utility is replaced by $(\theta^o_{ii} - \theta^*_{ii}) m_i$ and the term $U^x_i m_i$ in the second-period utility is replaced by $\theta^*_{ii} U^x_i m_i$. Since the two differences cancel out in the asset market equilibrium due to (25), (31) is identical to (30). Thus, the proposition that land taxation results in too high a tax rate does not depend on the result that the surcharge and endogenous land ownership eliminate absentee ownership. Rather, the inefficiency of land taxation stems from endowed absentee ownership. Intuitively,

the utility cost of purchasing land in the first period cancels out the return to the land in the second period utility in the asset market equilibrium due to the arbitrage-free condition, regardless of how much of the land in jurisdiction i a resident of jurisdiction i purchases, $\theta^*_{ii} = 1$ or $\theta^*_{ii} \in (0, 1)$. The land tax rate, however, again still depends on endowed land ownership represented by the parameter θ^o_{ii}.

Turning to the surcharge, s_i is chosen to satisfy the FOC, $dW_i/ds_i = [U^x_i r - V'_i] \frac{\partial b^*_i}{\partial s_i} + U^z_i \theta^*_{ji} m_i = U^z_i \theta^*_{ji} m_i > 0$ for all s_i by (25). The surcharge is thus set at a maximum possible level. Intuitively, as noted earlier, the surcharge s_i does not cost the resident of jurisdiction i in her first-period utility, but increases the revenues from absentee owners and hence increases the public good in her second-period utility. The government of jurisdiction i thus desires to impose a surcharge as much as possible. However, such a surcharge is inefficient, as noted earlier.

7. Surcharges and Efficiency

The previous section shows that surcharges, with endogenization of land ownership, eliminate absentee ownership but not necessarily the inefficiency of land taxation. However, the result that surcharges eliminate absentee ownership has an implication for the efficiency of land taxation in two different ways not considered in the previous section.

First, the analysis in Section 6 assumed that endowed land ownership $(\theta^o_{ii}, \theta^o_{ij}, \theta^o_{ji}, \theta^o_{jj})$ is fixed at an arbitrary level. However, endowed land ownership might have been chosen. Stated differently, residents of a jurisdiction in the model are assumed to be rational enough to take into account the effects of taxes and surcharges on the land prices when they choose land ownership in the asset market. Extending the assumption that residents are rational, they would then choose endowed land ownership $\theta^o_{ii} = 1$ and $\theta^o_{ij} = 0$, expecting that such ownership will be the efficient one that maximizes their utilities. For instance, adding period 0 to the timing in Section 6, residents of a jurisdiction may choose endowed land ownership $\theta^o_{ii} = 1$ and $\theta^o_{ij} = 0$, so that land taxes become efficient.

Second, starting from the current equilibrium in the previous section, $(\theta^*_{ii} = 1, \theta^*_{ij} = 0, \tau^*_i, s^*_i), i, j = 1, 2$, suppose that economic conditions change unexpectedly and such unexpected changes could not be incorporated into the current equilibrium above. In response to such changes, the governments of jurisdictions would change their taxes and and the residents of jurisdictions trade their assets, bonds and land ownership. For instance, suppose that the production function changes from $f_i(m_i)$ to $\pi_i f_i(m_i)$ with $\pi_i > 1$ or < 1, depending on the nature of the changes. That is, land becomes more productive or less productive as technologies change. As the governments of jurisdictions and the residents of jurisdictions re-optimize,

a new equilibrium $(\theta_{ii}^{**}, \theta_{ij}^{**}, \tau_i^{**}, s_i^{**})$ may emerge.[18] The new land tax rate τ_i^{**} then satisfies the FOC (30) with θ_{ii}^o replaced by $\theta_{ii}^* = 1$, because current land ownership $(\theta_{ii}^* = 1, \theta_{ij}^* = 0)$ would become endowed land ownership when the new equilibrium is determined in response to the changes in economic conditions. The new land tax becomes then efficient. As a result, surcharges and endogenization of land ownership tend to make the land tax efficient in the long run by reducing absentee ownership to the extent that economic conditions change over time and the governments and the residents change the taxes and their assets accordingly.

8. A Single Jurisdiction

The efficiency of land taxation has been analyzed in a model with multiple jurisdictions in a federation, and the analysis is certainly relevant to many settings. For instance, Queensland and Victoria in Australia appear to have imposed surcharges, under the name of 'absentee owners surcharge' or 'land tax surcharge,' in the same fashion as the one in this paper.[19] However, absentee owners from many jurisdictions or even foreign countries may be interested in land of a jurisdiction. For instance, many non-residents from many different jurisdictions and countries attempt to purchase properties in New York or Vancouver. This section considers this second setting. The key difference from the previous sections lies in the absence of strategic interactions between jurisdictions, as one jurisdiction such as New York or Vancouver does not seem to compete with particular jurisdictions or countries in setting its tax.

The surcharges of jurisdictions were indeterminate in the previous sections, but it appears that policymakers determine surcharges in a certain fashion. The surcharges may depend on economic factors such as the desire to raise tax revenues from non-residents and non-economic factors such as residents' attitude toward non-residents. This interesting topic is beyond the scope of this paper, and this section attempts to illustrate the determination of the surcharge in the simplest manner rather than to provide a full-fledged analysis. Consider a jurisdiction that attracts potential non-resident land (property) buyers. Let $\theta(p, s + \tau, \phi)$ denote the demand for land in the jurisdiction by those non-residents or equivalently denote the number of non-resident buyers, where p is the price of land in the jurisdiction that non-residents pay and ϕ a parameter that measures the attractiveness of the jurisdiction to non-residents including economic and non-economic factors. The demand function is assumed to decrease in the first two arguments and increase in the last one.

[18] According to the analysis in the previous section, it is clear that $\theta_{ii}^{**} = 1, \theta_{ij}^{**} = 0$ and $s_i^{**} =$ indeterminate.

[19] Foreign Investor Surcharges Illustrate Lack of Harmonisation in State Tax Policy. Australian Financial Review, August 2, 2017, available at http://www.klgates.com/foreign-investor-surcharges-illustrate-lack-of-harmonisation-in-state-tax-policy-08-02-2017/ [accessed on September 20, 2017].

The residents who sell their land to non-residents are assumed to purchase bonds using the proceeds from the sale of land and to earn the returns pr from the bonds. The residents would accept the price $p = (f' - \tau)/r$, making them indifferent between selling their land and not selling. Private good consumption and public good consumption of a resident then become

$$\begin{aligned} x &= f - mf' + (1 - \theta(.))(f' - \tau)m + \theta(.)prm \\ &= f - mf' + (1 - \theta(.))(f' - \tau)m + \theta(.)(f' - \tau)m \\ &= f - mf' + (f' - \tau)m = f - \tau m, \\ z &= \tau m + s\theta(.)m, \end{aligned} \tag{32}$$

where $\theta(.) = \theta((f' - \tau)/r, s + \tau, \phi)$. The analysis concerns the determination of the surcharge s, as a jurisdiction like New York or Vancouver does not change the land tax when it imposes a surcharge. The government of the jurisdiction chooses s to maximize $U(x, z)$, and the FOC reads as

$$\frac{dU}{ds} = U^z[\theta(.) + s\frac{\partial\theta(.)}{\partial k}] = 0, \tag{33}$$

where $k \equiv s + \tau$. Since $\partial\theta(.)/\partial k < 0$, the FOC determines the surcharge s. The determination of the surcharge resembles monopoly pricing, except that the demand depends on the taxes, the sum of the land tax and the surcharge. Intuitively, the surcharge has no effect on private good consumption x, and the government simply wants to maximize the public good z or the tax revenues from the surcharge. The government problem is thus qualitatively the same as the monopolist's revenue maximization problem.

The surcharge depends on the parameters, τ and ϕ, but the effects of the parameters on the surcharges cannot be analyzed in general and an example is considered: $\theta(.) = [\phi - \alpha(s + \tau) - \beta((f' - \tau)/r)]^\gamma, \alpha > 0, \beta > 0$ and $\gamma > 0$. Simple calculation can show that the FOC (33) becomes

$$[\phi - \alpha(s + \tau) - \beta(\frac{f' - \tau}{r})] - s\alpha\gamma = 0 \implies s^* = \frac{\phi - \alpha\tau - \beta(f' - \tau)/r}{\alpha(1 + \gamma)}.$$

The surcharge thus increases in the attractiveness of the jurisdiction ϕ and decreases (increases) in the land tax τ if $\alpha > (<)\ \beta/r$. The effect of ϕ is intuitive. The reason for the ambiguous effect of the land tax rate τ on the surcharge is that an increase in the land tax rate decreases the demand θ due to a higher tax burden $s + \tau$ but increases it due to the lower price of the land $p = (f' - \tau)/r$. Thus, the surcharge chosen by the jurisdiction depends on the land tax rate and the shape of the demand function θ.

9. Conclusion

The paper has studied the efficiency of land taxation in an environment where the land in a jurisdiction is owned by the residents of the jurisdiction and absentee owners as well. As jurisdictions attempt to exploit absentee owners of land, land is overtaxed in equilibrium, resulting in the overprovision of the public good. Thus, although land taxation does not distort the use of land, as in standard models of land taxation, it distorts the allocation of resources between the private and public goods.

The result that land taxation is inefficient when there is absentee ownership of land leads to the question of whether rational individuals would choose to own only domestic land by trading their ownership shares of land in the asset market. The analysis shows that the trading of ownership shares does not result in pure domestic ownership, because the net return to land per unit price of land is equalized across jurisdictions in the asset market equilibrium, and individuals are indifferent to ownership shares. The analysis also shows that if the governments of jurisdictions impose absentee owner surcharges that make absentee ownership less desirable, such surcharges eliminate absentee ownership but land taxation may still remain inefficient due to endowed absentee ownership. However, the elimination of absentee ownership makes land taxation more efficient in the long run.

It appears that absentee ownership of land has received little attention from economists. However, as the present paper shows, absentee ownership seems to play an important role in determining the efficiency of various taxes in a federal system. Given that economies are increasingly more integrated, greater absentee ownership of land is expected. Accordingly, more research on the role of absentee ownership in state and local public economics seems warranted.

Appendix

proof of $\theta^*_{ii} = 1$ and $\theta^*_{ji} = 0$ in Proposition 4

The inequality constraints for a resident of jurisdiction i are $\theta_{ii} \in [0,1]$ and $\theta_{ij} \in [0,1]$, so the maximization problem in (23) and (24) becomes

$$V_i(c_i) + U_i(x_i, z_i) + \gamma_{ii}\theta_{ii} + \delta_{ii}(1-\theta_{ii}) + \gamma_{ij}\theta_{ij} + \delta_{ij}(1-\theta_{ij}). \tag{34}$$

The constraints in (24) are not explicitly added to avoid cluttering up notations. γ_{ii} is the nonnegative multiplier associated with the constraint $\theta_{ii} \geq 0$, and δ_{ii} is the nonnegative multiplier associated with the constraint $\theta_{ii} \leq 1$, and similarly for γ_{ij} and δ_{ij}. The FOCs with respect to θ_{ii} and θ_{ij} are

$$\frac{dW_i}{d\theta_{ii}} = U_i^x[(f_i' - \tau_i)m_i - rp_i m_i] + \gamma_{ii} - \delta_{ii} = 0, \tag{35}$$

$$\frac{dW_i}{d\theta_{ij}} = U_i^x[(f_j' - \tau_j - \tilde{s}_j)m_j - rp_j m_j] + \gamma_{ij} - \delta_{ij} = 0, \tag{36}$$

and the complementary slackness conditions are

$$\gamma_{ii}\theta_{ii} = 0, \;\; \delta_{ii}(1-\theta_{ii}) = 0, \;\; \gamma_{ij}\theta_{ij} = 0, \;\; \delta_{ij}(1-\theta_{ij}) = 0. \tag{37}$$

For a resident of jurisdiction j, the maximization problem becomes

$$V_j(c_j) + U_j(x_j, z_j) + \gamma_{ji}\theta_{ji} + \delta_{ji}(1-\theta_{ji}) + \gamma_{jj}\theta_{jj} + \delta_{jj}(1-\theta_{jj}), \tag{38}$$

and the FOCs and the complementary slackness conditions are

$$\frac{dW_j(x_j, z_j)}{d\theta_{ji}} = U_j^x[(f_i' - \tau_i - \tilde{s}_i)m_i - rp_i m_i] + \gamma_{ji} - \delta_{ji} = 0 \tag{39}$$

$$\frac{dW_j(x_j, z_j)}{d\theta_{jj}} = U_j^x[(f_j' - \tau_j)m_j - rp_j m_j] + \gamma_{jj} - \delta_{jj} = 0, \tag{40}$$

$$\gamma_{ji}\theta_{ji} = 0, \;\; \delta_{ji}(1-\theta_{ji}) = 0, \;\; \gamma_{jj}\theta_{jj} = 0, \;\; \delta_{jj}(1-\theta_{jj}) = 0. \tag{41}$$

To show that $\theta^*_{ii} = 1$. Suppose to the contrary that $\theta_{ii} < 1$. Then, $\delta_{ii} = 0$ by (37). Since $\theta_{ii} + \theta_{ji} = 1$, $\theta_{ji} > 0$ and hence $\gamma_{ji} = 0$ by (41). Since $\gamma_{ii} \geq 0$, (35) with $\delta_{ii} = 0$ implies $f_i' - \tau_i \leq rp_i$. Since $\delta_{ji} \geq 0$, (39) with $\gamma_{ji} = 0$ implies $f_i' - \tau_i - \tilde{s}_i \geq rp_i$, so $f_i' - \tau_i > rp_i$, a contradiction to the earlier inequality $f_i' - \tau_i \leq rp_i$. Thus, $\theta^*_{ii} = 1$, and hence $\theta^*_{ji} = 0$.

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