Land and Property Taxes

Ram Singh

Lecture 2

Stamp Duty: Tax Evasion and Remedy I

Suppose

- a buyer has already engaged in a property transaction at price p^*.
- A stamp duty tax needs to be paid on the “reported price" p.
- t^S denote the stamp duty tax/rate
- the circle rate c.
- $\pi(.)$ is the probability of being investigated by the tax department and getting caught if and only if he under-reports
- F is the fine

Stamp Duty: Tax Evasion and Remedy II

The buyer solves the following maximisation problem:

$$\max_{p} \quad \{t^s p^* - t^s \max(p, c) - \pi(p)F\}$$

Assume:

$$\pi'(p) < 0, \quad \pi''(p) > 0, \quad \pi(0) = 1, \quad \pi(p^*) = 0, \quad F > 0 \tag{0.1}$$

$$-t^s - \pi'(c)F > 0 \tag{0.2}$$

The buyer compares the benefits of tax evasion against the costs. That is, $t^s(p^* - p)$ against the costs $\pi(p)F$
The solution to to this maximisation satisfies the following FOC:

$$-t^s = \pi'(p)F \tag{0.3}$$

Property Tax I

Property Tax

- Annual tax on Annual Property Value (APV).
- In Delhi the unit area method is used to calculate the annual property value
  - is calculated by multiplying unit area value assigned to the colony/locality by the covered area of the property
- depends on factors such as age, structure of the property and nature of use.

Let

- L be the land area
- Property value be $V = pK^{\alpha}L^{1-\alpha}$, where K is the amount of capital investment.

Property Tax II

- $p = 1$. So, value of property is $V = K^{\alpha}L^{1-\alpha}$
- t^p be the property tax
- r be the cost of capital
- r be the same for all types of properties

In the absence of property tax, the OP of the landowner :

$$\max_{K} \quad K^{\alpha}L^{1-\alpha} - rK$$

The profit maximizing investment solves :

$$K^* = \left(\frac{\alpha}{r}\right)^{\frac{1}{1-\alpha}} L$$

Property Tax III

In the presence of property tax, the OP of the landowner :

$$\max_{K} \quad (1 - t^p) K^\alpha L^{1-\alpha} - rK$$

The profit maximizing investment solves :

$$K^{**} = \left(\frac{\alpha(1 - t^p)}{r}\right)^{\frac{1}{1-\alpha}} L$$

Clearly, under tax the optimal level of value improving activity K^{**} is less than K^*.

Property Taxes: Tax Revenue

Let

- $T = t^p V$ denote the tax revenue collected from a property

That is,

$$T = t^p((\frac{\alpha(1-t^p)}{r})^{\frac{1}{1-\alpha}} L)^{\alpha} L^{1-\alpha}$$

Hence,

$$T = t^p(\frac{\alpha(1-t^p)}{r})^{\frac{\alpha}{1-\alpha}} L$$

T is increasing function of tax rate, t^p, only when:

$$(1-t^p)^{\frac{\alpha}{1-\alpha}} - t^p \frac{\alpha}{1-\alpha}(1-t^p)^{\frac{2\alpha-1}{1-\alpha}} > 0$$

That is,

$$1 - t^p > \alpha$$

Or,

$$t^p < 1 - \alpha$$

Property Tax based on Location I

Let

- a denote the index of locational amenities where the property is located

Now the value of a house is now:

$$V = p(a)K^{\alpha}L^{1-\alpha}$$

where $p'(a) > 0$
In the absence of tax, the OP for the landowner is: The FOC yields:

$$K^{*} = \left(\frac{\alpha p(a)}{r}\right)^{\frac{1}{1-\alpha}} L$$

Let

- t^{p} be tax rate (per-unit) of property value

Property Tax based on Location II

Now, the OP of the landowner becomes:

$$\max_{K}\{(1-t^p)p(a)K^{\alpha}L^{1-\alpha}-rK\}$$

The FOC yields:

$$K^{**}=(\frac{\alpha p(a)(1-t^p)}{r})^{\frac{1}{1-\alpha}}L$$

- An increase in the tax rate t^p leads to a decrease in the equilibrium level of investment
- An increase in the index of locational amenities a and hence $p(a)$ leads to an increase in the equilibrium level of investment.

Clearly, for given a,

$$K^{**}<K^{*}$$

Property Tax based on Location III

Note that for given a,

- $K^* - K^{**} = (\frac{\alpha p(a)}{r})^{\frac{1}{1-\alpha}} L[1 - (1 - t^p)^{\frac{1}{1-\alpha}}]$
- $\frac{K^{**}}{K^*} = (1 - t^p)^{\frac{1}{1-\alpha}}$

The tax collected is given by

$$T^P(t^p, a, L) = t^p p(a)(K^{**})^\alpha L^{1-\alpha}$$

Locally Funded Public Good

Assume

- there is only one property owner
- provision for a is funded by property tax
- $g(a)$ be the cost of a

Consider the following social welfare

$$\max_{t^p, a}\{(1 - t^p)p(a)K^\alpha L^{1-\alpha} - rK + t^p p(a)K^\alpha L^{1-\alpha} - g(a)\}$$

s.t. $t^p p(a)K^\alpha L^{1-\alpha} = g(a)$.
Question:

- Find out optimal mix of a and t^p
- Is $K = K^{**} = (\frac{\alpha p(a)(1-t^p)}{r})^{\frac{1}{1-\alpha}} L$?
- Is $K >< K^*$?

Land Tax I

The maximisation problem of the landowner now looks like :

$$\max_{K} \quad p(a)K^{\alpha}L^{1-\alpha} - rK - (t^{L})L$$

The FOC for optimization yields :

$$K^{L} = p(a)(\frac{\alpha}{r})^{\frac{1}{1-\alpha}}L = K^{*}$$

Clearly, the optimal level of value improving activity K^{L} equals its efficient level K^{*}.
The tax revenue is given by

$$T^{L}(t^{L}, a, L) = t^{L}L$$

Land Tax II

Consider

- two localities- 1 and 2 with different locational advantages, a_1 and a_2;
- $a_1 > a_2$. So $p(a_1) > p(a_2)$,
- two parcels of same size - one in each locality
- t^L as land tax

Surplus accruing to landowners in the two regions are:

$$\pi_1 = p(a_1)(K^\alpha L^{1-\alpha}) - rK - t_1^L L$$

$$\pi_2 = p(a_2)(K^\alpha L^{1-\alpha}) - rK - t_2^L L$$

Land Tax III

The optimization exercise of the landowners in the two regions yields:

$$K_1^* = (\frac{\alpha p(a_1)}{r})^{\frac{1}{1-\alpha}} L$$

$$K_2^* = (\frac{\alpha p(a_2)}{r})^{\frac{1}{1-\alpha}} L$$

It can be seen that $\pi_1(K_1^*) > \pi_2(K_2^*)$. Consider

$$\pi_1(K_1^*) = p(a_1)(K_1^{*\alpha} L^{1-\alpha}) - cK_1^* - t_1^L L = 0$$
$$\pi_2(K_2^*) = p(a_2)(K_1^{*\alpha} L^{1-\alpha}) - cK_2^* - t_2^L L = 0$$

That is, the tax rates are given by:

$$t_1^L > t_2^L \tag{0.4}$$