



# Property taxes and dynamic efficiency: A correction



Stefan Homburg

*Institute of Public Economics, Leibniz University of Hannover, Germany*

## HIGHLIGHTS

- Generally, land rules out overaccumulation in an OLG model.
- Following Kim and Lee (1997), a property case may invalidate this result.
- Whereas taxes on capital gains and taxes on rent preserve dynamic efficiency.
- We show that these statements are all unwarranted.
- As long as the rent is not completely taxed away, overaccumulation is ruled out.

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## ABSTRACT

According to Kim and Lee (1997), property taxes as opposed to capital gain taxes and taxes on rent endanger dynamic efficiency. The present paper shows that the choice of the tax base is immaterial. What counts is whether the taxes eliminate the after-tax rent. Empirical evidence suggests that this is not the case.

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## 1. Introduction

Diamond (1965) was the first to show that a competitive equilibrium in an overlapping generations (OLG) model with production may be dynamically inefficient in the sense that the economy could consume more in some periods without consuming less otherwise. This type of inefficiency is also referred to as overaccumulation. According to a now standard argument, however, overaccumulation cannot occur if one puts the land as a factor of production into the Diamond model; see Homburg (1991) or Rhee (1991). Provided that the land income share is uniformly positive, the compound interest rate will exceed the compound growth rate in the limit which implies dynamic efficiency. This result is trivial for stationary or steady states but extends to arbitrary growth paths with changing factor proportions and fluctuating prices.

Introducing land in a sense opens a new market in the OLG model, and as people start trading in that market, overaccumulation is ruled out.

Pointing to taxation, Kim and Lee (1997) have challenged this result. These authors assert: first, taxes on capital gains and taxes on rental incomes preserve dynamic efficiency. Second, this is not true for a property tax levied on land values. The purpose of this note is to show that both the statements are unwarranted.

In order to do so it will not be necessary to reproduce the entire model. It suffices to copy the author's central equation

$$\frac{q_{t+1} + \rho_{t+1}}{q_t} = 1 + r_{t+1} - \delta \quad (1)$$

which is quite intuitive: the left-hand side represents the return on land bought at price  $q_t$  in some period  $t$  and sold at price  $q_{t+1}$  thereafter. The land yields a rent  $\rho_{t+1}$  which equals its marginal productivity. The right-hand side represents the return on capital. It equals one plus interest  $r_{t+1}$  minus depreciation  $\delta$ , where the interest rate coincides with the marginal productivity of capital. In

E-mail address: [homburg@fiwi.uni-hannover.de](mailto:homburg@fiwi.uni-hannover.de).

URL: <http://www.fiwi.uni-hannover.de>.

equilibrium, the two rates of return match. All assumptions made by the authors are maintained; in particular, the marginal productivities are strictly positive.

## 2. Taxation in an economy with land

In footnote 6, Kim and Lee (1997: 171) state that capital gain taxes and taxes on rent do not impair dynamic efficiency. The first step is to show that this assertion is generally incorrect. In what follows a tax is referred to as *confiscatory* if it takes away the entire land rent; otherwise the tax is non-confiscatory. Rewriting (1) as

$$\frac{q_{t+1} - q_t}{q_t} + \frac{\rho_{t+1}}{q_t} = r_{t+1} - \delta \quad (2)$$

and multiplying this equation by  $1 - \tau$ , where  $\tau$  represents the tax rate, it is obvious that a comprehensive income tax imposed on the sum of capital gains  $(q_{t+1} - q_t)/q_t$ , land rents  $\rho_{t+1}/q_t$ , and interest income  $r_{t+1} - \delta$  leaves the arbitrage condition unaffected, provided that the tax is non-confiscatory. A confiscatory income tax ( $\tau = 1$ ) destroys the markets for land and capital in the same way as a confiscatory tax on earnings would destroy the labor market; it also invalidates the proof of dynamic efficiency. In order to avoid a possible misconception, stating that a non-confiscatory tax leaves the arbitrage condition unaffected does not mean that the involved variables remain unchanged—they will generally adjust. But the arbitrage condition itself holds true, and this suffices to deduce dynamic efficiency along the well-known route.

A tax on rent, as analyzed by Feldstein (1977), will also leave the arbitrage condition intact if and only if it is non-confiscatory. To see this one only has to replace the rent  $\rho_{t+1}$  by the after-tax rent  $\rho_{t+1} - \tau \rho_{t+1}$  in Eq. (1). Any tax rate below one hundred percent preserves the sign of the after-tax rent and validates the efficiency proof. Remembering that land opens a new market in the OLG model, a confiscatory tax on rent would close this market, making land as intrinsically worthless as Samuelson's (1958) bubble money. Inefficiency may then result.

The property tax studied by Kim and Lee remains to be considered. This tax is imposed in period  $t + 1$  on the land value in period  $t$ ; it diminishes the after-tax rent to  $\rho_{t+1} - \tau q_t$ . If the property tax is non-confiscatory, the resulting equilibrium will be dynamically

efficient, as argued in the preceding paragraph. However, if the property tax were confiscatory and eliminated the after-tax rent, land would become intrinsically worthless in the same manner as under a confiscatory tax on rent.

## 3. Conclusion

Regarding dynamic efficiency, there is no difference at all between a property tax on the one hand and a comprehensive income tax or a tax on rent on the other hand. All these taxes preserve dynamic efficiency if they are non-confiscatory. Conversely, if a government eliminated after-tax rents, the economy would become essentially an economy without land, since the land does not preclude overaccumulation via a technological channel but only through an arbitrage condition based on a functioning land market. The conclusions of Kim and Lee (1997) are unwarranted and result from an implicit assumption that income and rent taxes were non-confiscatory whereas the property tax could be confiscatory.

In reality, many countries levy property taxes indeed. To keep the land markets intact, which play an important allocative role at the micro-level, tax burdens are adjusted so as to ensure strictly positive after-tax rents. In accordance with this finding, modern national accounts show tremendous land values—the value of land being of the same order of magnitude as the value of reproducible capital; see OECD (2014). Therefore, real land markets can operate in a fashion that preserves dynamic efficiency.

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