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## A Simple Version of the Henry George Theorem

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### Abstract

Henry George advocated a single tax, on land, and an appropriation of all rent. The theorem dubbed after him proves that such a tax is optimal indeed. After comparing the different sources of taxation, he showed that he was against taxation in certain areas. The paper indicates that other studies conducted also leads to the same result of Henry George. He tried to contribute to a more equitable distribution of wealth through sound economic principles. This note presents an exceedingly simple derivation featuring land. By taking land, not an acre less is supplied and the economy is not distorted. Landlords have a passive function, which is least prove to incentive problems. According to George, to let profit be dissipated into the hands of the landlords, constant returns to scale should consider production function with labor and land as inputs.

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### Introduction

HENRY GEORGE WAS a self-made intellectual. He did not even complete high school. That he nonetheless bore an imprint on economics is not exceptional, think of his near contemporary Karl Marx. From a modern standpoint, many contributions of that time were opaque. Particularly Marx' writing is very roundabout. Not so Henry George's writing. It is lucid. He gets to the point. His economic intuition is sharp.

Henry George wrote "Progress and Poverty" in 1879. It is best known for his tax proposal. The latter is two-fold. He proposed to abolish all taxation save that upon land values. Moreover, the land tax must appropriate all rent. See George (1966, p. 130). He was quite radical. Nowadays politicians contemplate marginal variations in dozens of tax

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rates. Henry George, however, compared alternative sources for taxation. He was fervently against income taxation, as it would distort the incentive to accumulate wealth. Not only did he identify a source of taxation, he also advocated a certain level of taxation, namely 100% of land rent. One might wonder if this is not too simplistic, as it ignores the demand for public goods in determining the level of public expenditure. Surprisingly, the answer is no. Henry George was right. The optimum level of public good provision follows total land rent. This result of public economics is now called the Henry George theorem. It is still hot in the literature. A good review is given by Wildasin (1986) and a very recent contribution is Schweizer (1996).

Economic measures are commonly evaluated by their redistributive effects. It is rare that they are sorted out on the basis of economic efficiency. Now even though Henry George was driven to contribute to a more equitable distribution of wealth, his criteria to evaluate policies were sound economics. The main argument he offered for his rent tax is that it distorts little. His test to evaluate alternative taxes is the degree by which they check production or exchanges (George, 1966, pp. 132-134). This analysis is a nice precursor to the Ramsey (1927) inverse elasticity rule of taxation. Henry George essentially argues that it is best to tax the least elastically supplied good. By taxing land, not an acre less is supplied and the economy is not distorted. Landlords have a passive function, which is least prone to incentive problems.

The contribution of this note is very modest. I find that all students of economics must know the Henry George theorem and that, therefore, it must be presented in a very simple manner. The most accessible statement and proof of the theorem is by Atkinson and Stiglitz (1980), but they make no distinction between rent and profit, which is very unGeorgian.

#### **The Henry George theorem**

Atkinson and Stiglitz (1980) consider a variable number of workers producing a single good that can be divided between private and public consumption. The optimum number of workers balances the decreasing returns to labor in production and the increasing returns of inherent in the provision of the public good. They show that the first order condition equates the difference between output and wage-payments with public goods expenditure. Atkinson and Stiglitz (1980) call the difference rent and, therefore, the result the Henry George theorem. Strictly speaking, output minus wage payments is not rent but profit, which Henry George did not want to tax at all. Hence the model must at least be modified to let profit be dissipated into the hands of the landlords. An obvious way of doing so, would be to consider a constant-returns-to-scale production function with labor and land as inputs. Then profits will be zero and the difference between output and wage payments accrues to the landlords indeed.

A proper Henry George theorem, equating tax with rent, must take into account land, but can otherwise be exceedingly simple. Not even production

has to be modeled. All I need is utility and material balance. Utility is a function of the private good, the public good, and land per capita:

$$U(C, G, L/N)$$

where,  $C$  is private consumption in excess of individual endowment.  $G$  is public consumption.  $L$  is a fixed amount of land and  $N$  is population size. Utility will be maximized with respect to  $C$ ,  $G$  and  $N$ , where the latter determines city size. The only constraint is the material balance,

$$NC + G = 0$$

recalling that  $C$  is private consumption net of initial endowment, so that the constraint reflects the condition that excess demand is zero.

The marginal utilities, that is the partial derivatives of  $U$  with respect to  $C$ ,  $G$  and  $l = L/N$ , are denoted  $U_C$ ,  $U_G$  and  $U_l$ , respectively. Now use the constraint to eliminate private consumption. Then we have the unconstrained maximization problem for

$$U(-G/N, G, L/N)$$

with respect to  $G$  and  $N$ . The first order condition with respect to  $G$  reads

$$U_C \frac{-1}{N} + U_G = 0$$

This is the well known Samuelson condition for the optimum provision of a public good: the sum of the marginal utilities of the public good ( $NU_C$ ) equals the marginal utility of the private good ( $U_G$ ). The first order condition with respect to  $N$  reads, by the chain rule,

$$U_C \frac{G}{N^2} + U_l = \frac{L}{N^2} = 0$$

or, simplified,

$$G = (U_l / U_C) L$$

Here  $U_l / U_C = \frac{\partial U / \partial l}{\partial U / \partial C} = \frac{dC}{dl}$  is the marginal rate of substitution of land. Consumers equate it to the real price of land when they pick amounts of private consumption ( $C$ ) and land ( $l$ ) as to maximize utility. Hence the last condition is the Henry George theorem, equating government expenditure with rent.

### Production

It is easy to accommodate production. The simplest case is where the single good is produced by labor, as in Atkinson and Stiglitz (1980), and the individual productivities are independent. Then the individual endowments can be taken after production and, therefore, the above  $C$  is private consumption net of individual product. This case is particularly relevant when there are constant returns to scale. A tax on wage would have shown in a tax on the commodity. In the above analysis, however, only land turns out to be taxed.

Variable returns to scale can be introduced by redefining  $G$  as the input into the public goods sector and defining  $f(G)$  as the public good. The material balance is not affected. The only effect on utility is replacement of its second argument,  $G$ , by  $f(G)$ . This, however, amounts to a monotonic transformation of utility and hence does not affect the results. The concept of net consumption permits not only the single line derivation of the Henry George theorem, but also the inclusion of production without formal ramifications.

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