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The political economy of endogenous taxation and redistribution

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Abstract

This paper examines a simple dynamic model in which agents vote over capital income taxation and redistributive transfers. We show that in equilibrium the typical agent's preferences over the tax rate are single-peaked and derive a closed-form solution for the majority-rule tax rate. We also show that high levels of initial wealth inequality can place the economy on the 'wrong side of the Laffer curve'. © 1997 Elsevier Science S.A.

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1. Introduction

This note presents a simple dynamic model of voting over redistributive taxes and transfers. An interesting feature of the model is the closed form solution which we obtain for a typical individual's most-preferred tax rate. We show that induced preferences over the tax rate are single-peaked. We apply the median voter theorem to characterize the political equilibrium tax rate and transfer. We also show that for high levels of wealth inequality, measured as the deviation of the median from the mean of the initial wealth distribution, the median voter may choose a tax rate which is on the 'wrong side of the Laffer curve'.

This article is a contribution to the growing literature which seeks to characterize the relationship between the distribution of wealth and the endogenous determination of policy parameters, such as tax rates, within the context of dynamic economies. Krusell et al. (in press) show how the initial distribution of wealth would influence the resulting long-run distribution, as well as other variables such as tax rates and consumption levels, within the context of a model in which the median voter is assumed to determine the equilibrium tax rate. Huffman (in press) also shows how the labor and capital tax rates would fluctuate when a majority voting scheme determines these parameters.

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2. The model

Individuals in the economy live for two periods. The economic decisions which a typical individual makes are sequenced as follows. Each individual begins with some initial wealth $y \in \mathcal{Y} \subset \mathcal{R}_+$. In period one, an individual divides his or her initial wealth into consumption and savings. Savings earn an after-tax return of $(1-\theta)R$, where R is constant and θ is the tax rate. In period two, the individual consumes after-tax income from savings plus a per capita lump-sum transfer τ. The tax rate and transfer are identical across agents, and the transfer is financed with revenue collected from the tax on savings income. Individuals have identical preferences over consumption in the two periods, and these preferences are assumed to take the logarithmic, time-additive form

$$u(c_1, c_2) = \log(c_1) + \beta \log(c_2).$$

Prior to the period-one consumption-savings decision, individuals vote over tax-and-transfer schemes. The imposition of a balanced government budget, together with second-period general equilibrium, means the issue space can be reduced to the one-dimensional choice of tax rate. The political equilibrium concept is assumed to be majority rule in a standard two-party competition over the single issue θ.

An individual with initial wealth y—individual y, for short—thus solves the following problem:

$$\max_s \{\log(y-s) + \beta \log[(1-\theta)Rs + \tau]\}.$$

given y, θ and τ. The solution for savings, s, is:[1]

$$s = \frac{\beta}{1+\beta} y - \frac{\tau}{(1-\theta)R(1+\beta)}.$$

Consumption in the two periods is given by

$$c_1 = y - s = \frac{1}{1+\beta}\left[y + \frac{\tau}{(1-\theta)R}\right],$$

and

$$c_2 = (1-\theta)Rs + \tau = \frac{\beta}{(1-\beta)}(1-\theta)R\left[y + \frac{\tau}{(1-\theta)R}\right].$$

Given θ and τ, let $s(y)$ denote savings of someone with income y. Then, aggregate tax revenue is θ times aggregate period-two income from savings, and the per capita transfer in equilibrium satisfies

$$\tau = \frac{\theta R \int_{\mathcal{Y}} s(y)\mu(\mathrm{d}y)}{M},$$

where μ is the distribution of agents according to initial wealth levels, and $M = \int_{\mathcal{Y}} \mu(\mathrm{d}y)$ is the total measure of agents. Substituting in $s(y)$ gives

[1] Note we impose no nonnegativity constraint on s.

$$\tau = \frac{\theta R}{M} \int_{\mathscr{Y}} \left[\frac{\beta}{1+\beta} y - \frac{\tau}{(1-\theta)R(1+\beta)} \right] \mu(\mathrm{d}y) = \theta R \frac{\beta}{1+\beta} \bar{y} - \frac{\theta\tau}{(1-\theta)(1+\beta)}$$

where $\bar{y} \equiv \int_{\mathscr{Y}} y\mu(\mathrm{d}y)/M$ is average initial wealth. Then

$$\tau = \frac{\theta R\beta(1-\theta)}{(1-\theta)(1+\beta)+\theta} \bar{y}. \tag{2.1}$$

Remembering the expressions for individuals' consumption, a little algebra reveals that individual y's consumption in the two periods is given by

$$c_1 = \frac{1}{1+\beta}\left[y + \frac{\tau}{(1-\theta)R}\right] = \frac{1}{1+\beta}\left[\frac{(1+\beta)y + \theta\beta(\bar{y}-y)}{1+\beta-\theta\beta}\right]$$
$$= \frac{\bar{y}}{1+\beta}\left[\frac{(1+\beta)\frac{y}{\bar{y}} + \theta\beta\left(1-\frac{y}{\bar{y}}\right)}{1+\beta-\theta\beta}\right]$$

and

$$c_2 = \frac{\beta}{1+\beta}(1-\theta)R\left[y + \frac{\tau}{(1-\theta)R}\right] = \frac{\beta}{1+\beta}(1-\theta)R\bar{y}\left[\frac{(1+\beta)\frac{y}{\bar{y}} + \theta\beta\left(1-\frac{y}{\bar{y}}\right)}{1+\beta-\theta\beta}\right].$$

Then, individual y's 'indirect' utility function-maximized utility as a function of $y/\bar{y}$, θ and other parameters has the form

$$w(\theta; y/\bar{y}) = \text{constant} + (1+\beta)\log\left(\frac{(1+\beta)\frac{y}{\bar{y}} + \theta\beta\left(1-\frac{y}{\bar{y}}\right)}{1+\beta-\theta\beta}\right) + \beta\log(1-\theta). \tag{2.2}$$

The constant involves β and R, of course, as well as a term of the form $(1+\beta)\log(\bar{y})$.

Consider the problem of maximizing $w(\theta;\ y/\bar{y})$ with respect to θ, $\theta \in [0,1]$. The constraint $\theta \leq 1$ will not be binding, of course, as $w(1;\ y/\bar{y}) = -\infty$ when $\theta = 1$. The constraint $\theta \geq 0$ will be binding, however, for individuals with $y/\bar{y} \geq 1$. It is straightforward to show that for $y/\bar{y} \geq 1$—that is, for individuals whose initial wealth is greater than average—$w(\theta;\ y/\bar{y})$ is decreasing in θ over the interval [0,1] and is maximized at $\theta = 0$.

For the relatively poor—those individuals with $y/\bar{y} < 1$—one can show that $w(\theta;\ y/\bar{y})$ is concave and attains a unique maximum at a $\theta \in (0,1)$ which depends on $y/\bar{y}$. As one would expect, the maximizing value of θ rises as $y/\bar{y}$ falls: poorer individuals prefer higher taxes and transfers.

For individuals with $y/\bar{y} < 1$, given our specification of preferences, one can say even more. Tedious algebra shows that the first-order condition for an interior maximum of Eq. (2.2) reduces to the following quadratic equation in θ:

$$\beta^2(1-\Omega)\theta^2 - (1+\beta)[1+2\beta(1-\Omega)]\theta + (1+\beta)^2(1-\Omega) = 0,$$

where $\Omega \equiv y/\bar{y}$. The appropriate solution to this quadratic equation is

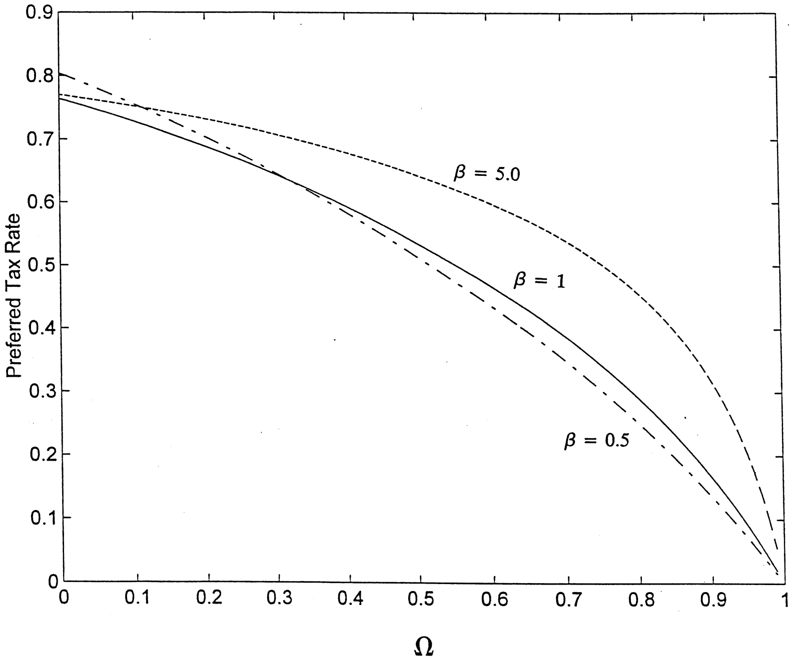

Fig. 1. $\theta^*(\Omega)$ for various values of β.

$$\theta^*(\Omega) = \frac{1+\beta}{\beta}\frac{1+2\beta(1-\Omega)}{2\beta(1-\Omega)} - \frac{1+\beta}{\beta}\frac{\sqrt{1+4\beta(1-\Omega)}}{2\beta(1-\Omega)}$$

For $0 \leq \Omega < 1$, $\theta^*(\Omega)$ is strictly between zero and one, and increases as Ω falls. Fig. 1 plots θ^* against values of $y/\bar{y} = \Omega \leq 1$ for various values of the preference parameter β. Although the tax rate is monotonically decreasing in Ω, it is not monotonic in β.

Let $\theta(y/\bar{y})$ denote the preferred tax rate of an individual with initial wealth relative to the average given by $y/\bar{y}$. The above considerations imply that

$$\theta(y/\bar{y}) = \begin{cases} 0 & \text{if } y/\bar{y} \geq 1 \\ \theta^*\left(\frac{y}{\bar{y}}\right) & \text{if } y/\bar{y} < 1 \end{cases}$$

Since each individual y's preferences over θ are single peaked, the median voter theorem applies. Let y_m denote the median of the distribution of initial wealth—i.e., y_m is defined by $\int_0^{y_m} \mu(dy) = \frac{1}{2}$. If $y_m \geq \bar{y}$, then the majority-rule equilibrium tax rate is zero. If $y_m < \bar{y}$, the equilibrium tax rate is given by $\theta^*(y_m/\bar{y})$.

Since the equilibrium tax rate depends only on $y_m/\bar{y}$, any change in the distribution of initial wealth which changed both the median and mean in the same proportion would leave the equilibrium tax rate unaffected. On the other hand, if we take, as seems natural, a decrease in $y_m/\bar{y}$ to indicate a greater level of wealth inequality, then greater inequality will be associated with higher rates of taxation. One can also compare the equilibrium tax rate to the tax rate, call it θ_τ, which would maximize the per capita transfer τ. As one can tell from the expression above for τ in terms of θ, Eq. (2.1), the model indeed has a 'Laffer curve', and a unique revenue-maximizing tax rate. In political equilibrium, though, if the median voter's level of income is such that

$$\frac{y_m}{\bar{y}} < \frac{\sqrt{1+\beta} - 1}{\beta}$$

then the majority-rule tax rate exceeds θ_τ—that is, the economy ends up on the 'wrong' side of the Laffer curve.

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