

Popular support for progressive taxation and the relative income hypothesis

Tapan Mitra^a, Efe A. Ok^{b,*}, Levent Koçkesen^b

^a*Department of Economics, Cornell University, Ithaca, NY 14853, USA*

^b*Department of Economics, New York University, 269 Mercer St., New York, NY 10003, USA*

Received 15 July 1997; accepted 22 August 1997

Abstract

We show that a marginal rate progressive tax always defeats a marginal rate regressive tax under pairwise majority voting (so long as the latter collects at least as much revenue as the former one) irrespective of whether the voters care at all about their relative incomes or not. © 1998 Elsevier Science S.A.

Keywords: Voting; Progressive income taxation; Interdependent preferences

JEL classification: D72

1. Introduction

(Statutory) income tax schedules of most of the industrial societies (and certainly all OECD countries; cf. OECD, 1986, and Snyder and Kramer, 1988) are marginal rate progressive; that is, in such countries, the tax rate increases with income. One interesting approach towards explaining this empirical regularity starts from the presumption that modeling income taxation as a direct outcome of a voting mechanism “mirrors” the actual public choices made in designing tax systems (Romer, 1975; Roberts, 1977), and hence examines the majority support of progressive tax schemes in direct democracies. Unfortunately, the literature that utilizes this approach is largely inconclusive; it seems that the related analyses are confined to either linear or quadratic tax functions for technical reasons, and thus, they are of limited descriptive content (cf. Kramer, 1983, and Cukierman and Meltzer, 1991).

The main reason why this literature falls short of obtaining definitive results about the popular support of progressive taxes is that the problem of voting over a nonlinear set of tax functions is really a multidimensional problem, and that the conditions which are necessary for the existence of a stable outcome in such voting problems are extremely restrictive. However, there is an alternative, and in fact, more realistic way of looking at the problem of voting over income taxes. One can model the basic problem such that individuals choose between only two tax schemes, one being interpreted as

*Corresponding author. Tel.: 212 998 8920; fax: 212 995 4186; e-mail: okefe@fasecon.econ.nyu.edu

the *status quo* scheme and the other as the *alternative* (or *reform*). Clearly, formulating the problem this way retains the basic flavor of the notion of “voting over income taxes in direct democracies.” Moreover, this model abstains from the difficulties that are usually encountered in multidimensional voting problems, and therefore, enables one to obtain new insights about the majority support of progressive taxation. Indeed, it is recently shown by Marhuenda and Ortuño-Ortín (1995) that any marginal rate progressive tax would always have the majority support over any marginal rate regressive tax (in the absence of negative taxation) for all positively skewed pre-tax income distributions. This result may well prove to be a first step towards a political economic theory which is capable of explaining why all industrial democracies choose to implement marginal rate progressive income tax schedules.

However, this basic “popular support theorem” is obtained in a setting where individual voting behavior is modeled in a disconcertingly simple manner; individuals are simply assumed to vote for the tax schedule that taxes them less. Apart from neglecting the disincentive effects of income taxation, this model ignores the potentially important reflection of the “relative standing” concerns of the agents on their voting behavior. Indeed, one of the central messages of the theory of preference formation is that individuals’ well-being depend on their “status” in the society as well as on their material consumption. In the present framework, this leads us to the highly plausible contention that the welfare of an individual depends on her relative as well as her absolute level of income.¹ In fact, the relevance of such *interdependent* preferences to the theory of progressive taxation is well recognized by authors like Boskin and Sheshinski (1978); Oswald (1983) and Tuomala (1990), who studied the implications of the various forms of “the relative income hypothesis” with regard to the optimal income tax schedule. Surprisingly, however, the progressivity implications of “interdependent preferences” within the standard models of voting over income taxes do not seem to have received any attention in the literature.

In this paper, therefore, we examine the issue of majority demand for progressive taxation in endowment economies where the voting behavior of the citizens is modeled in a way that reflects the potential relative income concerns of the voters: an individual is assumed to vote for a tax function over another whenever the former treats her better than the latter with respect to her absolute and relative income. Individuals are allowed to have any preference relation (which need not be identical across voters) so long as they abide by this weak restriction.

Our main finding is that there is indeed a majority demand for marginal rate progressive taxation in the presence of virtually any form of the relative income hypothesis. Informally put, we show that a marginal rate progressive tax always defeats a marginal rate regressive tax under pairwise majority voting (as long as the latter collects at least as much revenue as the former one) irrespective of whether the voters care about their relative incomes or not. Interestingly, there is a formal sense in which this result is “more basic” than the main finding of Marhuenda and Ortuño-Ortín (1995). For, it turns out that the latter result is an immediate corollary of the former one, and holds only under an

¹As Persson (Persson, 1995, p. 572) puts it, “if a man’s income suddenly increases to make him the richest person in his community, his sense of well-being will increase dramatically. But if everyone else’s income also rises in proportion, so that our man retains his initial position in the society, his happiness would not increase at all as much as it otherwise would have done.” This presumption is usually called the *relative income hypothesis* (or the phenomenon of *keeping up with the Joneses*), and is attributed to Duesenberry (1949). Abundant empirical and theoretical evidence in support of this hypothesis is provided in the literature; see Easterlin (1974); Layard (1980); Frank (1985); Clark and Oswald (1996); Koçkesen et al. (1997) and references cited therein.

additional restriction about the tax revenues. Moreover, our popular support theorem is obtained for a very general class of individual preference relations, and thus allows for fairly sophisticated voting behavior.

2. Preliminaries

The framework we employ in the present note is essentially standard. Each individual is identified by her income x in $[0, 1]$. The pre-tax income distribution of the economy is described by a strictly increasing distribution function F on $[0, 1]$.² We assume throughout that the *mean* of F is greater than its *median*:

$$\mu_F \equiv \int_0^1 \omega \, dF(\omega) \geq F^{-1}(1/2) \equiv m_F. \quad (1)$$

A *tax function* is a continuous and increasing function $t: \mathbf{R}_+ \rightarrow \mathbf{R}_+$ such that $0 \leq t(x) \leq x$ for all $x \in [0, 1]$ and

$$R(t) := \int_0^1 t(\omega) \, dF \geq R, \quad (2)$$

where $R \in (0, \mu_F)$ is the minimum amount of tax revenue that must be raised; R is exogenously given. (Notice that $R(t)$ denotes the total tax revenue that tax t raises.)³

It is important to note that the revenue constraint (2) appears as an inequality in the present setting, forcing a permissible tax function to collect *at least* a prespecified level of revenue (as opposed to raising *exactly* this preset amount); we allow for taxes which raise more revenue than R . We believe that this is a desirable feature of the present model. For, specifying (2) as an equality at the outset is unduly restrictive since the tax design exercise is in practice conducted without the knowledge of the actual income distribution (cf. Ok, 1995). Moreover, it is arguable that, in a general model of voting over income taxes individuals should be allowed to distinguish between alternative tax schedules on the basis of the associated tax revenues among other characteristics of the tax functions.

We denote the class of all tax functions by \mathcal{T}_R . A tax function $t \in \mathcal{T}_R$ is called *marginal rate progressive* if it is strictly convex, and *marginal rate regressive* if it is concave. Finally, a tax function $t \in \mathcal{T}_R$ is said to be *average rate progressive* if the mapping $x \rightarrow t(x)/x$ is strictly increasing on $[0, 1]$, and *average rate regressive* if the mapping $x \rightarrow t(x)/x$ is decreasing.

Imagine now that there are two political parties, and the i th one proposes the tax policy $t_i \in \mathcal{T}_R$.

²The economy that is studied here is thus an endowment economy; we simply assume away the incentive effects of income taxation in the present note. This is of course a very important limitation, but it is acceptable, we contend, at this rather preliminary stage of the theory.

³Redistribution of income is not allowed in the present setting due to the postulate $t(0)=0$. This assumption is, however, adopted here only for convenience; the main findings of the present paper would hold if we have allowed for negative taxation and have confined attention to pairwise voting between concave and strictly convex taxes where the strictly convex tax treats the poorest agent no worse than the concave one (cf. Marhuenda and Ortuño-Ortín, 1995).

Which tax policy would the agent $x \in (0, 1]$ vote for? Clearly, the answer to this question depends on the preferences of the agent over the tax functions. We model the preference relation of agent x over tax functions by means of any preorder \succ^x on \mathcal{T}_R which satisfies the following condition:

$$t_1 \succ^x t_2 \text{ whenever } \left(x - t_1(x), \frac{x - t_1(x)}{\mu_F - R(t_1)} \right) > \left(x - t_2(x), \frac{x - t_2(x)}{\mu_F - R(t_2)} \right). \quad (3)$$

We refer to the agent x with such a preference relation simply as *an agent with weakly interdependent preferences*, and assume that she votes for t_1 over t_2 if and only if $t_1 \succ^x t_2$.

The basic idea behind this preference specification is that one's well-being need not depend only on her absolute level of income but it may depend on her *relative* income as well. Clearly, if the well-being of agent x was determined *only* on the basis of her absolute income she would prefer t_1 over t_2 if and only if $x - t_1(x) > x - t_2(x)$. The other extreme is the case where an agent is solely concerned with her relative standing in the population so that she votes for t_1 over t_2 if, and only if, her relative income in the post-tax income distribution induced by t_1 is higher than that induced by t_2 , that is, if and only if

$$\frac{x - t_1(x)}{\mu_F - R(t_1)} > \frac{x - t_2(x)}{\mu_F - R(t_2)}.$$

However, while an individual may care about her relative income in the society, it is unlikely that she will care only about her relative income irrespective of how much money she makes in the post-tax distribution.⁵ It is far more realistic to postulate that an individual's well being would in fact depend on *both* her relative *and* absolute income. The way we have modeled the preferences of individuals reflects precisely this consideration. What is more, it is a very general way of introducing the effect of the relative income hypothesis on the agents' voting behavior; all (3) entails is that *no agent prefers less relative (or absolute) income to more*, other things being constant. In particular, we make no assumption whatsoever in relation to the relative significance an individual assigns to her absolute income as opposed to her relative income.

3. The main result

As we have noted earlier, Marhuenda and Ortuño-Ortín (1995) have shown that a marginal rate progressive tax always defeats a marginal rate regressive tax (so long as they collect the same revenue) provided that all individuals are concerned *only* about their absolute incomes. This is an

⁴For any $a, b \in \mathbf{R}^2$, by $a > b$ we mean that $a \neq b$ and $a_i \geq b_i$, $i = 1, 2$.

⁵As advanced by Frank (Frank, 1985, pp. 32–33), "... the conclusion that absolute income does not matter at all appears just as spurious as the notion that absolute income is the only income concept that matters. Granted, ... people tend to feel dissatisfied in proportion to how far their incomes fail to match those of their peers. But that does not mean that people would be indifferent if everyone's income suddenly became twice what it is today. After all, people are in competition not only with one another but with the external environment as well." (See also Ok and Koçkesen, 1997, for a related discussion.)

interesting *popular support theorem* paving the way towards a political economic theory of “demand for marginal rate progressivity.” As we shall prove in this section, it is also quite robust; somewhat unexpectedly, it is not at all altered when the interdependent preferences are introduced into the model.

We begin by demonstrating the following observation which provides a basic insight with regard to the tax progressivity implications of Duesenberry’s relative income hypothesis.

Lemma. Let $t_1, t_2 \in \mathcal{T}_R$ and assume that t_1 is marginal rate progressive while t_2 is marginal rate regressive. (i) There exists a $\theta > 0$ such that

$$\frac{x - t_1(x)}{\mu_F - R(t_1)} > \frac{x - t_2(x)}{\mu_F - R(t_2)} \text{ for all } x \in (0, \mu_F + \theta]. \tag{4}$$

(ii) If $R(t_1) \leq R(t_2)$, there exists a $\theta > 0$ such that

$$x - t_1(x) > x - t_2(x) \text{ for all } x \in (0, \mu_F + \theta).$$

Proof. Since t_1 is strictly convex, by using Jensen’s inequality we obtain

$$t_1(\mu_F) = t_1\left(\int_0^1 \omega \, dF\right) < \int_0^1 t_1(\omega) \, dF = R(t_1). \tag{5}$$

But since $t_1(0) = 0$ and t_1 is strictly convex, the mapping $x \rightarrow t_1(x)/x$ must be strictly increasing on $[0, 1]$, and therefore, by (5), we have

$$\frac{t_1(x)}{x} \leq \frac{t_1(\mu_F)}{\mu_F} < \frac{R(t_1)}{\mu_F} \text{ for all } x \in (0, \mu_F]. \tag{6}$$

By using the concavity of t_2 and $t_2(0) = 0$, we similarly obtain

$$\frac{t_2(x)}{x} \geq \frac{t_2(\mu_F)}{\mu_F} \geq \frac{R(t_2)}{\mu_F} \text{ for all } x \in (0, \mu_F]. \tag{7}$$

By (6) and (7), we conclude that, for all $x \in (0, \mu_F)$.

$$\frac{x - t_1(x)}{\mu_F - R(t_1)} = \left(\frac{x}{\mu_F - R(t_1)}\right) \left(1 - \frac{t_1(x)}{x}\right) > \frac{x}{\mu_F - R(t_1)} \left(1 - \frac{R(t_1)}{\mu_F}\right) = \frac{x}{\mu_F}$$

and

$$\frac{x - t_2(x)}{\mu_F - R(t_2)} = \left(\frac{x}{\mu_F - R(t_2)}\right) \left(1 - \frac{t_2(x)}{x}\right) \leq \frac{x}{\mu_F}.$$

Therefore,

$$\frac{x - t_1(x)}{\mu_F - R(t_1)} > \frac{x - t_2(x)}{\mu_F - R(t_2)},$$

holds for all $x \in (0, \mu_F]$, and if $R(t_1) \leq R(t_2)$, we have

$$x - t_1(x) > (\mu_F - R(t_1)) \left(\frac{x - t_2(x)}{\mu_F - R(t_2)} \right) \geq x - t_2(x) \text{ for all } x \in (0, \mu_F].$$

The proof is completed by a straightforward continuity argument. \square

The first part of the above observation says that if the voters care *only* about their relative incomes (as the relative income hypothesis postulates), everyone whose pre-tax income is below the mean pre-tax income would vote for any marginal rate progressive tax over any marginal rate regressive tax. It is important to note that this result is obtained without giving any reference to the tax revenues that are raised by the candidate tax functions. The second part of the lemma, on the other hand, says that a similar conclusion holds if the individuals cared only about their absolute incomes. (This observation readily entails the corresponding result of Marhuenda and Ortuño-Ortín (1995); see their Corollary 2.5.). Interestingly, this result is an immediate corollary of the first part of the lemma, and is in fact less general than the first part in that it works only under a particular restriction about the tax revenues of the candidate tax functions. There is then a formal sense in which the driving force behind the main finding of the present paper is but the relative income hypothesis.

The following is our main result, and is a straightforward consequence of the above lemma and (3).

Proposition. *Let $t_1, t_2 \in \mathcal{T}_R$ such that $R(t_1) \leq R(t_2)$. If t_1 is marginal rate progressive, and t_2 is marginal rate regressive, then there exists a $\theta > 0$ such that $t_1 \succ^x t_2$ for all $x \in (0, \mu_F + \theta)$.*

By this result and (1), we have the following

Corollary. *(Popular Support Theorem) Let $R \leq R_1 \leq R_2$, and assume that all individuals have weakly interdependent preferences. Any marginal rate progressive tax with revenue R_1 defeats any marginal rate regressive tax with revenue R_2 under pairwise majority voting.⁶*

Therefore, while we may not guarantee the existence of a majority rule equilibrium due to the multidimensionality of the associated voting problem, we may nevertheless conclude that if such an equilibrium exists, it cannot be a marginally regressive tax. It is in this sense we argue that this particular popular support theorem has a predictive content. Moreover, since the postulated voting behavior behind it is quite general, this result shows that the contention that there would generally be a majority demand for marginal rate progressive taxation in endowment economies is well supported.

In passing, we note that one cannot extend our popular support theorem (or either part of the above lemma) to the case where one compares *average* rate progressive taxes with marginal rate regressive taxes. Indeed, one can show that there exists an average rate progressive tax with revenue R , say t_1 , and a marginal rate regressive tax with revenue R , say t_2 , such that t_2 defeats t_1 under pairwise majority voting. (The proof of this claim is available from the authors upon request.) However, the

⁶It is important to note that the condition $R_2 \geq R_1$ makes this assertion non-trivial. After all, a voter with interdependent preferences may choose to vote for a tax function t^* which taxes her more than another tax function t , provided that t^* raises sufficiently more revenue than t so that the subject voter's relative post-tax income induced by t^* is sufficiently better than that induced by t .

way we have arrived at our popular support theorem makes it clear that the following generalization is true:

Corollary. *If $t_1, t_2 \in \mathcal{T}_R$ are such that $t_1(\mu_F) \leq R(t_1) \leq R(t_2) \leq t_2(\mu_F)$, and if t_1 is average rate progressive while t_2 is average rate regressive, then t_1 defeats t_2 under pairwise majority voting whenever all individuals have weakly interdependent preferences.*

4. Conclusion

One of the central questions of public economics concerns the explanation of the observed marginal rate progressivity of income tax schedules. A natural way to approach this problem appears to model the practice of income tax design as an outcome of a political process. In this paper, we have showed in the context of endowment economies (considered as direct democracies) that this approach is indeed promising. Our main finding is that a marginal rate progressive tax would always have a majority support over any marginal rate regressive tax for a very general specification of voting behavior. Since this specification extends the standard one by incorporating the so-called “keeping up with the Joneses effect,” which is forcefully advanced in the social psychology and the economics literature, there is reason to believe that the generalization considered here is a particularly relevant one. We therefore contend that the popular support theorem reported above brings us one step closer to explaining the empirically observed desire of democracies for progressive income taxation.

In conclusion, we should stress that the entirety of our analysis is conducted in the context of an endowment economy, thereby ignoring the potentially important disincentive effects of income taxation. The obvious next step is therefore to study the extensions of our findings in variable labor supply (Mirrleesian) economies. This important task is by no means trivial, and is left for future research.

Acknowledgements

We would like to thank Roland Benabou and Ignacio Ortuno-Ortín for helpful comments. The support of the C.V. Starr Center for Applied Economics at New York University is also gratefully acknowledged.

References

- Boskin, M.J., Sheshinski, E., 1978. Optimal redistributive taxation when individual welfare depends upon relative income. *Quarterly Journal of Economics* 43, 589–601.
- Clark, A.E., Oswald, A.J., 1996. Satisfaction and comparison income. *Journal of Public Economics* 61, 359–381.
- Cukierman, A., Meltzer, A., 1991. A political theory of progressive taxation. In Meltzer, A., Cukierman, A., Richard, S.F. (Eds.), *Political Economy*. Oxford University Press, New York.
- Duesenberry, J.S., 1949. *Income, Saving and the Theory of Consumer Behavior*. Harvard University Press, Cambridge.

- Easterlin, R.A., 1974. Does economic growth improve the human lot? Some empirical evidence. In: David, P.A., Reder, M.W. (Eds.), *Nations and Households in Economic Growth. Essays in Honor of Moses Abramowitz*, Academic Press, New York.
- Frank, R., 1985. *Choosing the Right Pond: Human Behavior and Quest for Status*. Oxford University Press, New York.
- Koçkesen, L., Ok, E.A., Sethi, R., 1997. Interdependent Preference Formation. C.V. Starr Center working paper 97-18, New York University.
- Kramer, G., 1983. Is there a demand for progressivity?. *Public Choice* 41, 223–228.
- Layard, R., 1980. Human satisfactions and public policy. *Economic Journal* 90, 737–750.
- Marhuenda, F., Ortuño-Ortín, I., 1995. Popular support for progressive taxation. *Economics Letters* 48, 319–324.
- OECD, 1986. *Personal Income Tax Systems Under Changing Economic Conditions*. OECD, Paris.
- Ok, E.A., 1995. On the principle of equal sacrifice in income taxation. *Journal of Public Economics* 58, 453–468.
- Ok, E.A., Koçkesen, L., 1997. Negatively Interdependent Preferences. C.V. Starr Center working paper 97-01, New York University.
- Oswald, A.J., 1983. Altruism, jealousy and the theory of optimal non-linear taxation. *Journal of Public Economics* 20, 77–87.
- Persson, M., 1995. Why are taxes so high in egalitarian societies?. *Scandinavian Journal of Economics* 97, 569–580.
- Romer, T., 1975. Individual welfare, majority voting, and the properties of a linear income tax. *Journal of Public Economics* 4, 163–186.
- Roberts, K., 1977. Voting over income tax schedules. *Journal of Public Economics* 7, 127–133.
- Snyder, J.M., Kramer, G.H., 1988. Fairness, self interest, and the politics of the progressive income tax. *Journal of Public Economics* 36, 197–230.
- Tuomala, M., 1990. *Optimal Income Tax and Redistribution*. Clarendon Press, Oxford.