A Contribution to the Positive Theory of Direct Taxation

Emanuele, Canegrati

London School of Economics and Political Science

5 December 2007

A Contribution to the Positive Theory of Direct Taxation

Emanuele Canegrati[a,b*]
[a]Department of Economics, UCSC, Milan, V. Necchi 5, 20123, Italy
[b]STICERD and Economics Department,
London School of Economics and Political Science,
Houghton Street, London, WC2A 2AE, UK

November 21, 2007

Abstract

In this paper I analyse a probabilistic voting model where political candidates choose a direct taxation policy to maximise the probability of winning elections. Society is divided into groups which have different preferences for consumption of leisure or, in other words, are differently single-minded on the amount of leisure. The use of a probabilistic voting model characterized by the presence of single-minded groups breaks down the classic results obtained by using the median voter theorem, because it is no longer only the level of income which drives the equilibrium policies but also the ability of groups to focus on leisure. The robustness of these results is also demonstrated in the presence of heterogeneity in the labour income. Finally, using data from the Luxemburg Income Study, I demonstrate that the cohort-specific inequality is significantly affected by the structure of the taxation system and that policies chosen by politicians do not seem to be originated by the goal of equality.

J*EL Classification*: D31, D63, D78, H24, J22

Keywords: Probabilistic Voting Theory, Single-mindedness, Direct Taxation, Income Distribution

*Corrisponding author (E-mail: e.canegrati@lse.co.uk)

1 Introduction

All modern democracies impose direct taxes on income in order to achieve redistribution goals. A common belief taken from the optimal theory of taxation affirms that a better income distribution may be achieved via a system where income tax paid as a fraction of before-tax income increases somewhat with income. Nevertheless, even though statutory schedules are revised from time to time, the stylised facts show that in Britain and America "from the 1970s to the 1990s inequality rose in both countries" and "redistribution toward the poor tends to happen least in those times and polities where it would seem most justified by the usual goal of welfare policy" (Lindert (2000)). Other evidence which shows an increasing level of inequality within industrialized countries was found by Gottschalk and Smeeding (2000). Finally, a comprehensive study made by the United Nations (WIDER 2000) demonstrated that a recent increase in inequality has taken place in several countries such as Australia, United Kingdom, United States, Chile, Peru, Bangladesh, China, Philippines and Poland. As a result, it seems that redistribution and equity goals are far from being reached even in more industrialised countries.

It is interesting to investigate the possible causes of this failure and this paper suggests that an explanation can be found in the analysis of the political process. In particular, I suggest that the level of inequality in income distribution is due to the existence of voter-seeking candidates who maximise the probability of winning elections instead of the social welfare function as in the theory of optimal taxation. This is of course not a completely new attempt. Some economists who tried to find a political economy explanation to redistribution issues were concerned with the schedule that emerges in a political equilibrium, with the prior question as to whether an equilibrium exists (Boadway and Keen, 2000). First works using the Median Voter Theorem failed to achieve this goal, because of the impossibility of finding a Condorcet winner. Since single-peakedness of preferences on tax rates is a sufficient condition to find a median voter equilibrium, the conditions for the existence of single-peaked preferences must be examined. Itsumi (1974) demonstrated that the non-single-peakedness of utility curves is more likely to arise when the dispersion of ability is larger and the preference for leisure is greater and it happens to individuals just below the average ability class. Romer (1975) demonstrated that single-peakedness condition is achievable only in a situation where unemployment does not exist. If this is not the case the size of the work force changes as the tax rate changes; and so the behaviour of all of the interesting variables becomes crucially dependent on the entire skill distribution. As a result, the hypothesis of single-peakedness for all individuals is no longer guaranteed. Nevertheless, Roberts (1977) demonstrated that a Condorcet winner exists even if the single-peakedness condition is not satisfied; it is sufficient that preferences satisfy the *hierarchical adherence* condition, that is that there exists an ordering of individuals such that the pre-tax income is monotonically increasing irrespective of the tax schedule. More recently, Gans and Smart (1996) demonstrated that the existence of a Condorcet winner is guaranteed by the Mirrlees-Spence single-crossing condition. Nevertheless, all approaches using the Median Voter Theorem fail once we assume that voters vote over multi-dimensional issues. Furthermore, the *hierarchical adherence* condition seems to be particularly restrictive, since it does not allow for the possibility that an individual may dislike a small increase in the marginal tax rate if this increase causes a large reduction in his labour supply but may prefer further increases if his labour supply function entails a small decrease of labour under that rate.

Instead, probabilistic voting models support the existence of multi-dimensional policies and thus they are more suitable in explaining political equilibria. Coughlin (1986), Lindbeck and Weibull (1987,1993) studied a problem of redistribution using probabilistic voting with lump-sum transfers. An interesting result achieved by these models states that the lower the loyalty of a voter for a party, the more generous the transfer he gets. In political economy literature these less loyal individuals are called *swing voters* in order to denote their proclivity to swing from one party to another as a consequence of a small change in policy. Unfortunately, as explained by Canegrati (2006), lump-sum taxation is never used in practise, while the distribution of income takes always place via income taxation.

In this paper I use the Probabilistic Voting Theory in order to explain why, in the real world, the use of direct taxation may not necessarily lead to an increase in equity. Exploiting the framework suggested by Atkinson and Stiglitz (1980), but moving from the hypothesis that political candidates are not benevolent but simple voter-seekers, I will demonstrate that, in order to win elections, a candidate must favour the most powerful or "single-minded" groups. That is, those groups which, due to their idiosyncratic preference for leisure, are more able to focalise on leisure have a stronger political power and are more influencing in determine the outcome of policies. Should these single-minded components be located amongst the richest individuals of society, we would achieve an equilibrium where direct taxation is no longer an instrument to reduce inequality, but a tool which increases it, favouring the most powerful group.

2 A model of direct taxation

I consider a society divided in H groups, indexed by $h = 1, ..., H$. Groups have size f^h, and their members are perfectly identical. Two political candidates, $j = D, R$, run for an election. Both candidates have an ideological label (for example, Democrats and Republicans), exogenously given. Voters' welfare depends on two components; the first is deterministic and it is represented by consumption, whilst the second is stochastic and derives from personal attributes of candidates.

I assume that each individual in group h derives his consumption from only one good. The stochastic component is captured by expression $D^R \cdot \left(\xi^h + \varsigma\right)$, where the indicator function

$$D^R = \begin{cases} 1 & if\ R\ wins \\ 0 & if\ D\ wins \end{cases}$$

Term $\varsigma \lesseqgtr 0$ reflects candidate R's popularity amongst the electorate and it is realized between the announcement of policies and elections. It is not idiosyncratic and it is uniformly distributed

$$\varsigma \sim U\left[-\frac{1}{2}, \frac{1}{2}\right]$$

with mean zero. Otherwise, term $\xi^h \lesseqgtr 0$ represents an idiosyncratic component which measures voters' preferences for candidate R. It cannot be perfectly observed by candidates and it is uniformly distributed

$$\xi^h \sim U\left[-\frac{1}{2s^h}, \frac{1}{2s^h}\right]$$

again with mean zero and density s^h.

Hence, each individual in group h has the following utility function

$$U^h = U\left(c^h, l^h; \psi^h\right) + D^R \cdot \left(\xi^h + \varsigma\right) \tag{1}$$

where c^h denotes consumption, l^h labour and ψ^h is a parameter which captures the preference of groups for leisure. The utility function is increasing in consumption and decreasing in labour. The labour income is given by $I^h = wl^h$ where w denotes the real wage, equal for every group. Income is taxed according to a linear taxation $T(I^h) = -X^{jh} + t^j I^h$, $X^{jh} > 0$ represents a fixed subsidy and t^j is the marginal tax rate on labour. In the absence of savings, consumption of individuals may be written as

$$c^h = X^{jh} + \left(1 - t^j\right) wl^h \tag{2}$$

I introduce now three useful definition[1]

Definition 1 ***(Single-mindedness)*** *group A is said to be more single-minded than group B with respect to leisure if the weight assigned by A is greater than the weight assigned by B. That is, if* $\psi^A > \psi^B$.

Definition 2 ***(Political power)*** *group A is said to be more politically powerful than group B if its density is higher than B's. That is if* $s^A > s^B$.

Definition 3 *the density function of a group is monotonically increasing in the amount of leisure. That is* $s^h = s(l^h)$, *with* $\frac{\partial s^h}{\partial l^h} > 0$.

Substituting 2 in 1, we may write the following maximisation problem:

$$\max_{\{l^h\}} \; U\left(X^{jh} + \left(1 - t^j\right) wl^h, l^h; \psi^h\right) + D^R \cdot \left(\xi^h + \varsigma\right)$$

whose resolution yields the optimal choice for leisure $l^{h*} = l\left(X^{jh}, \left(1 - t^j\right) w\right)$ and the Indirect Utility Function

$$V\left(X^{jh}, \left(1 - t^j\right) w; \psi^h\right) = \tag{3}$$

$$= U\left(X^{jh} + \left(1 - t^j\right) wl^h\left(X^{jh}, \left(1 - t^j\right) w\right), l^h\left(X^{jh}, \left(1 - t^j\right) w\right); \psi^h\right)$$

Candidates maximize the probability of winning elections under the balanced-budget constraint

$$\sum_h f^h\left(t^j wl^h - X^{jh}\right) = 0$$

They realize that the choice on tax rates modifies individuals' choice on the amount of labour to supply. Deriving 3 with respect to X^{jh} and t^j we obtain

[1] For a more in details explanation of these definitions, see Canegrati (2006)

$\frac{\partial V^h}{\partial X^{jh}} = \lambda^h$ and $\frac{\partial V^h}{\partial t^j} = -\lambda^h w l^h$, where λ^h represents the marginal utility of income for group h. Candidates must choose an optimal policy vector $\eta^j = \left[t^j, X^{j1}, ..., X^{jH}\right] \in \Phi^j \subset \mathbb{R}^{H+1}$.

The Lagrangian function for candidate j is

$$\mathcal{L}^j = \frac{1}{2} + \frac{d}{s}\sum_h f^h s^h \left[V\left(\eta^j\right) - V\left(\eta^{-j}\right)\right] + \mu^j \left(\sum_h f^h \left(t^j w l^h - X^{jh}\right)\right) \tag{4}$$

Referring to Canegrati (2006)[2] we may write first order conditions in the following fashion

$$\begin{cases} \frac{\partial \mathcal{L}^j}{\partial X^{jh}} = \frac{d}{s}\sum_h s^h f^h \lambda^h + \mu^j \sum_h \left(t^j w \frac{\partial l^h}{\partial X^{jh}} - n\right) = 0 \\ \frac{\partial \mathcal{L}^j}{\partial t^j} = -\frac{d}{s}\sum_h s^h f^h \lambda^h w l^h + \mu^j \sum_h \left(t^j w \frac{\partial l^h}{\partial t^j} - \sum_h w l^h\right) = 0 \\ \frac{\partial \mathcal{L}^j}{\partial \mu^j} = \sum_h f^h \left(t^j w l^h - X^{jh}\right) = 0 \end{cases}$$

Dividing $\frac{\partial \mathcal{L}^j}{\partial X^{jh}}$ by μ^j we obtain

$$\frac{\partial \mathcal{L}^j}{\partial X^{jh}} = \frac{d}{\mu^j s}\sum_h s^h f^h \lambda^h + \sum_h \left(\tau^j w \frac{\partial l^h}{\partial X^{jh}} - n\right) = 0$$

Differentiating l^h with respect to t^j we obtain $\frac{\partial l^h}{\partial t^j} = -\frac{\partial l^h}{\partial w}$. Applying the Slutzky decomposition we obtain $\frac{\partial l^h}{\partial w} = \frac{\partial l^{hc}}{\partial w} + \frac{\partial l^h}{\partial X^{jh}} l^h$, where $\frac{\partial l^{hc}}{\partial w} > 0$ represents the compensative variation of labour supply. Substituting in $\frac{\partial \mathcal{L}^j}{\partial t^j}$, we obtain

$$\frac{\partial \mathcal{L}^j}{\partial t^j} = -\frac{d}{s}\sum_h s^h f^h \lambda^h w l^h + \mu^j \left\{\sum_h \left(t^j w \left[-\left(\frac{\partial l^{hc}}{\partial w} + \frac{\partial l^h}{\partial X^{jh}} l^h\right)\right] + \sum_h w l^h\right)\right\} = 0 \tag{5}$$

and rearranging terms

$$\frac{\partial \mathcal{L}^j}{\partial t^j} = -\sum_h \left(\frac{d}{s} s^h f^h \lambda^h + \mu^j t^j w \frac{\partial l^h}{\partial X^{jh}}\right) w l^h + \tag{6}$$

$$+\mu^j \frac{t^j}{1-t^j}\sum_h l^h w \left[-\left(1-t^j\right)\left(\frac{\partial l^{hc}}{\partial w}\frac{1}{l^h}\right)\right] + \mu^j \sum_h w l^h = 0$$

Let us define $\epsilon^{jh} := w\left(1-t^j\right)\left(\frac{\partial l^{hc}}{\partial w}\frac{1}{l^h}\right)$ as the compensated elasticity of

[2] see Proposition 6 and Corollary 7

labour price for group h and re-write 6 as

$$\frac{\partial \mathcal{L}^j}{\partial t^j} = -\sum_h \left(\frac{d}{s} s^h f^h \lambda^h + \mu^j t^j w \frac{\partial l^h}{\partial X^{jh}} \right) w l^h - \mu^j \frac{t^j}{1-t^j} \sum_h l^h w \epsilon^{jh} + \mu^j \sum_h w l^h = 0 \tag{7}$$

Furthermore, let us impose $\varphi^h := \frac{d}{s} s^h f^h \lambda^h + \mu^j t^j w \frac{\partial l^h}{\partial X^{jh}}$, $I^h = w l^h$ and substitute again in 7 we obtain

$$\frac{\partial \mathcal{L}^j}{\partial t^j} = -\sum_h \varphi^h I^h - \mu^j \frac{t^j}{1-t^j} \sum_h I^h \epsilon^{jh} + \mu^j \sum_h I^h = 0 \tag{8}$$

Re-arranging terms we obtain the following expression:

$$\frac{t^j}{1-t^j} = \frac{\sum_h I^h - \sum_h \varphi^h I^h}{\sum_h I^h \epsilon^{jh}} \tag{9}$$

where $\overline{\varphi} := \frac{\sum_h \varphi^h}{n}$. Finally we obtain

$$\frac{t^j}{1-t^j} = \frac{n \overline{I} \overline{\varphi} - \sum_h \varphi^h I^h}{\sum_h I^h \epsilon^{jh}} = -\frac{cov\left(\varphi^h, I^h\right)}{\sum_h I^h \epsilon^{jh}} \tag{10}$$

where $\overline{I}$ represents the average income. The covariance on the right hand side of 10 is made by terms φ^h and I^h. φ^h represents the candidate marginal probability of income in group h and it is composed by two terms

1. $\frac{d}{s} s^h f^h \lambda^h$ which measures by how much an increase in the utility of a group affects the probability of winning elections at the margin and represents the weight attached to a change in individual's income by candidates. This weight is greater for more single-minded groups if the function expressing the probability of winning elections is strictly concave. Notice that λ^h is greater for the poorest individuals, because marginal utility of income is decreasing with respect to income. Nevertheless, the poor do not get more favourable taxation than the rich if their political power is not sufficient to capture politicians;

2. the effect of an extra-dollar on revenues, weighted by μ which translates a change in revenues in the probability of winning.

Let us now analyse 10 starting from the left-hand side. Notice that

$$\frac{\partial}{\partial t^j}\left(\frac{t^j}{1-t^j}\right)=\frac{1}{\left(1-t^j\right)^2}>0$$

As a consequence, the tax rate is higher the higher is the right-hand side.

Proposition 4 *the tax rate is lower the higher is the political power of the social group.*

Proof. notice that expression $\frac{t^j}{1-t^j}$ is lower the higher is φ^h. The political power of a group is captured by the expression $\frac{d}{s}s^h f^h$, since the higher the size and the density of a group, the higher the power of its influence as a consequence of a variation in the redistribution policy chosen by the Government. ■

3 A model with income heterogeneity

Suppose now that the segmentation of society in groups is made according to two dimensions: preferences for leisure and wages. That is, individuals differ also for their levels of income. Then, I suppose that the constituency may be clustered in $H \times K$ groups, where H represents the number of groups obtained by clustering the population with respect to preference for leisure and K the number of groups obtained by clustering with respect to labour income. Thus, each individual belongs to a cluster $\{h, k\}$, where $h = 1, ..., H$ indexes groups according to the preference of individuals for leisure and $k = 1, ..., K$ indexes groups according individuals' income. The deterministic component of utility of an individual h, k is written as:

$$U^{h,k}=U\left(c^{h,k},l^{h,k};\psi^h\right) \tag{11}$$

and the consumption

$$c^{h,k}=X^{jh,k}+\left(1-t^j\right)w^k l^{h,k} \tag{12}$$

The stochastic component is captured by expression $D^R\cdot\left(\xi^h+\pi^k+\varsigma\right)$, which this time encompasses another idiosyncratic variable, π^k. The two idiosyncratic variables are uniformly distributed on intervals $\left[-\frac{1}{2s^h},\frac{1}{2s^h}\right]$ and $\left[-\frac{1}{2s^k},\frac{1}{2s^k}\right]$, respectively. Variable ξ^h captures political preferences of voters according to their preferences for leisure, whilst variable π^k captures the political preferences of voters according to their labour income. For example, a voter in the cluster $\{h,k\}$ may prefer candidate D to candidate R for the first dimension, because the former chooses a policy which better reflects his needs for leisure, but in the same breath may prefer candidate R to candidate D for the second dimension because it chooses a policy which strongly protects his income.

The new maximisation problem may be written as

$$\max_{\{l^{h,k}\}} U^{h,k}\left(X^{jh,k} + \left(1-t^j\right) w^k l^{h,k}, l^{h,k}; \psi^h\right) + D^R \cdot \left(\xi^h + \pi^k + \varsigma\right)$$

Candidates maximise the following Lagrangian function

$$\mathcal{L}^j = \frac{1}{2} + \frac{d}{s^1 s^2}\sum_h\sum_k f^{h,k} s^h s^k \left[V\left(\eta^j\right) - V\left(\eta^{-j}\right)\right] + \tag{13}$$

$$\mu^j\left(\sum_h\sum_k f^{h,k}\left(t^j w^k\left(1-l^{h,k}\right) - X^{jh,k}\right)\right)$$

where $s^1 := \sum_h s^h f^h$ and $s^2 := \sum_k s^k f^k$.

First order conditions are

$$\begin{cases} \frac{\partial \mathcal{L}^j}{\partial X^{jh,k}} = \frac{d}{s^1 s^2}\sum_h\sum_k s^h f^{h,k}\lambda^{h,k} + \mu^j \sum_h\sum_k\left(t^j w^k \frac{\partial l^{h,k}}{\partial X^{jh,k}} - n\right) = 0 \\ \frac{\partial \mathcal{L}^j}{\partial t^j} = -\frac{d}{s^1 s^2}\sum_h\sum_k s^h f^{h,k}\lambda^{h,k} w^k l^{h,k} + \mu^j\sum_h\sum_k\left(t^j w^k \frac{\partial l^{h,k}}{\partial t^j} - \sum_h\sum_k w^k l^{h,k}\right) = 0 \\ \frac{\partial \mathcal{L}^j}{\partial \mu^j} = \sum_h\sum_k f^{h,k}\left(t^j w^k l^{h,k} - X^{jh,k}\right) = 0 \end{cases}$$

Again exploiting the Roy identity and the Slutzky decomposition we can re-write the derivative of the Lagrangian with respect to the tax rate as follows

$$\frac{\partial \mathcal{L}^j}{\partial t^j} = -\frac{d}{s^1 s^2}\sum_h\sum_k s^h s^k f^{h,k}\lambda^h w^k l^{h,k} + \tag{14}$$

$$\mu^j\left\{\sum_h\sum_k\left(t^j w^k\left[-\left(\frac{\partial l^{h,kc}}{\partial w^k} + \frac{\partial l^{h,k}}{\partial X^{jh,k}} l^{h,k}\right)\right] + \sum_h\sum_k w^k l^{h,k}\right)\right\} = 0$$

and re-arranging terms we obtain

$$\frac{\partial \mathcal{L}^j}{\partial t^j} = -\sum_h\sum_k \left(\frac{d}{s^1s^2}s^hs^kf^{h,k}\lambda^hw^kl^{h,k} + \mu^jt^jw^k\frac{\partial l^{h,k}}{\partial X^{jh,k}}\right)w^kl^{h,k} +$$
$$\mu^j\frac{t^j}{1-t^j}\sum_h\sum_k w^kl^{h,k}\left[-\left(1-t^j\right)\left(\frac{\partial l^{h,kc}}{\partial w^k}\cdot\frac{1}{l^{h,k}}\right)\right] + \mu^j\sum_h\sum_k w^kl^{h,k} = 0$$

Let us define $\varphi^{h,k} := \frac{d}{s^1s^2}s^hs^kf^{h,k}\lambda^h + \mu^jt^jw^k\frac{\partial l^{h,k}}{\partial X^{jh,k}}$ and substitute we obtain:

$$\frac{t^j}{1-t^j} = \frac{\sum_h\sum_k I^{h,k} - \sum_h\sum_k \varphi^{h,k}I^{h,k}}{\sum_h\sum_k I^{h,k}\epsilon^{jh,k}} \tag{15}$$

And defining $\overline{\varphi} := \frac{\sum_h\sum_k \varphi^{h,k}}{n}$ we finally obtain

$$\frac{t^j}{1-t^j} = \frac{n\overline{I}\overline{\varphi} - \sum_h\sum_k \varphi^{h,k}I^{h,k}}{\sum_h\sum_k I^{h,k}\epsilon^{jh,k}} = -\frac{cov\left(\varphi^{h,k}, I^{h,k}\right)}{\sum_h\sum_k I^{h,k}\epsilon^{jh,k}} \tag{16}$$

This time, the mindedness of individuals is two-dimensional and thus, the political power of groups depends on the combination of the two mindedness. Notice that density functions enter $\varphi^{h,k}$ in a multiplicative way, meaning that a weak-minded group on a dimension may reinforce its total mindedness thanks to being strong-minded on the other dimension. Nevertheless, the main achievement of the Single-mindedness Theory still holds; the tax rate will be lower the higher is the political power of the group, since $\frac{t^j}{1-t^j}$ is lower the higher $\varphi^{h,k}$. This allows us to affirm that results of the theory, which affirms that more single-minded groups are the most favoured groups by a taxation policy, are robust even in a multi-dimensional space.

4 Measuring income inequality at a microeconomic level

We now have all the elements to measure how groups' welfare is affected by the decisions taken by self-interested candidates who choose their taxation policy in order to maximise the probability of winning elections. The goal of this section is twofold: measuring the difference in the level of inequality amongst age groups and analysing the relation between this inequality and the structure of taxations systems. To the best of my knowledge this is the first attempt to measure the cohort-specific inequality and the first time that the Gini index is disaggregated at a microeconomic level in order to capture in a more precise way the differences in inequality amongst social groups. In other words, I suggest that the Gini index measured at a `macroeconomic level` to capture the general inequality levels of countries, is the result of many Gini indexes calculated at a `microeconomic level`. Calculating Gini indexes at a microeconomic levels allows us to evaluate more precisely the impact of the Government's policies on groups' welfare, something which cannot be made by using the Gini index calculated at a country level.

The question addressed is: which are the age groups which are afflicted by the highest degree of inequalitity? In order to answer this question we must remember that inequality measurement is always an attempt to give meaning to comparisons of income distributions in terms of criteria which may be derived from ethical principles, appealing mathematical constructs or simple intuition (Cowell, 2000). As a consequence, before measuring the level of inequality in practise it is necessary to define the concepts, the ranking criteria and the indices necessary to achieve our goal.

4.1 Distributional and Ranking concepts

I will denote by $\mathcal{F}$ the space of all univariate probability distributions with support $\Lambda \subseteq \Re; x \in \Lambda$ represents a particular value of income and $F \in \mathcal{F}$ one of the possible income distribution. So $F(x \leq \widetilde{x})$ represents the proportion of population with income less than $\widetilde{x}$. Furthermore define $\underline{x} := inf(\Lambda)$ and denote by $\mathcal{F}(\varrho) \subseteq \mathcal{F}$ a subset with given mean $\varrho : \mathcal{F} \mapsto \Re$ given by

$$\varrho(F) := \int x dF(x) \tag{17}$$

and $f : \Lambda' \mapsto \Re$ as a density function, supposed that F is continuous over some intervals $\Lambda' \subseteq \Lambda$. Furthermore, in order to compare distributions, I assume the existence of a complete and transitive binary relation $\succcurlyeq_I$on $\mathcal{F}$, called *inequality ordering* and represented by $I : F \mapsto \Re$, if the ordering is continuous.[3]

In order to compare distributions we also need some ranking criteria over $\mathcal{F}$. I use the notation $\succcurlyeq_T$to indicate the *ranking* induced by a comparison principle T. Three possible situations arise:

[3] I assume that axioms of *Anonymity*, *Population Principle*, *Principle of Transfers*, *Monotonicity*, *Scale Invariance*, *Decomposability*, *Uniform income growth* and *Translation Invariance* (Cowell, 2000) are satisfied.

Definition 5 *For all* $F, G \in \mathcal{F}$:

(a) (strict dominance) $G \succ_T F \Leftrightarrow G \succcurlyeq_T F \quad \wedge \quad F / \succcurlyeq_T G$.
(b) (equivalence) $G \sim_T F \Leftrightarrow G \succcurlyeq_T F \quad \wedge \quad F \succcurlyeq_T G$.
(c) (non-comparability) $G \perp_T \quad F \Leftrightarrow G / \succcurlyeq_T F \quad \wedge \quad F / \succcurlyeq_T G$.

Suppose now to focus on the concept of social-welfare function, expressed in the following additively separable form:

$$W(F) = \int u(x)\, dF(x) \tag{18}$$

where $u : \mathcal{F} \mapsto \Re$ is an evaluation function. Denote by $\hat{W}_1$ the subclass of SWFs where u is increasing and by $\hat{W}_2$ the subclass of $\hat{W}_1$ where u is also concave. Furthermore, define the set of age years A where a is a given age in A. Finally, introduce the following

Definition 6 *For all* $F \in \mathcal{F}$, $a \in A$ *and for all* $0 \leq q \leq 1$, *the quantile functional for a given age year is defined by*

$$Q(F; (q, a)) = \inf \{x | F(x) \geq q, a\} = x_{qa} \tag{19}$$

This definition enables us to state the theorem of *first-order distributional dominance*

Theorem 7 $G \succcurlyeq_Q F \Leftrightarrow W(G) \geq W(F)\ \forall \left(W \in \hat{W}_1\right)$

Otherwise, if we consider this other

Definition 8 *For all* $F \in \mathcal{F}$, $a \in A$ *and for all* $0 \leq q \leq 1$, *the cumulative income functional for a given age year is defined by*

$$C(F; (q, a)) := \int_{x}^{Q(F;(q,a))} x dF(x) \tag{20}$$

[4]

which leads us to the theorem of *second-order distributional dominance*

Theorem 9 $\forall F, G \in \mathcal{F}\ (\varrho) : G \succcurlyeq_C F \Leftrightarrow W(G) \geq W(F)\ \forall \left(W \in \hat{W}_2\right)$

[4] The graph $C(F; q)$ against q describes the *generalised Lorenz curve*

Suppose now that a distribution depends on the effects of a policy $p \in P$, where P is the space of all the possible policies. Without loss of generality, I suppose that $P = \left\{p^1, p^2\right\}$. Suppose also that distribution F is obtained under policy p^1 and distribution G is obtained under policy p^2. We may denote by $F = F\left(p^1, a\right)$ and $G = G\left(p^2, a\right)$ the distribution obtained under the two policies for a given age group a.

We want to define a comparison criterion for judging policies and their effects on the distribution of age groups.

Theorem 10 *(First-order distributional dominance) For all* $p^1, p^2 \in P$*,* $a \in A$ *:* $p^1 \succcurlyeq_Q p^2 \Leftrightarrow W\left(F\left(p^1, a\right)\right) \geq W\left(G\left(p^2, a\right)\right) \; \forall \left(W \in \hat{W}_1\right)$

Theorem 11 *(Second-order distributional dominance) For all* $p^1, p^2 \in P$*,* $a \in A$*,* $F, G \in \digamma\ (\varrho) : p^1 \succcurlyeq_C p^2 \Leftrightarrow W\left(F\left(p^1, a\right)\right) \geq W\left(G\left(p^2, a\right)\right) \; \forall \left(W \in \hat{W}_2\right)$

These two theorems simply state that a policy q^1 is preferred to policy q^2 if and only if `the welfare obtained under the distribution it generates is higher than the welfare obtained under the distribution generated by the other policy for every age group`. Notice that this condition must hold *for every age group*; that means that we should see an improvement in welfare of all cohorts.

4.2 Decomposition indices

The Generalised Entropy measure is the more suitable index to analyse inequality within and between groups because of its decomposability. It may be written as

$$GE(\alpha) = \overbrace{\int_h f^h \left(\frac{x_h}{x}\right)^\alpha I_h(\alpha)}^{within-group\ inequality} + \overbrace{I_{bet}(\alpha)}^{between-group\ inequality} \tag{21}$$

where

$$I_{bet}(\alpha) = \frac{1}{\alpha(\alpha - 1)} \left[\int_h f^h \left(\frac{x_h}{x}\right)^\alpha - 1\right] \tag{22}$$

The α in 22 is a parameter that characterises different members of the GE class: a high positive value of α yields an index that is very sensitive to income transfers at the top of the distribution. In particular, $GE(0)$ represents the mean logarithmic deviation, $GE(1)$ the Theil index, and $GE(2)$ the half of square of the coefficient of variation.

Another useful indicator to measure the inequality between groups is represented by Gini:

$$G = 1 + \frac{1}{N} - \left[\frac{2}{N^2 x}\right]\left[\int_h (N - h + 1)\, x_h\right] \tag{23}$$

where $N = \int w_h$, $w_h = f^h N$. When data are unweighted, $w_h = 1$ and $N = H$. Individuals are ranked in ascending order of h.

5 Empirical evidence from the Luxemburg Income Study

5.1 Dataset

The Luxembourg Income Study (LIS) is a panel database including 30 countries and made by 5 *waves* of data from 1979 – 2002. The source of data is represented by country specific household income surveys. For example, individual data from the United States is taken from the Current Population Survey. Datasets are identified by a code made by two letters denoting a country and two numbers which identify the wave of data. For instance, US00 identifies the wave 2000 for the United States. I used data of 17 countries (here with the relative LIS codes): `Austria` (`AT`), `Belgium` (`BE`), `Canada` (`CA`), `Czech Republic` (`CZ`), `Switzerland` (`CH`), `Germany` (`DE`), `Denmark` (`DK`), `Estonia` (`EE`), `Spain` (`ES`), `Finland` (`FI`), `France` (`FR`), `Greece` (`GR`), `Hungary` (`HU`), `Ireland` (`IE`), `Israel` (`IL`), `Italy` (`IT`), `Luxemburg` (`LU`), `Mexico` (`MX`), `Netherlands` (`NL`), `Norway` (`NO`), `Poland` (`PL`), `Romania` (`RO`), `Russia` (`RU`), `Slovak Republic` (`SK`), `Slovenia` (`SI`), `Sweden` (`SE`), `Taiwan` (`TW`), `United Kingdom` (`UK`) and `United States` (`US`).

The dataset includes data at an individual or household level, on demographics, expenditure, income, labor market outcomes and tax variables.

Inequality indexes were calculated using the definition of disposable income, calculated as follows:

`disposable income = compensation of employees + gross self-employment income + realised property income + occupational pensions`[5] `+ other`

[5]Occupational pensions include all pensions paid from non-social retirement schemes in-

`cash income`[6] `+ social insurance cash transfers`[7] `+ universal cash transfers`[8] `+ social assistance`[9] `- direct taxes - social security contributions`

This choice is natural because the disposable income allows us to assess the impact of taxation on individuals' welfare and thus to evaluate the degree of inequality as a result of the candidates' choice.

5.2 Cohort-specific inequality

In order to assess the level of inequality amongst cohorts I used the Jenkins' Stata routine `ineqdec0` which estimates a range of inequality and related indices (Generalized Entropy of class a, Atkinson class A(e), the Gini coefficient and the percentile ratios), plus decompositions of a subset of these indices by population subgroups. Calculations do not exclude values less than or equal to zero. Appendix 1 reports an example of results for the Generalized Entropy index of class 2 and the Gini index calculated for Austria[10]. Here I will briefly provide a description of data analysing the evolution of the indexes over time for every country.

1. *Austria*. It is characterised by a low level of inequality, with the average Gini index equal to 0.29 in 2000, lower then the levels reached in previous years. The maximum value of the Gini index was reached in 1995 (0.33) and since than it is decreased. The country has always been characterised for higher levels of inequality amongst the older cohorts, especially for individuals aged over 50.

2. *Belgium*. The country is characterised by a low level of inequality, with the Gini indexes constantly lower than 0.3. Nevertheless, the index worsen from 0.26 reached in 1985 to 0.286 in 2000. Nevertheless, in 2000 the situation had a more equitable distribution amongst cohorts, whilst before the inequality was more concentrated amongst elder cohorts.

cluding employer-based pensions for private sector workers and public employees.

[6] Other cash income includes regular private transfers, alimony and child support benefits, other sources of regular cash income, not classified above.

[7] Social insurance transfers include: accident or short-term disability pay, long-term disability pay, social retirement benefits (old age and survivors), unemployment pay, maternity allowances, military or veteran's benefis, other social insurance.

[8] Universal cash transfers include child and/or family allowances if paid directly by governments. Universal cash transfers paid as refundable income tax credits are counted as negative amounts in the income tax of some countries.

[9] Social assistance includes all income-tested and means-tested benefits, both cash and near-cash.

[10] Inter-generational indexes for all the other countries are available upon request to the author.

3. *Canada*. Canada has characterised by a medium level of inequality, with the Gini index which remained all in all steady over time. The higher levels of the Gini index is concentrated amongst the younger cohorts and the individuals aged over 45, even though these differences with respect to the average are not particularly high.

4. *Switzerland*. The inequality in Switzerland has been soundly reduced since 1982, when the Gini index was equal to 0.35, much higher than the same value calculated in 2000 (0.264). Wealth is well distributed amongst cohorts and we almost never observe values above 0.4. A slight increase in inequality levels is observable amongst people between 60 and 70, but still these values are not particularly high.

5. *Czech Republic*. The country is characterised by a low level of inequality and a very fair distribution of wealth amongst cohorts. The very low level of the variance (0.001) states that the difference from a cohort to another is minimal and we never observe values of the Gini index above 0.4.

6. *Germany*. The level of inequality is low, even though we observe a slight increase in the Gini index from 1984 to 2000. The distribution of wealth is very fair, and even amongst the younger and older components of society we do not observe radical changes with respect to the average.

7. *Denmark*. Denmark is characterised by a very low level of inequality, with an exception represented by 1995 when the Gini index was equal to 0.361. Nevertheless, we observe that amongst younger cohorts the inequality increases.

8. *Spain*. The country is characterised by a medium level of inequality and the situation remained all in all steady over years. The inequality increases when we consider people aged 60 and this situation has worsen in 2000.

9. *Finland*. The level of inequality is low, even though the situation has worsen since 1995. The wealth is well distributed amongst cohorts, with a slight increase in the values of the Gini index for individuals in their fifties.

10. *Hungary*. Like others former communist countries, the situation in Hungary in characterised by a general low level of inequality which has remained steady over the 1990s and by a well distribution of wealth amongst

different cohorts, with values of the Gini index which are almost never higher than 0.4. In particular this feature has improved since the beginning of the 1990s.

11. *Greece.* We do not have data in order to make a comparison, but still the situation of Greece is characterised by a medium level of inequality, with a general increase in the level of inequality amongst the younger and the elder cohorts.

12. *Ireland.* Ireland is characterised by a medium level of inequality. The situation has slightly improved since the end of the 1980s. The wealth is well distributed amongst cohorts, with higher levels of inequality observable amongst the elder components of society.

13. *Israel.* Inequality in Israel is particularly worsen since the end of the 1970s, with the Gini index which increased from 0.29 to 0.36. Nevertheless, if we analyse the redistribution of wealth amongst cohorts we may record an improvement during the recent years, where we do not observe great differences amongst cohorts, even though the level of the Gini index are slightly higher for elder cohorts.

14. *Italy.* Italy is characterised by a medium level of inequality. The situation is worsen over years and the Gini index has increased from 0.315 in 1986 to 0.356 in 2000. The country is characterised by the harmful phenomenon of the increase in the inequality amongst younger cohorts which, on average, has doubled or tripled (depending on the cohort analysed) in 2000. Differences are observable also amongst elder cohorts, even tough not in the same manner as for the younger.

15. *Luxemburg.* The country is characterised by a very low level of inequality, which has remained steady over time. The wealth is very well distributed amongst cohorts and the variance is amongst the lowest we observed.

16. *Mexico.* Mexico has one of the worse values of the Gini index. Over years the indicator has always been higher than 0.4, with values even higher than 0.5 in 1990s. The situation does not seem to be improved and we record very high level of the Gini index, sometimes higher than 0.6, especially amongst elder cohorts.

17. *The Netherlands.* The country is characterised by a very low level of inequality and the Gini index has improved from the 1980s, with a significant

improvement in 2000. The distributions of wealth amongst cohorts is very good, especially recently, and we do not observe any worsening in the Gini index amongst elder components of society.

18. *Norway.* Norway has a medium level of inequality, which is significantly improved since the end of the 1970s when the Gini index was equal to 0.46, even though the situation is worsening in recent years. As other Scandinavian countries, also Norway has a very fair redistribution of wealth amongst cohorts and this situation has been preserved over years.

19. *Poland.* Poland is characterised by a low level of inequality and the Gini index has improved recently with respect to the previous years. Like other former communist countries, wealth is well distributed amongst cohorts, since the variance is very low (0.001).

20. *Romania.* The country is characterised by a medium level of inequality and by a well distribution of wealth amongst cohorts.

21. *Russia.* The situation in Russia is particularly negative, especially if we consider that the country has one of the worst value for the Gini index (0.42 in 2000). It has also a bad distribution of wealth amongst cohorts, with a variance which is ten times the variance that we observe in Scandinavian countries. Unlike the other countries, Russia is characterised by having high Gini index concentrated amongst middle generations, whilst the values of the index are lower amongst the elder components of society.

22. *Sweden.* Like the other Scandinavian countries, also Sweden has relatively low levels of inequality which has remained steady over time and a very good distribution of wealth amongst cohorts, with values of the Gini index which are slightly higher for younger cohorts.

23. *Slovak Republic.* The country is characterised by a low level of inequality and a very good distribution of wealth amongst generations. In particular, observe that the level of variance (0.0009) is the lowest observed in our dataset.

24. *Slovenia.* Although we do not have many observations we may say that the country is characterised by low levels of inequality and a good distribution of wealth amongst cohorts.

25. *Taiwan.* The country is characterised by a medium level of inequality, even though the situation is worsened over the recent years. The country has always been characterised by higher levels of inequality amongst elder cohorts, especially for individuals aged 60.

26. *United Kingdom.* The country is characterised by a medium level of inequality, even though the situation has steadily worsened since the end of the 1960s. The distribution of wealth amongst cohorts is all in all good, but especially over the last year we observe a worsening in the Gini index amongst individuals aged 50.

27. *United States.* The country is characterised by a medium level of inequality and by a worsening in the level of distribution, even though the phenomenon has not reached the magnitude achieved by the United Kingdom. The system is fair and we do not observe particular spike in the distribution of wealth amongst cohorts.

5.3 Empirical Framework

In order to evaluate if and how the cohort-specific inequality depends on the structure of taxation system I run a regression using the gini index calculated by using the Jenkins' routine for every age group as dependent variable. The regressors are both variables which capture the characteristics of the taxation system and some control variables, such as the GDP growth rate, unemployment rate and consumer price index (CPI). Regressions were made only for 17 countries (Austria, Belgium, Canada, Switzerland, Germany, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Luxemburg, Mexico, Norway, Sweden, United States) because of the absence of data for the other countries, for year 2000. The specification of the model is the following

$$gini = \beta_0 + \beta_1 ttw + \beta_2 tmpit + \beta_3 nptdi + \beta_4 gdp99 + \quad (24)$$

$$+\beta_5 ur99 + \beta_6 cpi99 + \beta_{6+g} \sum_{g=1}^{61} d_g + \varepsilon_t$$

where

gini= age group Gini index (2000)

ttw is variable indicating the total tax wedge which may be one of the following:

ttw67 = Total tax wedge as a 67% of Average Wage; marginal personal income tax and social security contribution rates on gross labour income

ttw100 = Total tax wedge as a 100% of Average Wage; marginal personal income tax and social security contribution rates on gross labour income

ttw133 = Total tax wedge as a 133% of Average Wage; marginal personal income tax and social security contribution rates on gross labour income

ttw167 = Total tax wedge as a 167% of Average Wage; marginal personal income tax and social security contribution rates on gross labour income

attw67 = Total tax wedge as a 67% of Average Wage; average personal income tax and social security contribution rates on gross labour income

attw100 = Total tax wedge as a 100% of Average Wage; average personal income tax and social security contribution rates on gross labour income

attw133 = Total tax wedge as a 133% of Average Wage; average personal income tax and social security contribution rates on gross labour income

attw167 = Total tax wedge as a 167% of Average Wage; average personal income tax and social security contribution rates on gross labour income

tmpit = Top marginal personal income tax rates for employee (combined)

nptdi = Net personal Tax; overall statutory tax rates on dividend income

gdp99 = GDP Growth Rate 1999

ur99 = Unemployment rate 1999

cpi99 = Consumer price index 1999

$\mathbf{d}_g$ = dummy for age group g

The marginal and average tax rates "all-in" for employees includes personal income tax and employee social security contributions and less cash benefits, for a single individual without children at different income levels. Marginal tax rates measure how much of the extra wage income an individual worker keeps after taxes, whilst average tax rates measure how much total net income after tax changes if one decides to join (or exit from) the labour market (OECD, 2004).

The taxation of personal capital income varies substantially amongst OECD countries because some of them tax all personal capital income at a flat rate and wage and pensions at progressive rates (Dual-income tax); in other countries the taxation is progressive and the capital is taxed at more or less the same rates as labour (comprehensive income tax systems); finally in some countries we observe a semi-dual income taxation of capital income, since some capital is taxed at lower rates than wage income. Due to these differences, the OECD has chosen to use the taxation of dividends as a proxy for the taxation of capital, in order to allow for comparability. Appendix 2 reports the results of regressions and relative graphics of coefficients betas.

The total tax wedge and overall statutory tax rates on dividend income are always statistically significant at 1 per cent of the significant interval, meaning that these two variables have a great explanatory power for the cohort-specific inequality. More controversial is the evidence about the top marginal personal income tax rates for employee; this variable is significant at 5 per cent of the confidence interval only when we use the total tax wedge as a 133 and 167 per cent of the average wage with marginal personal income tax and as a 167 per cent of the average wage with average personal income tax.

As for the age groups dummies, we can observe that, most of the times, they are statistically significant at 1 per cent of the confidence interval for young cohorts; otherwise, they are never significant for old cohorts (especially for individuals aged 50 or more).

Therefore, overall results shows the existence of a strong relation between the taxation system and the inequality amongst age-groups, especially for younger individuals.

6 Concluding remarks

In this paper I analysed a probabilistic voting model of direct taxation where self-interested governments set their policies in order to maximise the probability of winning elections. Society is divided into groups who have different preferences for the consumption of leisure. The use of a probabilistic voting model characterized by the presence of single-minded groups changes the classic results of median voter models because it is no longer the level of income which drives the equilibrium policies but the ability of groups to focus on leisure, instead. This ability enables them to achieve a strong political power which candidates cannot help going along with, because they would lose the elections otherwise. I also show the robustness of the single-mindedness theory in a two-dimensional setting, where individuals differ also for their levels of income, not only preference for leisure. Results from the Luxemburg Income Study corroborate the theoretical results and show how goals in terms of cohort-specific inequality are still very far from being reached in the real world.

Acknowledgement 12 *I am particularly grateful to Mario Gilli, Frank Cow-*

ell, Sangamitra Bandyopadhyay and Fernando Aragon for useful comments and to the Luxemburg Income Study staff for the kindness. To the Toyota Centre at the London School of Economics where this paper was written. All errors are mine.

7 Appendix 1

AUSTRIA

age	gen2_AT81	gen2_AT87	gen2_AT94	gen2_AT95	gen2_AT97	gen2_AT00
19	0.27523	0.04553	0.22233	0.40876	0.20567	0
20	0.21493	0.08294	0.38405	0.47644	0.10894	0.02608
21	0.20278	0.13421	0.22409	0.39933	0.18989	0.12403
22	0.16485	0.14668	0.12977	0.26077	0.14164	0.26366
23	0.20968	0.13639	0.16412	0.35486	0.18645	0.16583
24	0.183	0.12371	0.16439	0.21554	0.12458	0.06911
25	0.12369	0.0986	0.12998	0.27466	0.14559	0.08143
26	0.13922	0.10477	0.1369	0.16417	0.10172	0.13755
27	0.13348	0.08437	0.27687	0.2169	0.07776	0.09473
28	0.12026	0.09914	0.12282	0.15547	0.11324	0.08929
29	0.11832	0.12484	0.12105	0.17941	0.16818	0.09229
30	0.10514	0.07123	0.12206	0.14645	0.07855	0.0828
31	0.12493	0.07577	0.13736	0.12271	0.13538	0.12616
32	0.12843	0.09248	0.11921	0.12224	0.14661	0.12119
33	0.12578	0.06034	0.09069	0.12836	0.06415	0.25269
34	0.11477	0.07832	0.13371	0.12119	0.05808	0.09634
35	0.11387	0.06752	0.07042	0.12258	0.18114	0.19637
36	0.10709	0.06045	0.36603	0.18879	0.07509	0.09409
37	0.10542	0.0819	0.11164	0.14147	0.08084	0.07739
38	0.12518	0.08893	0.16063	0.10928	0.06272	0.23582
39	0.1198	0.12965	0.28495	0.12378	0.22948	0.09471
40	0.11621	0.0734	0.19278	0.1259	0.09638	0.06439
41	0.11476	0.10087	0.09561	0.13351	0.12711	0.06265
42	0.14295	0.1029	0.11324	0.13888	0.3054	0.1261
43	0.11068	0.10255	0.10202	0.1121	0.13436	0.13967
44	0.1123	0.11499	0.29329	0.15698	0.09731	0.09694
45	0.14254	0.12846	0.13047	0.13542	0.25254	0.08503
46	0.14773	0.1432	0.09814	0.1402	0.10193	0.09825
47	0.15354	0.1382	0.3126	0.15642	0.17973	0.14639
48	0.14812	0.14279	0.14581	0.16197	0.12727	0.13686
49	0.1721	0.13782	0.11283	0.15114	0.12356	0.11355
50	0.16461	0.15592	0.19426	0.16682	0.20683	0.3045
51	0.17518	0.17292	0.18427	0.16892	0.14611	0.08092
52	0.17536	0.19792	0.13339	0.19878	0.15831	0.12516
53	0.14163	0.18818	0.2575	0.17703	0.14604	0.16831
54	0.17207	0.15597	0.317	0.17525	0.1299	0.26289
55	0.1933	0.19222	0.26579	0.20559	0.17101	0.07751
56	0.17301	0.15026	0.16685	0.20935	0.18652	0.15374
57	0.21078	0.23471	0.29849	0.18397	0.16035	0.19093
58	0.17809	0.14317	0.20851	0.19244	0.29088	0.1275
59	0.24858	0.19516	0.16402	0.19507	0.18774	0.16268
60	0.23237	0.1913	0.14822	0.22121	0.18515	0.2102
61	0.35633	0.27229	0.17028	0.18902	0.12613	0.36048
62	0.29752	0.20967	0.17248	0.23411	0.13744	0.225
63	0.25695	0.25638	0.39155	0.2236	0.16006	0.17547
64	0.2984	0.25927	0.14831	0.22759	0.18302	0.12149
65	0.30494	0.25167	0.24476	0.22662	0.20914	0.24762
66	0.2042	0.19542	0.1497	0.18072	0.15705	0.30201
67	0.34052	0.20299	0.1706	0.22394	0.182	0.28207
68	0.22707	0.16918	0.19639	0.20563	0.33885	0.17858
69	0.29017	0.18181	0.14626	0.21686	0.14935	0.14879

7.1

70	0.16389	0.20754	0.2764	0.24003	0.13561	0.25692
71	0.21415	0.21932	0.18063	0.23711	0.20396	0.26261
72	0.23721	0.27098	0.18201	0.24913	0.2422	0.22027
73	0.24773	0.21071	0.24251	0.24612	0.25004	0.11828
74	0.33316	0.25256	0.30121	0.25233	0.13601	0.21595
75	0.08446	0.22245	0.16496	0.23895	0.23343	0.14067
76	0.31632	0.16431	0.25675	0.20827	0.34988	0.23612
77	0.25462	0.21869	0.30179	0.25463	0.27684	0.15107
78	0.2384	0.2024	0.0738	0.17864	0.26674	0.28586
79	0.32036	0.27349	0.30181	0.18722	0.18339	0.53275
80	0.29263	0.41491	0.23909	0.25137	0.18485	0.33009
81	0.18971	0.25238	0.3126	0.20594	0.20055	0.20875
82	0.34148	0.15121	0.64463	0.29873	0.34728	0.23852
83	0.30446	0.14992	0.14279	0.1739	0.22801	0.1129
84	0.18058	0.20339	0.26669	0.26928	0.13868	0.18779
85	0.26799	0.14716	0.81539	0.25191	0.26707	0.22778
mean	**0.194701642**	**0.15986239**	**0.2104709**	**0.2031606**	**0.1713091**	**0.18750269**
var	**0.005348056**	**0.00467133**	**0.01461624**	**0.00489227**	**0.00465142**	**0.03411195**

Generalised Entropy index of class 2 – Austria

AUSTRIA

age	*gini_AT81*	*gini_AT87*	*gini_AT94*	*gini_AT95*	*gini_AT97*	*gini_AT00*
19	*0.39331*	*0.165*	*0.32396*	*0.49366*	*0.34815*	*0*
20	*0.33342*	*0.21484*	*0.48782*	*0.53148*	*0.24158*	*0.12464*
21	*0.34635*	*0.2482*	*0.32848*	*0.49308*	*0.33878*	*0.26498*
22	*0.3138*	*0.30051*	*0.2892*	*0.39798*	*0.28853*	*0.38474*
23	*0.34377*	*0.2801*	*0.28641*	*0.4439*	*0.34479*	*0.31939*
24	*0.33223*	*0.2734*	*0.31163*	*0.36834*	*0.2854*	*0.20894*
25	*0.27054*	*0.25413*	*0.29086*	*0.36606*	*0.29696*	*0.22803*
26	*0.28121*	*0.2506*	*0.29161*	*0.3172*	*0.25754*	*0.29544*
27	*0.28693*	*0.23084*	*0.39289*	*0.33255*	*0.21966*	*0.24874*
28	*0.27475*	*0.24968*	*0.27362*	*0.29819*	*0.25888*	*0.2313*
29	*0.27253*	*0.22118*	*0.27959*	*0.32533*	*0.30598*	*0.23743*
30	*0.25192*	*0.21639*	*0.26879*	*0.28727*	*0.22515*	*0.23132*
31	*0.27494*	*0.22042*	*0.28066*	*0.27357*	*0.26008*	*0.26603*
32	*0.26382*	*0.23589*	*0.27455*	*0.27653*	*0.24352*	*0.25903*
33	*0.26459*	*0.19244*	*0.24022*	*0.27098*	*0.20338*	*0.32614*
34	*0.26383*	*0.21469*	*0.26214*	*0.26944*	*0.18455*	*0.2442*
35	*0.26658*	*0.20652*	*0.21277*	*0.27218*	*0.31182*	*0.29127*
36	*0.25672*	*0.19381*	*0.32719*	*0.30489*	*0.21418*	*0.22432*
37	*0.25394*	*0.22468*	*0.26349*	*0.27316*	*0.22032*	*0.21517*
38	*0.27302*	*0.22602*	*0.3012*	*0.25282*	*0.20128*	*0.32656*
39	*0.26937*	*0.2648*	*0.31238*	*0.26487*	*0.30128*	*0.24025*
40	*0.26547*	*0.21428*	*0.25922*	*0.27347*	*0.24307*	*0.19358*
41	*0.26022*	*0.24372*	*0.2396*	*0.27913*	*0.27366*	*0.19388*
42	*0.28717*	*0.25204*	*0.25477*	*0.28579*	*0.28737*	*0.26779*
43	*0.25601*	*0.23317*	*0.22375*	*0.26781*	*0.27716*	*0.29304*
44	*0.26522*	*0.26394*	*0.37591*	*0.31539*	*0.23653*	*0.24844*
45	*0.29626*	*0.28116*	*0.28151*	*0.29439*	*0.30746*	*0.23509*
46	*0.29664*	*0.28307*	*0.24653*	*0.29133*	*0.24389*	*0.23056*
47	*0.29704*	*0.28863*	*0.37568*	*0.30984*	*0.30803*	*0.26479*
48	*0.30311*	*0.29325*	*0.27717*	*0.30879*	*0.2858*	*0.27147*
49	*0.31757*	*0.29232*	*0.27142*	*0.30706*	*0.28039*	*0.26043*
50	*0.31804*	*0.31016*	*0.33211*	*0.31875*	*0.32616*	*0.3463*
51	*0.32003*	*0.31846*	*0.32179*	*0.32209*	*0.29315*	*0.21885*
52	*0.31062*	*0.33522*	*0.28635*	*0.34522*	*0.30501*	*0.28289*
53	*0.28966*	*0.33477*	*0.36788*	*0.32576*	*0.29033*	*0.29552*
54	*0.32434*	*0.30437*	*0.37261*	*0.32349*	*0.27981*	*0.34564*
55	*0.34286*	*0.32361*	*0.37072*	*0.34425*	*0.32273*	*0.22011*
56	*0.33244*	*0.30134*	*0.32016*	*0.34463*	*0.31008*	*0.31161*
57	*0.34206*	*0.3577*	*0.34199*	*0.33644*	*0.30323*	*0.32773*
58	*0.32809*	*0.30237*	*0.33627*	*0.33439*	*0.38825*	*0.28035*
59	*0.35688*	*0.33072*	*0.31582*	*0.34097*	*0.32636*	*0.31101*
60	*0.35154*	*0.32342*	*0.30133*	*0.34344*	*0.33323*	*0.33324*
61	*0.40119*	*0.34792*	*0.31025*	*0.327*	*0.28138*	*0.38135*
62	*0.40636*	*0.33541*	*0.32669*	*0.35504*	*0.2833*	*0.34629*
63	*0.37624*	*0.35783*	*0.38393*	*0.34128*	*0.27253*	*0.31462*
64	*0.38643*	*0.32938*	*0.29589*	*0.35342*	*0.31883*	*0.2694*
65	*0.34965*	*0.34863*	*0.3467*	*0.34904*	*0.34311*	*0.37096*
66	*0.32376*	*0.33048*	*0.2918*	*0.31964*	*0.29739*	*0.35958*
67	*0.39054*	*0.33276*	*0.30745*	*0.34469*	*0.31361*	*0.33097*
68	*0.34391*	*0.31334*	*0.33929*	*0.33509*	*0.40072*	*0.31957*
69	*0.37072*	*0.32545*	*0.27846*	*0.34646*	*0.30326*	*0.4507*

70	*0.29057*	*0.33147*	*0.35869*	*0.3553*	*0.28895*	*0.36374*
71	*0.31555*	*0.34256*	*0.31918*	*0.33555*	*0.34597*	*0.37462*
72	*0.34093*	*0.33963*	*0.33223*	*0.33968*	*0.35403*	*0.34496*
73	*0.34316*	*0.33162*	*0.35085*	*0.3432*	*0.34818*	*0.26466*
74	*0.3715*	*0.33968*	*0.38*	*0.3564*	*0.29269*	*0.33997*
75	*0.22339*	*0.33832*	*0.28789*	*0.33898*	*0.33405*	*0.30024*
76	*0.36109*	*0.29289*	*0.38212*	*0.33695*	*0.39371*	*0.34608*
77	*0.32062*	*0.32974*	*0.36341*	*0.3438*	*0.34286*	*0.29808*
78	*0.33052*	*0.30874*	*0.21323*	*0.33045*	*0.35599*	*0.35192*
79	*0.36176*	*0.33943*	*0.38749*	*0.31905*	*0.33698*	*0.46303*
80	*0.3174*	*0.34514*	*0.30635*	*0.34904*	*0.31509*	*0.37855*
81	*0.28384*	*0.33127*	*0.37685*	*0.34072*	*0.30976*	*0.31737*
82	*0.39251*	*0.26995*	*0.42346*	*0.35192*	*0.43507*	*0.37498*
83	*0.34346*	*0.26694*	*0.29686*	*0.30181*	*0.31937*	*0.23866*
84	*0.30677*	*0.30612*	*0.34138*	*0.32218*	*0.28217*	*0.306*
85	*0.33595*	*0.27948*	*0.45054*	*0.30442*	*0.3346*	*0.35994*
mean	**0.315472537**	**0.2863588**	**0.316761791**	**0.330851045**	**0.298165821**	***0.290544478***
var	**0.001848617**	**0.0023986**	**0.002868845**	**0.002566864**	**0.002360967**	***0.005210053***

Gini index – Austria

8 Appendix 2

Gini index	**Coef.**	**Robust Std. Err.**	**t**	**P>|t|**	**95% Conf. Interval**	
ttw67	-0.26158	0.017453	-14.99	0(***)	-0.29583	-0.22733
tmpit	-0.03427	0.027968	-1.23	0.221	-0.08915	0.020615
nptdi	-0.0014	0.000153	-9.14	0(***)	-0.0017	-0.0011
gdpgr99	-0.00127	0.001235	-1.03	0.302	-0.0037	0.001148
ur99	0.004558	0.000538	8.47	0(***)	0.003501	0.005614
cpi99	0.003593	0.000571	6.29	0(***)	0.002472	0.004713
g1	-0.04796	0.044034	-1.09	0.276	-0.13437	0.038448
g2	-0.01879	0.032442	-0.58	0.563	-0.08246	0.044869
g3	0.002495	0.026636	0.09	0.925	-0.04977	0.054765
g4	-0.01684	0.02337	-0.72	0.471	-0.0627	0.02902
g5	-0.01278	0.023486	-0.54	0.587	-0.05887	0.03331
g6	-0.03823	0.022421	-1.71	0.088(*)	-0.08223	0.005766
g7	-0.03082	0.022227	-1.39	0.166	-0.07444	0.012794
g8	-0.05092	0.020377	-2.5	0.013(**)	-0.09091	-0.01094
g9	-0.04708	0.019986	-2.36	0.019(**)	-0.0863	-0.00786
g10	-0.06087	0.019446	-3.13	0.002(***)	-0.09903	-0.02271
g11	-0.0572	0.021709	-2.63	0.009(***)	-0.0998	-0.0146
g12	-0.04536	0.020593	-2.2	0.028(**)	-0.08577	-0.00495
g13	-0.05675	0.019982	-2.84	0.005(***)	-0.09597	-0.01754
g14	-0.04373	0.022909	-1.91	0.057(*)	-0.08868	0.001227
g15	-0.05049	0.020255	-2.49	0.013(**)	-0.09024	-0.01074
g16	-0.03276	0.022496	-1.46	0.146	-0.0769	0.011389
g17	-0.03842	0.020263	-1.9	0.058(*)	-0.07818	0.001342
g18	-0.04039	0.020145	-2.01	0.045(**)	-0.07992	-0.00086
g19	-0.05085	0.021489	-2.37	0.018(**)	-0.09302	-0.00868
g20	-0.04138	0.021431	-1.93	0.054(*)	-0.08344	0.000677
g21	-0.04254	0.019101	-2.23	0.026(**)	-0.08002	-0.00506
g22	-0.0427	0.020468	-2.09	0.037(**)	-0.08287	-0.00254
g23	-0.04093	0.020344	-2.01	0.044(**)	-0.08086	-0.00101
g24	-0.04215	0.021371	-1.97	0.049(**)	-0.08409	-0.00021
g25	-0.0363	0.020695	-1.75	0.08(*)	-0.07691	0.004308
g26	-0.04259	0.020543	-2.07	0.038(**)	-0.08291	-0.00228
g27	-0.03686	0.021344	-1.73	0.084(**)	-0.07874	0.005026
g28	-0.02599	0.021631	-1.2	0.23	-0.06843	0.016462
g29	-0.02117	0.021254	-1	0.319	-0.06288	0.020536
g30	-0.01459	0.0213	-0.69	0.493	-0.05639	0.027208
g31	-0.01491	0.020186	-0.74	0.46	-0.05452	0.024705
g32	-0.01456	0.020957	-0.69	0.487	-0.05569	0.026565
g33	-0.0216	0.021233	-1.02	0.309	-0.06327	0.020066
g34	-0.00826	0.019735	-0.42	0.676	-0.04699	0.030469
g35	-0.01953	0.020283	-0.96	0.336	-0.05933	0.020276
g36	0.015429	0.031929	0.48	0.629	-0.04723	0.078086
g37	-0.00274	0.021461	-0.13	0.898	-0.04485	0.039376
g38	0.01969	0.021875	0.9	0.368	-0.02324	0.062617
g39	0.041252	0.023599	1.75	0.081(*)	-0.00506	0.087563
g40	0.013112	0.02005	0.65	0.513	-0.02623	0.052457
g41	0.023191	0.020628	1.12	0.261	-0.01729	0.06367
g42	0.020414	0.02242	0.91	0.363	-0.02358	0.06441
g43	0.015101	0.021085	0.72	0.474	-0.02628	0.056478
g44	0.028168	0.019497	1.44	0.149	-0.01009	0.066427
g45	0.01119	0.02246	0.5	0.618	-0.03288	0.055265
g46	0.024157	0.0225	1.07	0.283	-0.02	0.06831

g47	0.00951	0.020796	0.46	0.648	-0.0313	0.05032
g48	0.007551	0.021572	0.35	0.726	-0.03478	0.049883
g49	-0.00595	0.023663	-0.25	0.801	-0.05239	0.040482
g50	0.000394	0.023093	0.02	0.986	-0.04492	0.04571
g51	-0.01166	0.024581	-0.47	0.635	-0.0599	0.036578
g52	0.007726	0.022344	0.35	0.73	-0.03612	0.051572
g53	-0.00681	0.022707	-0.3	0.764	-0.05137	0.037745
g54	0.001128	0.022218	0.05	0.96	-0.04247	0.044729
g55	-0.00276	0.023866	-0.12	0.908	-0.04959	0.044079
g56	-0.0037	0.021853	-0.17	0.866	-0.04658	0.039183
g57	-0.01108	0.024447	-0.45	0.65	-0.05906	0.036892
g58	-0.01288	0.020855	-0.62	0.537	-0.05381	0.028046
g59	0.002195	0.024229	0.09	0.928	-0.04535	0.04974
g60	-0.00992	0.021595	-0.46	0.646	-0.05229	0.032461
g61	0.007792	0.029873	0.26	0.794	-0.05083	0.066414
cons	0.468766	0.024516	19.12	0(***)	0.420657	0.516875
Number of obs	*1054*					
R-squared	*0.4484*					

OLS Regression ttw67; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

Gini index	Coef.	Robust Std. Err.	t	P>|t|	95% Conf. Interval	
ttw100	-0.24639	0.016318	-15.1	0(***)	-0.27841	-0.21436
tmpit	-0.02015	0.028762	-0.7	0.484	-0.07659	0.036295
nptdi	-0.00136	0.000151	-9.02	0(***)	-0.00166	-0.00106
gdpgr99	0.003968	0.001269	3.13	0.002(***)	0.001478	0.006457
ur99	0.003176	0.00054	5.88	0(***)	0.002117	0.004235
cpi99	0.003563	0.000567	6.28	0(***)	0.00245	0.004676
g1	-0.04796	0.044788	-1.07	0.284	-0.13585	0.039929
g2	-0.01879	0.033175	-0.57	0.571	-0.0839	0.046307
g3	0.002495	0.027212	0.09	0.927	-0.0509	0.055895
g4	-0.01684	0.023517	-0.72	0.474	-0.06299	0.02931
g5	-0.01278	0.024025	-0.53	0.595	-0.05992	0.034369
g6	-0.03823	0.022532	-1.7	0.09(*)	-0.08245	0.005984
g7	-0.03082	0.02291	-1.35	0.179	-0.07578	0.014135
g8	-0.05092	0.02085	-2.44	0.015(**)	-0.09184	-0.01001
g9	-0.04708	0.020652	-2.28	0.023(**)	-0.0876	-0.00655
g10	-0.06087	0.020019	-3.04	0.002(***)	-0.10015	-0.02158
g11	-0.0572	0.021831	-2.62	0.009(***)	-0.10004	-0.01436
g12	-0.04536	0.021517	-2.11	0.035(**)	-0.08758	-0.00313
g13	-0.05675	0.020206	-2.81	0.005(***)	-0.0964	-0.0171
g14	-0.04373	0.02368	-1.85	0.065(*)	-0.0902	0.00274
g15	-0.05049	0.020643	-2.45	0.015(**)	-0.091	-0.00998
g16	-0.03276	0.02299	-1.42	0.155	-0.07787	0.012358
g17	-0.03842	0.020944	-1.83	0.067(*)	-0.07952	0.00268
g18	-0.04039	0.02139	-1.89	0.059(*)	-0.08237	0.001585
g19	-0.05085	0.022314	-2.28	0.023(**)	-0.09464	-0.00706
g20	-0.04138	0.021515	-1.92	0.055(*)	-0.0836	0.000842
g21	-0.04254	0.019674	-2.16	0.031(**)	-0.08115	-0.00393
g22	-0.0427	0.020978	-2.04	0.042(**)	-0.08387	-0.00154
g23	-0.04093	0.020789	-1.97	0.049(**)	-0.08173	-0.00014
g24	-0.04215	0.021902	-1.92	0.055(*)	-0.08513	0.000829
g25	-0.0363	0.021874	-1.66	0.097(*)	-0.07923	0.006621
g26	-0.04259	0.021254	-2	0.045(**)	-0.0843	-0.00089
g27	-0.03686	0.022275	-1.65	0.098(*)	-0.08057	0.006852
g28	-0.02599	0.02293	-1.13	0.257	-0.07098	0.01901
g29	-0.02117	0.022379	-0.95	0.344	-0.06509	0.022744
g30	-0.01459	0.02246	-0.65	0.516	-0.05867	0.029484
g31	-0.01491	0.020868	-0.71	0.475	-0.05586	0.026042
g32	-0.01456	0.021726	-0.67	0.503	-0.0572	0.028075
g33	-0.0216	0.022239	-0.97	0.332	-0.06524	0.022039
g34	-0.00826	0.020788	-0.4	0.691	-0.04905	0.032536
g35	-0.01953	0.020734	-0.94	0.347	-0.06022	0.02116
g36	0.015429	0.032236	0.48	0.632	-0.04783	0.078689
g37	-0.00274	0.022781	-0.12	0.904	-0.04744	0.041967
g38	0.01969	0.022392	0.88	0.379	-0.02425	0.063631
g39	0.041252	0.024176	1.71	0.088(*)	-0.00619	0.088694
g40	0.013112	0.020815	0.63	0.529	-0.02773	0.053959
g41	0.023191	0.020788	1.12	0.265	-0.0176	0.063985
g42	0.020414	0.02307	0.88	0.376	-0.02486	0.065686
g43	0.015101	0.021472	0.7	0.482	-0.02704	0.057236
g44	0.028168	0.020094	1.4	0.161	-0.01126	0.0676
g45	0.01119	0.022519	0.5	0.619	-0.033	0.05538
g46	0.024157	0.023924	1.01	0.313	-0.02279	0.071104

g47	0.00951	0.021409	0.44	0.657	-0.0325	0.051521
g48	0.007551	0.021926	0.34	0.731	-0.03548	0.050579
g49	-0.00595	0.024293	-0.25	0.806	-0.05363	0.041718
g50	0.000394	0.024138	0.02	0.987	-0.04697	0.047762
g51	-0.01166	0.025142	-0.46	0.643	-0.061	0.037678
g52	0.007726	0.022616	0.34	0.733	-0.03665	0.052107
g53	-0.00681	0.023343	-0.29	0.77	-0.05262	0.038993
g54	0.001128	0.022979	0.05	0.961	-0.04397	0.046222
g55	-0.00276	0.024664	-0.11	0.911	-0.05116	0.045646
g56	-0.0037	0.022248	-0.17	0.868	-0.04736	0.039959
g57	-0.01108	0.025256	-0.44	0.661	-0.06064	0.03848
g58	-0.01288	0.021683	-0.59	0.553	-0.05543	0.029669
g59	0.002195	0.025012	0.09	0.93	-0.04689	0.051277
g60	-0.00992	0.022064	-0.45	0.653	-0.05322	0.033382
g61	0.007792	0.02988	0.26	0.794	-0.05084	0.066427
cons	0.459757	0.024464	18.79	0(***)	0.41175	0.507764
Number of obs	*1054*					
R-squared	*0.4263*					

OLS Regression ttw100; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

Gini index	Coef.	Robust Std. Err.	t	P>|t|	95% Conf. Interval	
ttw133	-0.24076	0.016967	-14.19	0(***)	-0.27406	-0.20747
tmpit	-0.0557	0.028137	-1.98	0.048(**)	-0.11091	-0.00049
nptdi	-0.00123	0.000152	-8.08	0(***)	-0.00153	-0.00093
gdpgr99	0.003717	0.001212	3.07	0.002(***)	0.001338	0.006096
ur99	0.003761	0.000538	6.99	0(***)	0.002705	0.004817
cpi99	0.003329	0.000564	5.91	0(***)	0.002223	0.004436
g1	-0.04796	0.044732	-1.07	0.284	-0.13574	0.039818
g2	-0.01879	0.033071	-0.57	0.57	-0.08369	0.046102
g3	0.002495	0.02708	0.09	0.927	-0.05065	0.055637
g4	-0.01684	0.023416	-0.72	0.472	-0.06279	0.02911
g5	-0.01278	0.02354	-0.54	0.587	-0.05897	0.033416
g6	-0.03823	0.022497	-1.7	0.09(*)	-0.08238	0.005916
g7	-0.03082	0.022752	-1.35	0.176	-0.07547	0.013825
g8	-0.05092	0.020532	-2.48	0.013(**)	-0.09122	-0.01063
g9	-0.04708	0.020332	-2.32	0.021(**)	-0.08697	-0.00718
g10	-0.06087	0.019983	-3.05	0.002(***)	-0.10008	-0.02165
g11	-0.0572	0.02156	-2.65	0.008(***)	-0.09951	-0.01489
g12	-0.04536	0.021093	-2.15	0.032(**)	-0.08675	-0.00397
g13	-0.05675	0.020013	-2.84	0.005(***)	-0.09603	-0.01748
g14	-0.04373	0.023231	-1.88	0.06(*)	-0.08932	0.00186
g15	-0.05049	0.020468	-2.47	0.014(**)	-0.09066	-0.01032
g16	-0.03276	0.022986	-1.43	0.154	-0.07786	0.012351
g17	-0.03842	0.020777	-1.85	0.065(*)	-0.07919	0.002352
g18	-0.04039	0.021073	-1.92	0.056(*)	-0.08175	0.000963
g19	-0.05085	0.02198	-2.31	0.021(**)	-0.09398	-0.00772
g20	-0.04138	0.021363	-1.94	0.053(*)	-0.0833	0.000543
g21	-0.04254	0.019571	-2.17	0.03(**)	-0.08094	-0.00413
g22	-0.0427	0.021053	-2.03	0.043(**)	-0.08402	-0.00139
g23	-0.04093	0.020659	-1.98	0.048(**)	-0.08147	-0.0004
g24	-0.04215	0.021493	-1.96	0.05(**)	-0.08433	2.73E-05
g25	-0.0363	0.02135	-1.7	0.089(*)	-0.0782	0.005593
g26	-0.04259	0.020918	-2.04	0.042(**)	-0.08364	-0.00154
g27	-0.03686	0.021777	-1.69	0.091(*)	-0.07959	0.005875
g28	-0.02599	0.022451	-1.16	0.247	-0.07004	0.01807
g29	-0.02117	0.021984	-0.96	0.336	-0.06431	0.021968
g30	-0.01459	0.022015	-0.66	0.508	-0.05779	0.028611
g31	-0.01491	0.020526	-0.73	0.468	-0.05519	0.025371
g32	-0.01456	0.021314	-0.68	0.495	-0.05639	0.027266
g33	-0.0216	0.021758	-0.99	0.321	-0.0643	0.021097
g34	-0.00826	0.020108	-0.41	0.681	-0.04772	0.031202
g35	-0.01953	0.020378	-0.96	0.338	-0.05952	0.020462
g36	0.015429	0.032251	0.48	0.632	-0.04786	0.078718
g37	-0.00274	0.022061	-0.12	0.901	-0.04603	0.040553
g38	0.01969	0.022041	0.89	0.372	-0.02356	0.062943
g39	0.041252	0.023821	1.73	0.084(*)	-0.00549	0.087997
g40	0.013112	0.020521	0.64	0.523	-0.02716	0.053383
g41	0.023191	0.020629	1.12	0.261	-0.01729	0.063673
g42	0.020414	0.022522	0.91	0.365	-0.02378	0.06461
g43	0.015101	0.021306	0.71	0.479	-0.02671	0.056912
g44	0.028168	0.019706	1.43	0.153	-0.0105	0.066838
g45	0.01119	0.022041	0.51	0.612	-0.03206	0.054442
g46	0.024157	0.023343	1.03	0.301	-0.02165	0.069964

g47	0.00951	0.021193	0.45	0.654	-0.03208	0.051098
g48	0.007551	0.021858	0.35	0.73	-0.03534	0.050444
g49	-0.00595	0.023976	-0.25	0.804	-0.053	0.041096
g50	0.000394	0.023819	0.02	0.987	-0.04635	0.047135
g51	-0.01166	0.024868	-0.47	0.639	-0.06046	0.03714
g52	0.007726	0.022862	0.34	0.735	-0.03714	0.052589
g53	-0.00681	0.023273	-0.29	0.77	-0.05248	0.038855
g54	0.001128	0.022698	0.05	0.96	-0.04341	0.045671
g55	-0.00276	0.024504	-0.11	0.91	-0.05084	0.045332
g56	-0.0037	0.02214	-0.17	0.867	-0.04715	0.039747
g57	-0.01108	0.025077	-0.44	0.659	-0.06029	0.038128
g58	-0.01288	0.021454	-0.6	0.548	-0.05498	0.029222
g59	0.002195	0.024748	0.09	0.929	-0.04637	0.05076
g60	-0.00992	0.022106	-0.45	0.654	-0.0533	0.033464
g61	0.007792	0.029765	0.26	0.794	-0.05062	0.066202
cons	0.474443	0.024745	19.17	0(***)	0.425884	0.523003
Number of obs	*1054*					
R-squared	*0.4296*					

OLS Regression ttw133; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

Gini index	Coef.	Robust Std. Err.	t	P>|t|	95% Conf. Interval	
ttw133	-0.24076	0.016967	-14.19	0(***)	-0.27406	-0.20747
tmpit	-0.0557	0.028137	-1.98	0.048(**)	-0.11091	-0.00049
nptdi	-0.00123	0.000152	-8.08	0(***)	-0.00153	-0.00093
gdpgr99	0.003717	0.001212	3.07	0.002(***)	0.001338	0.006096
ur99	0.003761	0.000538	6.99	0(***)	0.002705	0.004817
cpi99	0.003329	0.000564	5.91	0(***)	0.002223	0.004436
g1	-0.04796	0.044732	-1.07	0.284	-0.13574	0.039818
g2	-0.01879	0.033071	-0.57	0.57	-0.08369	0.046102
g3	0.002495	0.02708	0.09	0.927	-0.05065	0.055637
g4	-0.01684	0.023416	-0.72	0.472	-0.06279	0.02911
g5	-0.01278	0.02354	-0.54	0.587	-0.05897	0.033416
g6	-0.03823	0.022497	-1.7	0.09(*)	-0.08238	0.005916
g7	-0.03082	0.022752	-1.35	0.176	-0.07547	0.013825
g8	-0.05092	0.020532	-2.48	0.013(**)	-0.09122	-0.01063
g9	-0.04708	0.020332	-2.32	0.021(**)	-0.08697	-0.00718
g10	-0.06087	0.019983	-3.05	0.002(***)	-0.10008	-0.02165
g11	-0.0572	0.02156	-2.65	0.008(***)	-0.09951	-0.01489
g12	-0.04536	0.021093	-2.15	0.032(**)	-0.08675	-0.00397
g13	-0.05675	0.020013	-2.84	0.005(***)	-0.09603	-0.01748
g14	-0.04373	0.023231	-1.88	0.06(*)	-0.08932	0.00186
g15	-0.05049	0.020468	-2.47	0.014(**)	-0.09066	-0.01032
g16	-0.03276	0.022986	-1.43	0.154	-0.07786	0.012351
g17	-0.03842	0.020777	-1.85	0.065(*)	-0.07919	0.002352
g18	-0.04039	0.021073	-1.92	0.056(*)	-0.08175	0.000963
g19	-0.05085	0.02198	-2.31	0.021(**)	-0.09398	-0.00772
g20	-0.04138	0.021363	-1.94	0.053(*)	-0.0833	0.000543
g21	-0.04254	0.019571	-2.17	0.03(*)	-0.08094	-0.00413
g22	-0.0427	0.021053	-2.03	0.043(**)	-0.08402	-0.00139
g23	-0.04093	0.020659	-1.98	0.048(**)	-0.08147	-0.0004
g24	-0.04215	0.021493	-1.96	0.05(**)	-0.08433	2.73E-05
g25	-0.0363	0.02135	-1.7	0.089(*)	-0.0782	0.005593
g26	-0.04259	0.020918	-2.04	0.042(**)	-0.08364	-0.00154
g27	-0.03686	0.021777	-1.69	0.091(**)	-0.07959	0.005875
g28	-0.02599	0.022451	-1.16	0.247	-0.07004	0.01807
g29	-0.02117	0.021984	-0.96	0.336	-0.06431	0.021968
g30	-0.01459	0.022015	-0.66	0.508	-0.05779	0.028611
g31	-0.01491	0.020526	-0.73	0.468	-0.05519	0.025371
g32	-0.01456	0.021314	-0.68	0.495	-0.05639	0.027266
g33	-0.0216	0.021758	-0.99	0.321	-0.0643	0.021097
g34	-0.00826	0.020108	-0.41	0.681	-0.04772	0.031202
g35	-0.01953	0.020378	-0.96	0.338	-0.05952	0.020462
g36	0.015429	0.032251	0.48	0.632	-0.04786	0.078718
g37	-0.00274	0.022061	-0.12	0.901	-0.04603	0.040553
g38	0.01969	0.022041	0.89	0.372	-0.02356	0.062943
g39	0.041252	0.023821	1.73	0.084(*)	-0.00549	0.087997
g40	0.013112	0.020521	0.64	0.523	-0.02716	0.053383
g41	0.023191	0.020629	1.12	0.261	-0.01729	0.063673
g42	0.020414	0.022522	0.91	0.365	-0.02378	0.06461
g43	0.015101	0.021306	0.71	0.479	-0.02671	0.056912
g44	0.028168	0.019706	1.43	0.153	-0.0105	0.066838
g45	0.01119	0.022041	0.51	0.612	-0.03206	0.054442
g46	0.024157	0.023343	1.03	0.301	-0.02165	0.069964

g47	0.00951	0.021193	0.45	0.654	-0.03208	0.051098
g48	0.007551	0.021858	0.35	0.73	-0.03534	0.050444
g49	-0.00595	0.023976	-0.25	0.804	-0.053	0.041096
g50	0.000394	0.023819	0.02	0.987	-0.04635	0.047135
g51	-0.01166	0.024868	-0.47	0.639	-0.06046	0.03714
g52	0.007726	0.022862	0.34	0.735	-0.03714	0.052589
g53	-0.00681	0.023273	-0.29	0.77	-0.05248	0.038855
g54	0.001128	0.022698	0.05	0.96	-0.04341	0.045671
g55	-0.00276	0.024504	-0.11	0.91	-0.05084	0.045332
g56	-0.0037	0.02214	-0.17	0.867	-0.04715	0.039747
g57	-0.01108	0.025077	-0.44	0.659	-0.06029	0.038128
g58	-0.01288	0.021454	-0.6	0.548	-0.05498	0.029222
g59	0.002195	0.024748	0.09	0.929	-0.04637	0.05076
g60	-0.00992	0.022106	-0.45	0.654	-0.0533	0.033464
g61	0.007792	0.029765	0.26	0.794	-0.05062	0.066202
cons	0.474443	0.024745	19.17	0(***)	0.425884	0.523003
Number of obs	*1054*					
R-squared	*0.4720*					

OLS Regression ttw167; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

Gini index	Coef.	Robust Std. Err.	t	P>|t|	95% Conf. Interval	
attw67	-0.33975	0.021997	-15.45	0(***)	-0.38292	-0.29659
tmpit	-0.00283	0.02861	-0.1	0.921	-0.05897	0.053314
nptdi	-0.00131	0.000155	-8.46	0(***)	-0.00161	-0.00101
gdpgr99	-0.0046	0.001317	-3.49	0.001(***)	-0.00718	-0.00201
ur99	0.003453	0.000542	6.37	0(***)	0.00239	0.004516
cpi99	0.003837	0.00057	6.73	0(***)	0.002718	0.004956
g1	-0.04796	0.044461	-1.08	0.281	-0.13521	0.039287
g2	-0.01879	0.032597	-0.58	0.564	-0.08276	0.045173
g3	0.002495	0.026656	0.09	0.925	-0.04981	0.054804
g4	-0.01684	0.02327	-0.72	0.469	-0.0625	0.028825
g5	-0.01278	0.023091	-0.55	0.58	-0.05809	0.032536
g6	-0.03823	0.022245	-1.72	0.086(*)	-0.08188	0.00542
g7	-0.03082	0.022014	-1.4	0.162	-0.07402	0.012377
g8	-0.05092	0.020069	-2.54	0.011(**)	-0.09031	-0.01154
g9	-0.04708	0.019582	-2.4	0.016(**)	-0.0855	-0.00865
g10	-0.06087	0.019174	-3.17	0.002(***)	-0.09849	-0.02324
g11	-0.0572	0.02099	-2.73	0.007(***)	-0.09839	-0.01601
g12	-0.04536	0.020073	-2.26	0.024(**)	-0.08475	-0.00597
g13	-0.05675	0.019501	-2.91	0.004(***)	-0.09502	-0.01848
g14	-0.04373	0.022428	-1.95	0.051(*)	-0.08774	0.000284
g15	-0.05049	0.019737	-2.56	0.011(**)	-0.08922	-0.01176
g16	-0.03276	0.021802	-1.5	0.133	-0.07554	0.010027
g17	-0.03842	0.019801	-1.94	0.053(**)	-0.07728	0.000436
g18	-0.04039	0.019686	-2.05	0.04(**)	-0.07902	-0.00176
g19	-0.05085	0.021155	-2.4	0.016(**)	-0.09236	-0.00933
g20	-0.04138	0.020873	-1.98	0.048(**)	-0.08234	-0.00042
g21	-0.04254	0.018703	-2.27	0.023(**)	-0.07924	-0.00584
g22	-0.0427	0.020158	-2.12	0.034(**)	-0.08226	-0.00315
g23	-0.04093	0.019876	-2.06	0.04(**)	-0.07994	-0.00193
g24	-0.04215	0.020871	-2.02	0.044(**)	-0.08311	-0.00119
g25	-0.0363	0.020188	-1.8	0.072(*)	-0.07592	0.003313
g26	-0.04259	0.020099	-2.12	0.034(**)	-0.08203	-0.00315
g27	-0.03686	0.020786	-1.77	0.076(*)	-0.07765	0.00393
g28	-0.02599	0.021225	-1.22	0.221	-0.06764	0.015664
g29	-0.02117	0.020576	-1.03	0.304	-0.06155	0.019205
g30	-0.01459	0.020696	-0.71	0.481	-0.0552	0.026022
g31	-0.01491	0.019596	-0.76	0.447	-0.05336	0.023548
g32	-0.01456	0.020567	-0.71	0.479	-0.05492	0.025799
g33	-0.0216	0.020914	-1.03	0.302	-0.06264	0.019439
g34	-0.00826	0.019174	-0.43	0.667	-0.04588	0.029368
g35	-0.01953	0.019721	-0.99	0.322	-0.05823	0.019172
g36	0.015429	0.031347	0.49	0.623	-0.04608	0.076944
g37	-0.00274	0.020927	-0.13	0.896	-0.0438	0.038328
g38	0.01969	0.02119	0.93	0.353	-0.02189	0.061273
g39	0.041252	0.023859	1.73	0.084(*)	-0.00557	0.088071
g40	0.013112	0.019524	0.67	0.502	-0.0252	0.051425
g41	0.023191	0.020156	1.15	0.25	-0.01636	0.062746
g42	0.020414	0.021693	0.94	0.347	-0.02216	0.062983
g43	0.015101	0.02053	0.74	0.462	-0.02519	0.055388
g44	0.028168	0.018913	1.49	0.137	-0.00895	0.065283
g45	0.01119	0.021769	0.51	0.607	-0.03153	0.053908
g46	0.024157	0.021954	1.1	0.271	-0.01893	0.067239

g47	0.00951	0.020503	0.46	0.643	-0.03073	0.049745
g48	0.007551	0.021203	0.36	0.722	-0.03406	0.049159
g49	-0.00595	0.022976	-0.26	0.796	-0.05104	0.039133
g50	0.000394	0.022603	0.02	0.986	-0.04396	0.04475
g51	-0.01166	0.024223	-0.48	0.63	-0.05919	0.035874
g52	0.007726	0.021904	0.35	0.724	-0.03526	0.050709
g53	-0.00681	0.021965	-0.31	0.756	-0.04992	0.036289
g54	0.001128	0.02162	0.05	0.958	-0.0413	0.043555
g55	-0.00276	0.023419	-0.12	0.906	-0.04871	0.043202
g56	-0.0037	0.021246	-0.17	0.862	-0.04539	0.037992
g57	-0.01108	0.023983	-0.46	0.644	-0.05815	0.035982
g58	-0.01288	0.020314	-0.63	0.526	-0.05274	0.026984
g59	0.002195	0.02367	0.09	0.926	-0.04425	0.048644
g60	-0.00992	0.021266	-0.47	0.641	-0.05165	0.031814
g61	0.007792	0.029251	0.27	0.79	-0.04961	0.065193
cons	0.475867	0.024318	19.57	0(***)	0.428146	0.523587
Number of obs	*1054*					
R-squared	*0.4533*					

OLS Regression attw67; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

Gini index	Coef.	Robust Std. Err.	t	P>|t|	95% Conf. Interval	
attw100	-0.34485	0.022688	-15.2	0(***)	-0.38937	-0.30033
tmpit	0.014947	0.028642	0.52	0.602	-0.04126	0.071154
nptdi	-0.00131	0.000155	-8.42	0(***)	-0.00161	-0.001
gdpgr99	-0.00193	0.001267	-1.52	0.128	-0.00442	0.000555
ur99	0.00372	0.000535	6.96	0(***)	0.002671	0.004769
cpi99	0.004089	0.000573	7.13	0(***)	0.002963	0.005214
g1	-0.04796	0.044191	-1.09	0.278	-0.13468	0.038756
g2	-0.01879	0.032621	-0.58	0.565	-0.08281	0.045219
g3	0.002495	0.0271	0.09	0.927	-0.05069	0.055676
g4	-0.01684	0.023707	-0.71	0.478	-0.06336	0.029682
g5	-0.01278	0.023705	-0.54	0.59	-0.0593	0.033741
g6	-0.03823	0.022499	-1.7	0.09(*)	-0.08238	0.00592
g7	-0.03082	0.022495	-1.37	0.171	-0.07497	0.013321
g8	-0.05092	0.020605	-2.47	0.014(**)	-0.09136	-0.01049
g9	-0.04708	0.020164	-2.33	0.02(**)	-0.08664	-0.00751
g10	-0.06087	0.019644	-3.1	0.002(***)	-0.09942	-0.02232
g11	-0.0572	0.021682	-2.64	0.008(***)	-0.09975	-0.01465
g12	-0.04536	0.020721	-2.19	0.029(**)	-0.08602	-0.0047
g13	-0.05675	0.020009	-2.84	0.005(***)	-0.09602	-0.01749
g14	-0.04373	0.022888	-1.91	0.056(*)	-0.08864	0.001187
g15	-0.05049	0.020492	-2.46	0.014(**)	-0.0907	-0.01028
g16	-0.03276	0.022484	-1.46	0.145	-0.07688	0.011365
g17	-0.03842	0.020474	-1.88	0.061(*)	-0.0786	0.001757
g18	-0.04039	0.020275	-1.99	0.047(**)	-0.08018	-0.0006
g19	-0.05085	0.021623	-2.35	0.019(**)	-0.09328	-0.00842
g20	-0.04138	0.02161	-1.91	0.056(*)	-0.08379	0.001027
g21	-0.04254	0.019241	-2.21	0.027(**)	-0.0803	-0.00478
g22	-0.0427	0.020584	-2.07	0.038(**)	-0.0831	-0.00231
g23	-0.04093	0.020357	-2.01	0.045(**)	-0.08088	-0.00099
g24	-0.04215	0.02152	-1.96	0.05(**)	-0.08438	0.00008
g25	-0.0363	0.020967	-1.73	0.084(*)	-0.07745	0.004842
g26	-0.04259	0.020742	-2.05	0.04(**)	-0.0833	-0.00189
g27	-0.03686	0.02139	-1.72	0.085(*)	-0.07883	0.005117
g28	-0.02599	0.021809	-1.19	0.234	-0.06878	0.016811
g29	-0.02117	0.021439	-0.99	0.324	-0.06324	0.020899
g30	-0.01459	0.021451	-0.68	0.497	-0.05669	0.027505
g31	-0.01491	0.02026	-0.74	0.462	-0.05467	0.024851
g32	-0.01456	0.021159	-0.69	0.492	-0.05608	0.026962
g33	-0.0216	0.021422	-1.01	0.314	-0.06364	0.020437
g34	-0.00826	0.019858	-0.42	0.678	-0.04723	0.030711
g35	-0.01953	0.020532	-0.95	0.342	-0.05982	0.020764
g36	0.015429	0.032262	0.48	0.633	-0.04788	0.078739
g37	-0.00274	0.021543	-0.13	0.899	-0.04501	0.039536
g38	0.01969	0.022019	0.89	0.371	-0.02352	0.062899
g39	0.041252	0.024146	1.71	0.088(*)	-0.00613	0.088636
g40	0.013112	0.020173	0.65	0.516	-0.02647	0.052698
g41	0.023191	0.020678	1.12	0.262	-0.01739	0.06377
g42	0.020414	0.02241	0.91	0.363	-0.02356	0.06439
g43	0.015101	0.021149	0.71	0.475	-0.0264	0.056603
g44	0.028168	0.019627	1.44	0.152	-0.01035	0.066684
g45	0.01119	0.022371	0.5	0.617	-0.03271	0.055091
g46	0.024157	0.022637	1.07	0.286	-0.02027	0.06858

g47	0.00951	0.021106	0.45	0.652	-0.03191	0.050929
g48	0.007551	0.021734	0.35	0.728	-0.0351	0.050201
g49	-0.00595	0.023751	-0.25	0.802	-0.05256	0.040653
g50	0.000394	0.023316	0.02	0.987	-0.04536	0.046148
g51	-0.01166	0.024911	-0.47	0.64	-0.06055	0.037225
g52	0.007726	0.022604	0.34	0.733	-0.03663	0.052083
g53	-0.00681	0.022866	-0.3	0.766	-0.05169	0.038058
g54	0.001128	0.022415	0.05	0.96	-0.04286	0.045115
g55	-0.00276	0.024023	-0.11	0.909	-0.0499	0.044386
g56	-0.0037	0.022017	-0.17	0.867	-0.04691	0.039504
g57	-0.01108	0.024406	-0.45	0.65	-0.05898	0.03681
g58	-0.01288	0.021254	-0.61	0.545	-0.05459	0.028829
g59	0.002195	0.024319	0.09	0.928	-0.04553	0.049917
g60	-0.00992	0.021813	-0.45	0.649	-0.05272	0.03289
g61	0.007792	0.030088	0.26	0.796	-0.05125	0.066835
cons	0.47152	0.024669	19.11	0(***)	0.423109	0.51993
Number of obs	*1054*					
R-squared	*0.4543*					

OLS Regression attw100; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

Gini index	Coef.	Robust Std. Err.	t	P>|t|	95% Conf. Interval	
attw133	-0.35432	0.022434	-15.79	0(***)	-0.39835	-0.3103
tmpit	0.034216	0.028787	1.19	0.235	-0.02227	0.090706
nptdi	-0.00129	0.000153	-8.46	0(***)	-0.00159	-0.00099
gdpgr99	-0.00059	0.001235	-0.48	0.634	-0.00301	0.001835
ur99	0.00376	0.000524	7.18	0(***)	0.002732	0.004787
cpi99	0.004163	0.000572	7.28	0(***)	0.00304	0.005285
g1	-0.04796	0.043972	-1.09	0.276	-0.13425	0.038326
g2	-0.01879	0.032457	-0.58	0.563	-0.08249	0.044898
g3	0.002495	0.027163	0.09	0.927	-0.05081	0.055798
g4	-0.01684	0.023726	-0.71	0.478	-0.0634	0.029718
g5	-0.01278	0.023749	-0.54	0.591	-0.05938	0.033826
g6	-0.03823	0.022429	-1.7	0.089(*)	-0.08224	0.005781
g7	-0.03082	0.022673	-1.36	0.174	-0.07532	0.01367
g8	-0.05092	0.020563	-2.48	0.013(**)	-0.09128	-0.01057
g9	-0.04708	0.020189	-2.33	0.02(**)	-0.08669	-0.00746
g10	-0.06087	0.019611	-3.1	0.002(***)	-0.09935	-0.02238
g11	-0.0572	0.02162	-2.65	0.008(***)	-0.09963	-0.01477
g12	-0.04536	0.020721	-2.19	0.029(**)	-0.08602	-0.00469
g13	-0.05675	0.020011	-2.84	0.005(***)	-0.09602	-0.01748
g14	-0.04373	0.022815	-1.92	0.056(*)	-0.0885	0.001044
g15	-0.05049	0.020528	-2.46	0.014(**)	-0.09077	-0.01021
g16	-0.03276	0.022514	-1.45	0.146	-0.07694	0.011423
g17	-0.03842	0.020482	-1.88	0.061(*)	-0.07861	0.001774
g18	-0.04039	0.020355	-1.98	0.047(**)	-0.08034	-0.00045
g19	-0.05085	0.021573	-2.36	0.019(**)	-0.09318	-0.00851
g20	-0.04138	0.021688	-1.91	0.057(*)	-0.08394	0.001181
g21	-0.04254	0.019253	-2.21	0.027(**)	-0.08032	-0.00476
g22	-0.0427	0.020581	-2.07	0.038(**)	-0.08309	-0.00232
g23	-0.04093	0.020208	-2.03	0.043(**)	-0.08059	-0.00128
g24	-0.04215	0.021399	-1.97	0.049(**)	-0.08414	-0.00016
g25	-0.0363	0.021146	-1.72	0.086(*)	-0.0778	0.005193
g26	-0.04259	0.020682	-2.06	0.04(**)	-0.08318	-0.00201
g27	-0.03686	0.021292	-1.73	0.084(*)	-0.07864	0.004925
g28	-0.02599	0.021794	-1.19	0.233	-0.06875	0.016781
g29	-0.02117	0.021534	-0.98	0.326	-0.06343	0.021085
g30	-0.01459	0.021461	-0.68	0.497	-0.05671	0.027524
g31	-0.01491	0.020225	-0.74	0.461	-0.0546	0.024781
g32	-0.01456	0.021109	-0.69	0.49	-0.05598	0.026863
g33	-0.0216	0.021282	-1.01	0.31	-0.06337	0.020163
g34	-0.00826	0.019828	-0.42	0.677	-0.04717	0.030652
g35	-0.01953	0.020487	-0.95	0.341	-0.05973	0.020676
g36	0.015429	0.032493	0.47	0.635	-0.04833	0.079192
g37	-0.00274	0.021391	-0.13	0.898	-0.04471	0.039238
g38	0.01969	0.022095	0.89	0.373	-0.02367	0.063048
g39	0.041252	0.02414	1.71	0.088	-0.00612	0.088624
g40	0.013112	0.020114	0.65	0.515	-0.02636	0.052584
g41	0.023191	0.020501	1.13	0.258	-0.01704	0.063422
g42	0.020414	0.022393	0.91	0.362	-0.02353	0.064357
g43	0.015101	0.021084	0.72	0.474	-0.02627	0.056475
g44	0.028168	0.019686	1.43	0.153	-0.01046	0.0668
g45	0.01119	0.022171	0.5	0.614	-0.03232	0.054698
g46	0.024157	0.022634	1.07	0.286	-0.02026	0.068573

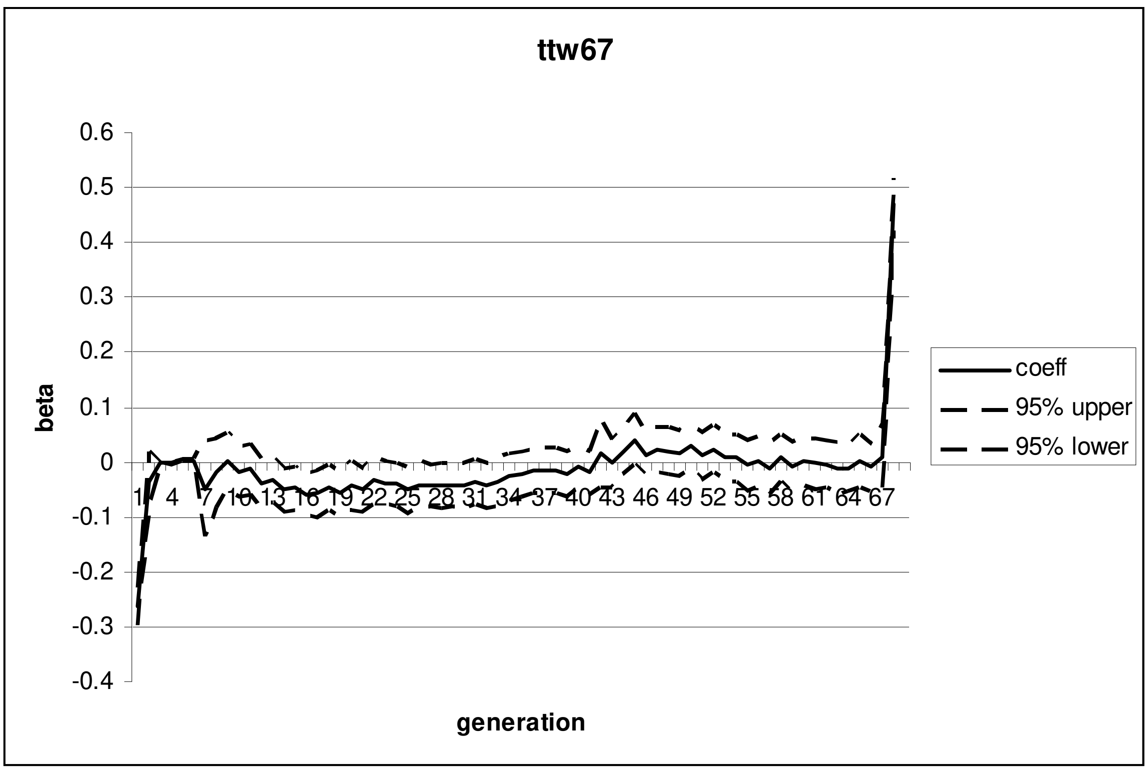
g47	0.00951	0.021172	0.45	0.653	-0.03204	0.051057
g48	0.007551	0.021795	0.35	0.729	-0.03522	0.050321
g49	-0.00595	0.023764	-0.25	0.802	-0.05259	0.04068
g50	0.000394	0.0234	0.02	0.987	-0.04553	0.046312
g51	-0.01166	0.025006	-0.47	0.641	-0.06073	0.037412
g52	0.007726	0.022763	0.34	0.734	-0.03694	0.052396
g53	-0.00681	0.022985	-0.3	0.767	-0.05192	0.038291
g54	0.001128	0.022423	0.05	0.96	-0.04287	0.04513
g55	-0.00276	0.023984	-0.11	0.909	-0.04982	0.04431
g56	-0.0037	0.022083	-0.17	0.867	-0.04704	0.039634
g57	-0.01108	0.024273	-0.46	0.648	-0.05872	0.036551
g58	-0.01288	0.021411	-0.6	0.548	-0.0549	0.029137
g59	0.002195	0.024411	0.09	0.928	-0.04571	0.050098
g60	-0.00992	0.021768	-0.46	0.649	-0.05263	0.032801
g61	0.007792	0.030132	0.26	0.796	-0.05134	0.066922
cons	0.471559	0.024513	19.24	0(***)	0.423456	0.519663
Number of obs	*1054*					
R-squared	*0.4651*					

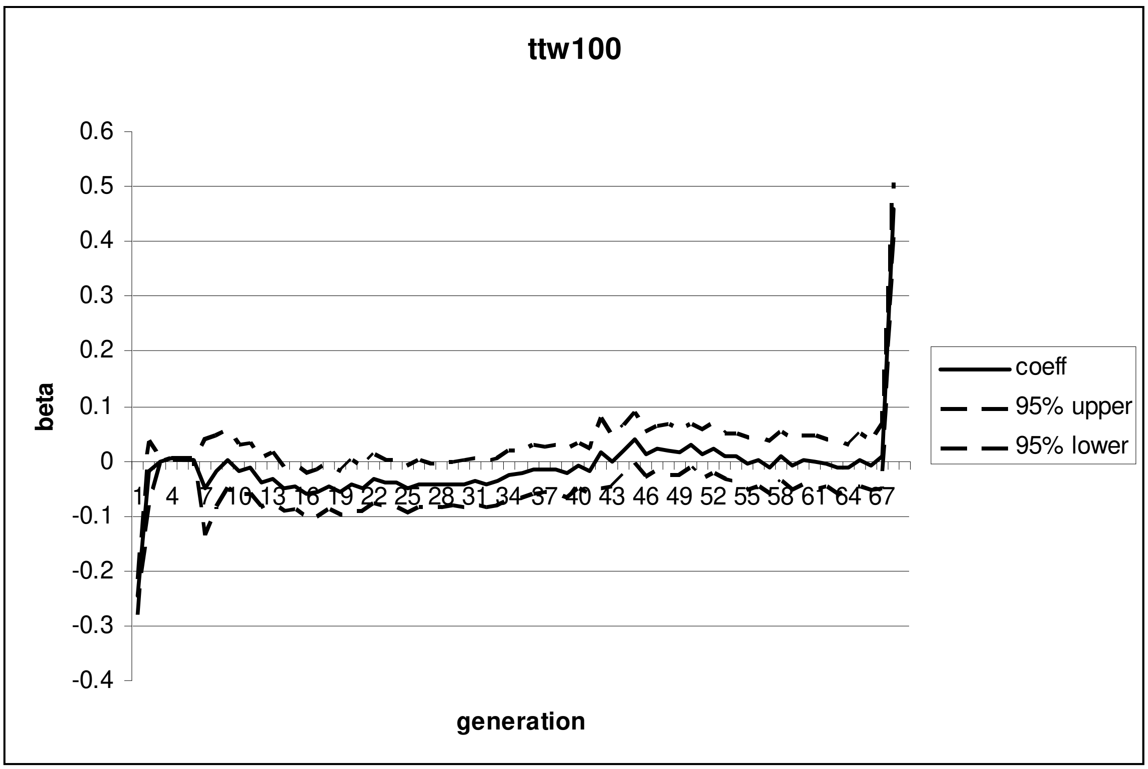
OLS Regression attw133; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

Gini index	Coef.	Robust Std. Err.	t	P>|t|	95% Conf. Interval	
attw167	-0.36892	0.022812	-16.17	0(***)	-0.41369	-0.32416
tmpit	0.052806	0.02888	1.83	0.068(**)	-0.00387	0.10948
nptdi	-0.00134	0.00015	-8.91	0(***)	-0.00163	-0.00104
gdpgr99	-0.00033	0.001202	-0.27	0.784	-0.00269	0.002028
ur99	0.003747	0.000519	7.21	0(***)	0.002728	0.004766
cpi99	0.004263	0.000571	7.47	0(***)	0.003144	0.005383
g1	-0.04796	0.043982	-1.09	0.276	-0.13427	0.038347
g2	-0.01879	0.032367	-0.58	0.562	-0.08231	0.044721
g3	0.002495	0.02702	0.09	0.926	-0.05053	0.055519
g4	-0.01684	0.023625	-0.71	0.476	-0.0632	0.029521
g5	-0.01278	0.023555	-0.54	0.588	-0.059	0.033447
g6	-0.03823	0.022232	-1.72	0.086(*)	-0.08186	0.005395
g7	-0.03082	0.022547	-1.37	0.172	-0.07507	0.013421
g8	-0.05092	0.020344	-2.5	0.012(**)	-0.09085	-0.011
g9	-0.04708	0.019977	-2.36	0.019(**)	-0.08628	-0.00787
g10	-0.06087	0.019483	-3.12	0.002(***)	-0.0991	-0.02264
g11	-0.0572	0.021386	-2.67	0.008(***)	-0.09917	-0.01523
g12	-0.04536	0.020473	-2.22	0.027(**)	-0.08553	-0.00518
g13	-0.05675	0.01981	-2.86	0.004(***)	-0.09563	-0.01788
g14	-0.04373	0.022584	-1.94	0.053(*)	-0.08805	0.000589
g15	-0.05049	0.020323	-2.48	0.013(**)	-0.09037	-0.01061
g16	-0.03276	0.022393	-1.46	0.144	-0.0767	0.011186
g17	-0.03842	0.020317	-1.89	0.059(*)	-0.07829	0.00145
g18	-0.04039	0.020251	-1.99	0.046(**)	-0.08013	-0.00065
g19	-0.05085	0.021374	-2.38	0.018(**)	-0.09279	-0.0089
g20	-0.04138	0.021522	-1.92	0.055(*)	-0.08361	0.000855
g21	-0.04254	0.019131	-2.22	0.026(**)	-0.08008	-0.005
g22	-0.0427	0.02047	-2.09	0.037(**)	-0.08287	-0.00254
g23	-0.04093	0.02001	-2.05	0.041(**)	-0.0802	-0.00167
g24	-0.04215	0.021158	-1.99	0.047(**)	-0.08367	-0.00063
g25	-0.0363	0.020942	-1.73	0.083(*)	-0.0774	0.004793
g26	-0.04259	0.020418	-2.09	0.037(**)	-0.08266	-0.00253
g27	-0.03686	0.02104	-1.75	0.08(*)	-0.07815	0.004429
g28	-0.02599	0.021534	-1.21	0.228	-0.06824	0.01627
g29	-0.02117	0.021284	-0.99	0.32	-0.06294	0.020595
g30	-0.01459	0.021243	-0.69	0.492	-0.05628	0.027095
g31	-0.01491	0.019971	-0.75	0.456	-0.0541	0.024283
g32	-0.01456	0.02085	-0.7	0.485	-0.05548	0.026355
g33	-0.0216	0.021113	-1.02	0.307	-0.06303	0.019831
g34	-0.00826	0.01954	-0.42	0.673	-0.0466	0.030087
g35	-0.01953	0.020254	-0.96	0.335	-0.05927	0.020219
g36	0.015429	0.032518	0.47	0.635	-0.04838	0.079242
g37	-0.00274	0.021085	-0.13	0.897	-0.04411	0.038638
g38	0.01969	0.021919	0.9	0.369	-0.02332	0.062704
g39	0.041252	0.024076	1.71	0.087(*)	-0.00599	0.088497
g40	0.013112	0.019938	0.66	0.511	-0.02601	0.052238
g41	0.023191	0.020221	1.15	0.252	-0.01649	0.062872
g42	0.020414	0.022073	0.92	0.355	-0.0229	0.063729
g43	0.015101	0.020816	0.73	0.468	-0.02575	0.055949
g44	0.028168	0.019459	1.45	0.148	-0.01002	0.066353
g45	0.01119	0.02174	0.51	0.607	-0.03147	0.053853
g46	0.024157	0.022284	1.08	0.279	-0.01957	0.067885

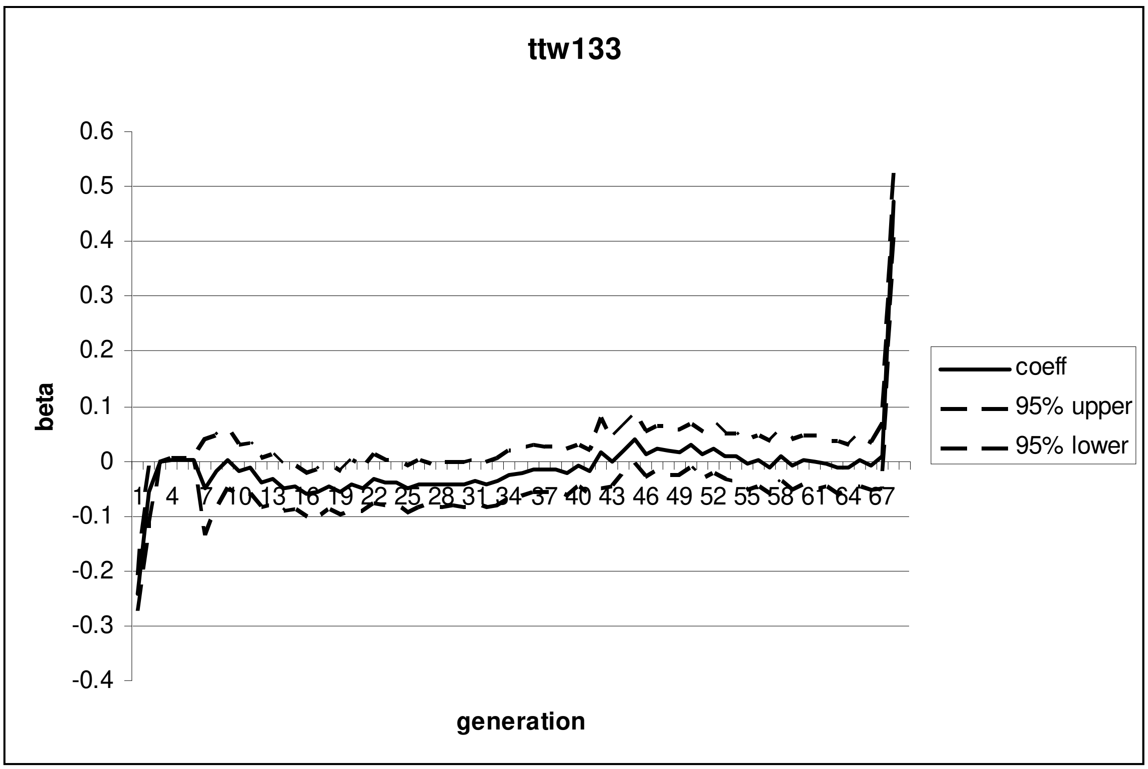
g47	0.00951	0.020968	0.45	0.65	-0.03164	0.050657
g48	0.007551	0.02156	0.35	0.726	-0.03476	0.049861
g49	-0.00595	0.023372	-0.25	0.799	-0.05182	0.039909
g50	0.000394	0.023146	0.02	0.986	-0.04503	0.045815
g51	-0.01166	0.02473	-0.47	0.637	-0.06019	0.03687
g52	0.007726	0.022615	0.34	0.733	-0.03665	0.052105
g53	-0.00681	0.02277	-0.3	0.765	-0.0515	0.037868
g54	0.001128	0.02218	0.05	0.959	-0.0424	0.044653
g55	-0.00276	0.023738	-0.12	0.908	-0.04934	0.043827
g56	-0.0037	0.021789	-0.17	0.865	-0.04646	0.039057
g57	-0.01108	0.023965	-0.46	0.644	-0.05811	0.035945
g58	-0.01288	0.021161	-0.61	0.543	-0.0544	0.028645
g59	0.002195	0.024108	0.09	0.927	-0.04511	0.049504
g60	-0.00992	0.021563	-0.46	0.646	-0.05223	0.032399
g61	0.007792	0.029858	0.26	0.794	-0.0508	0.066385
cons	0.476033	0.024325	19.57	0(***)	0.428298	0.523768
Number of obs	*1054*					
R-squared	*0.4720*					

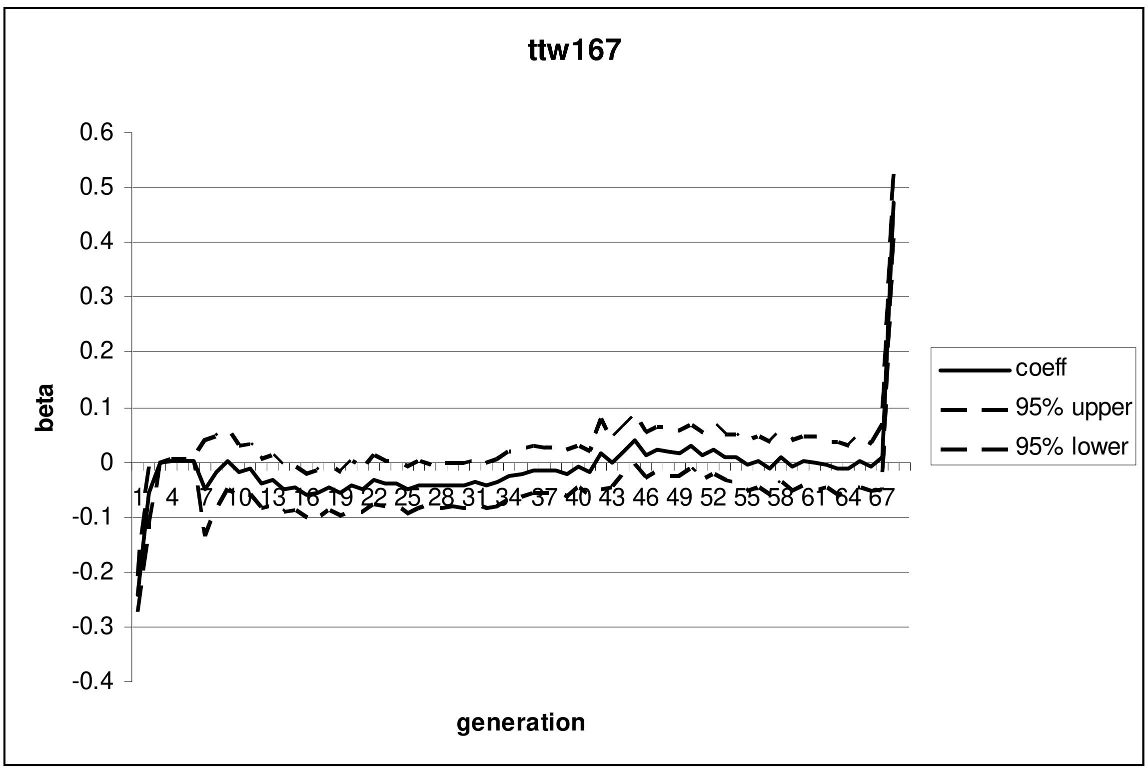
OLS Regression attw167; (***) significant at 1% C.I.; (**) significant at 5% C.I.; (*) significant at 10% C.I.

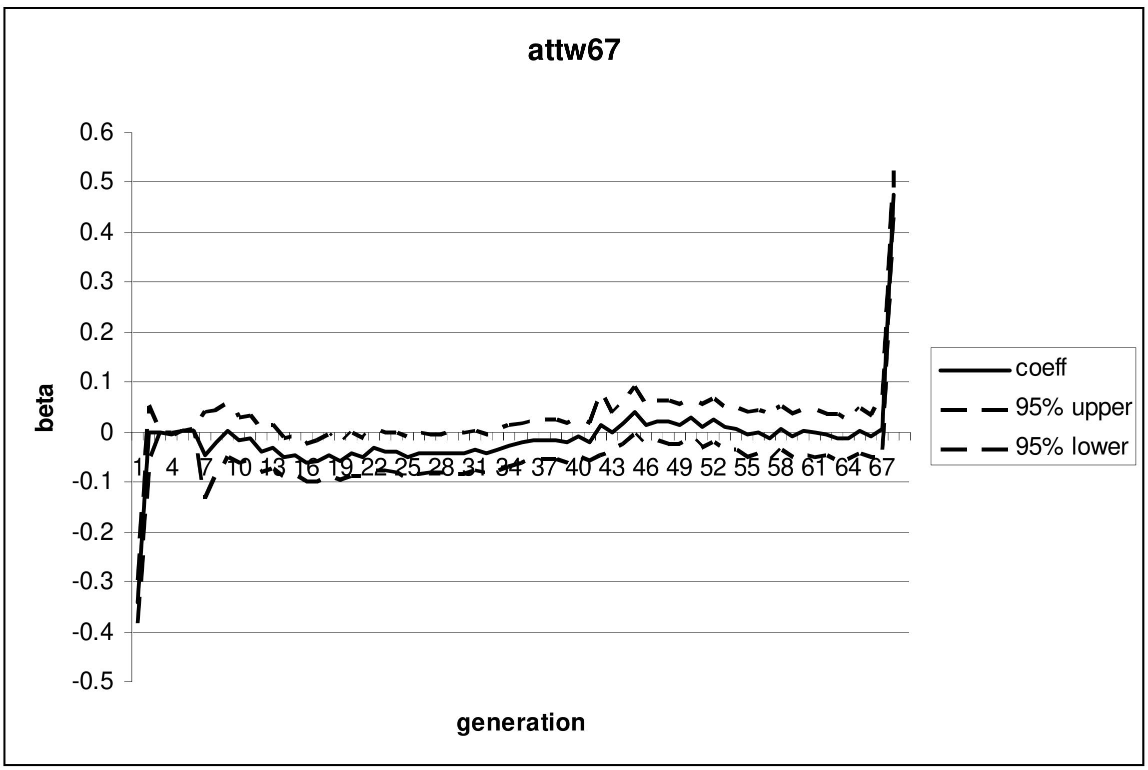

ttw67
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower

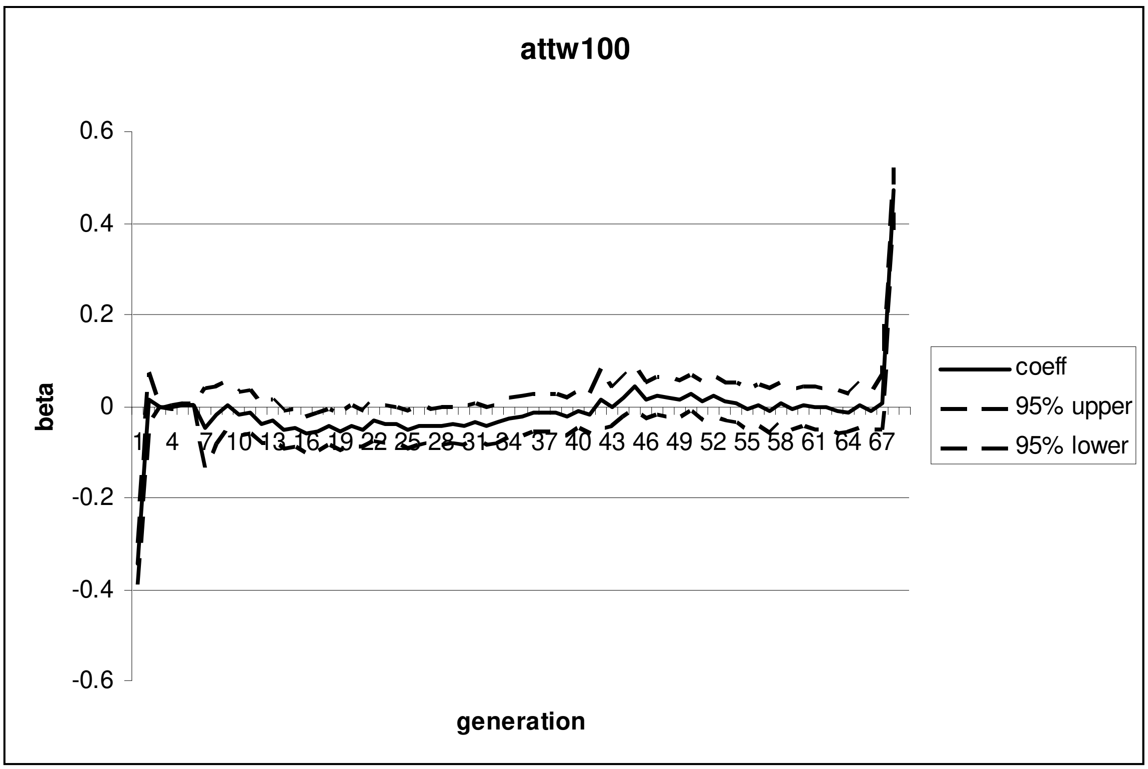


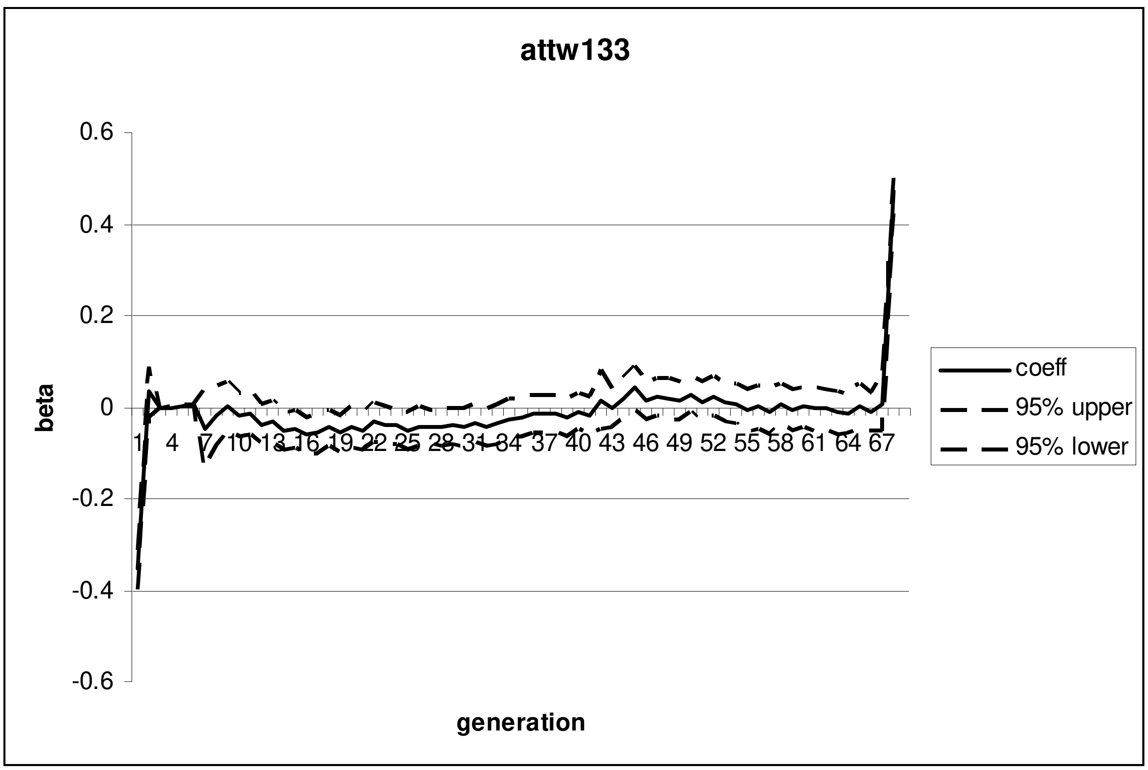
ttw100
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower

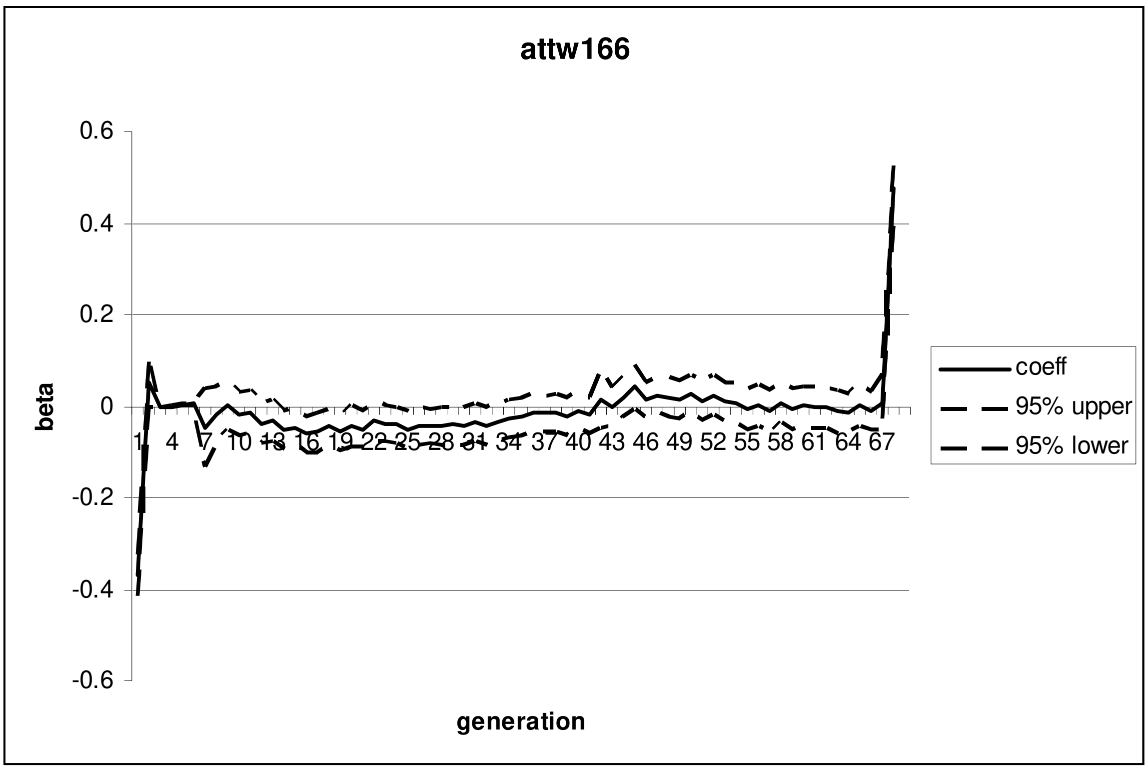

ttw133
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower


ttw167
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower


attw67
0.6
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower


attw100
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower


attw133
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower


attw166
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
beta
1 4 7 10 13 16 19 22 25 28 31 34 37 40 43 46 49 52 55 58 61 64 67
generation
coeff
95% upper
95% lower

References

[1] Atkinson, A. B. (1970) *On the Measurement of Inequality*, Journal of Economic Theory, 2, pp.244-63.

[2] Ambrosanio, M.F., Bordignon, M, Galmarini, U. and Panteghini, P. (1997) *Lezioni di Teoria delle Imposte*, Milan, ETAS

[3] Atkinson, A. B. & Stiglitz, J. (1980) *Lectures on public economics*, McGraw Hill, London

[4] Auerbach, A. (1985) *The Theory of Excess Burden and Optimal Taxation, in Handbook of Public Economics*, Vol. I, Elsevier.

[5] Beckmann, K. (2002) *How Leviathan Taxes*, Constitutional Political Economy, Vol.13, pp. 265-273.

[6] Boadway, R. W. & Bruce, N. (1984), Welfare Economics, Basil Blackwell

[7] Boadway, R. W. & Keen, M. (2000) *Redistribution*, in Handbook of Income Distribution, Amsterdam, Elsevier

[8] Canegrati, E. (2006) The Single-Mindedness Theory; Micro-foundation and Application to Social Security Systems, London School of Economics, mimeo

[9] Canegrati, E. (2007) A Probabilistic Voting Models of Indirect Taxation with Single-minded Groups, London School of Economics, mimeo

[10] Coughlin, P. (1985) *Elections with Redistributional Reputations*. Prepared for the 1985 Carnegie-Mellon conference on Political Economy.

[11] Coughlin, P. (1986) *Elections and Income Distribution*, Public Choice 50, pp. 27-91

[12] Coughlin, P. (1992) *Probabilistic Voting Theory*, Cambridge University Press

[13] Cowell, F. (2000) Measurement of Inequality, in Handbook of Income Distribution, Amsterdam, Elsevier

[14] Diamond, P. (1975) *A Many-Person Ramsey Rule*, Journal of Public Economics Vol.4, pp.335-42

[15] Gans, J. S. & Smart, M. (1996) *Majority Voting with Single-crossing Preferences*, Journal of Public Economics 59, pp. 219-237

[16] Gentry, W. *Optimal Taxation*, Columbia University, mimeo

[17] Gottschalk, T. & Smeeding, T. (2000) *Empirical Evidence on Income Inequality in Industrialized Countries*, in Handbook of Income Distribution, Amsterdam, Elsevier

[18] Hettich, W. & Winer, S. (1999), Democratic Choice and Taxation: A Theoretical and Empirical Analysis, Cambridge University Press

[19] Hinich, M, Ledyard, J and Ordershook, P. (1973) *A Theory of Electoral Equilibrium: A Spatial Analysis Based on the Theory of Games*, Journal of Politics, 35; pp. 154-193

[20] Kramer, G. (1983), *Is there a demand for progressivity?*, Public Choice 41, pp. 223-228

[21] Itsumi, Y. (1974), *Distributional Effect of Linear Income Tax Schedule*, Review of Economics Studies 41, pp.371-382

[22] Lindert, P. (2000) *Three Centuries of Inequality in Britain and America*, in Handbook of Income Distribution, Amsterdam, Elsevier

[23] Lindbeck, A. & Weibull, J. (1987), *Balanced-budget redistribution as the outcome of political competition.* Public Choice 52(3): 273-297

[24] Lindbeck, A. & Weibull, J. (1993) *A model of Political Equilibrium in a Representative Democracy*, Journal of Public Economics 51, pp. 195-209

[25] Meltzer, A. & Richard, S. (1985) *A Positive Theory of in-kind Transfers and the Negative Income Tax*, Public Choice 47, pp.231-265

[26] OECD (2001) *Tax and the Economy A Comparative Assessment of OECD Countries*, Tax Policy Studies No.6

[27] OECD (2004) *Recent Tax Policy Trends and Reforms in OECD Countries*, Tax Policy Studies No.9

[28] OECD (2006) *Fundamental Reform of Personal Income Tax*, Tax Policy Studies No.13

[29] Office of National Statistics (2007) *2005 — 2006 Expenditure and Food Survey*

[30] Persson, T. & Tabellini, G. (2000), *Political Economics: Explaining Economic Policy*, MIT Press

[31] Polo, M. (1998) *Electoral Competition and Political Rents*, IGIER, Milan, mimeo

[32] Roberts, K. (1977) *Voting over Income Tax Schedules*, Journal of Public Economics 8, pp: 392-340

[33] Romer, T. (1975) *Individual Welfare, Majority Voting and the Properties of a Linear Income Tax*, Journal of Public Economics 7, pp:163-168

[34] Sen, A. K. (1973) On Economic Inequality, Oxford: Clarendon Press; and New York: Norton.

[35] Svensson, J. (1997) *The Control of Public Policy: Electoral Competition, Polarization and Primary Elections*, The World Bank, Washington D.C. mimeo

[36] WIDER (World Institute for Development Economics Research), (2000) *World Income Inequality Database: User Guide and Data Sources.* Helsinki: United Nations University

Legend of symbols	
$h = 1, ..., H$	social groups
f^h	group's size
$j = D, R$	political candidates
ψ_i^h	preference for leisure/level of single-mindedness
ξ^h	idiosyncratic stochastic variable
ς	non-idiosyncratic stochastic variable
l^h	labour
s^h	density function of idiosyncratic variable/political power of a group
d	density function of non-idiosyncratic variable
λ^h	marginal utility of income
α^j	marginal probability of winning of D for group h
$\chi_i^{h,j}$	distributive characteristic
X^{jh}	fixed subsidy

	Classic rule	Single-mindedness rule
General formula	$\frac{t}{1-t} = \frac{-cov\left(b^i, I^i\right)}{\sum_i I^i \epsilon^i}$	$\frac{t^j}{1-t^j} = -\frac{cov\left(\varphi^{h,k}, I^{h,k}\right)}{\sum_h \sum_k I^{h,k} \epsilon^{jh,k}}$
Distortion on labour	yes	yes
Political failure	no	yes
Achievement of equity goals	yes	depending on the location of single-minded groups on the income scale
Better off groups	poor	more single-minded
Worse off groups	rich	less single-minded
Highest weight assigned	poor	more single-minded