A COMPLETE PARAMETRICAL CLASS OF REDISTRIBUTION AND PROGRESSIVITY MEASURES

Autores: *Isabel Rabadán* (a)
Rafael Salas (b)

P. T. N.º 13/01

(a) Universidad Complutense de Madrid.

(b) Instituto de Estudios Fiscales y Universidad Complutense de Madrid.

Address for correspondence: Rafael Salas, Departamento del Análisis Económico I, Universidad Complutense de Madrid, Campus de Somosaguas, 28223 Madrid (Spain), Phone +34 91 3942512, Fax +34 91 3942561, E-mail: R.Salas@ccee.ucm.es

INDEX

ABSTRACT

We propose a complete parametrical class of redistribution measures that satisfy desirable properties: S-convexity, monotonicity on the normative parameter, and equivalence with the Lorenz dominance criterion. The last property is not satisfied by the common redistribution indices. Moreover, we prove that, under these conditions, redistribution cannot be decomposed into the difference between two S-convex inequality indices. A particular parameterization class is proposed, in which we can always find a critical parameter value such that the index adopts a zero value if there is one (several) intersection(s) between the Lorenz curves. A parallel progressivity class is proposed, with the usual decomposition property.

Key Words: redistribution, progressivity, parameterization, Lorenz dominance and Lorenz equivalence.

JEL Classification: H23, D63, D31.

Acknowledgements

This paper has benefited from support from the European Commission Project #ERBCHRXCT980248 and the Spanish Ministry of Education Project #PB98-0546-C0202. We acknowledge useful comments by Peter Lambert and participants in several seminars. Any errors are our own.

1. INTRODUCTION

The traditional focus of studies of the redistribution of public policies is based on the evaluation of policy changes on inequality of incomes. The standard case defines redistribution as the difference between S-convex relative inequality indices[1] evaluated on the *before* (i.e., pre-tax) public policy and the *after* (post-tax) public policy income distributions.

The justification of S-convexity is based on the consistency of these indices with the second-order welfare (generalized Lorenz) dominance criterion, see Atkinson (1970), Dasgupta et al. (1973) and Shorrocks (1983).

However, the reduction in the (S-convex) inequality inherent in these redistribution measures satisfies the principle of Lorenz dominance only as a sufficient condition. We point out that the classes of indices used in the literature (i.e., those mentioned in footnote 1) do not satisfy the principle as a necessary condition. That is, we can prove that all Atkinson-based redistribution indices are, for example, positive but not prove Lorenz dominance. We concentrate on a general measure of redistribution that satisfies the following properties: "S-convexity" applied to inequality change measure, Lorenz equivalence and monotonicity of redistribution on the normative (redistribution-sensitive) parameter.

The novelty is the Lorenz equivalence property. We refer to any functional class of indices that satisfies this property as a "complete parametrical class". This means that, for all the normative parameters that define this class, there is equivalence between the Lorenz dominance criterion and the sign of all the indices of redistribution linked to all these normative parameters.

We show the following impossibility result: any index of redistribution in this class cannot be decomposed into the difference between two S-convex indices of inequality, as is usually done in the literature.

Moreover, we propose a particular parameterization that belongs to this class that has, in turn, the following desirable implication: if there is one (several) intersection(s) between the Lorenz curves, we can always find a critical regulatory value for which the index adopts a zero value. For values above (below) that threshold, we can consider that a reduction (increase) in the inequality has taken place and, therefore, a positive (negative) redistributive effect has occurred.

Finally, when these methods are used to compare the distributive effect of the public policies, properties of decomposition arise into progressivity, effective average rate and re-ordering, in the spirit of Pfähler (1987), Duclos (1993) or

[1] A particular case is the re-formulated Reynolds-Smolensky (1977) index that makes use of the Gini coefficient. Other possible cases are the extensions of the Gini coefficient proposed by Donaldson and Weymark (1980) and Yitzhaki (1983), the Atkinson indices (Atkinson, 1970) and the general Entropy indices (Cowell, 1977).

Lerman and Yitzhaki (1995). In the case of progressivity, a parallel complete parametrical class is derived that also verifies the property of equivalence between the dominance principle (in terms of the concentration curve) and the sign of all the progressivity indices linked to all the normative parameters.

2. A COMPLETE PARAMETRICAL CLASS OF INEQUALITY CHANGE (REDISTRIBUTION) MEASURES

Let D be the set of all income distributions represented by R^{N}_{++} vectors in increasing order. Let $X=(x_1,\ldots,x_N) \in D$ and $Y=(y_1,\ldots,y_N) \in D$ be an initial (i.e., pre-tax) and a final (i.e., after-tax) income distribution, so that $0<x_1 \leq \ldots \leq x_i \leq \ldots \leq x_N$ and $0<y_1 \leq \ldots \leq y_i \leq \ldots \leq y_N$. Note that a common sub-index i does not necessarily identify the same household in each of the previous distributions, since the order may have changed.

The Lorenz curves of the distributions X and Y are defined as:

$$L_X(j/N) = \sum_{k=1}^{j} x_k / Nm_X$$

$$L_Y(j/N) = \sum_{k=1}^{j} y_k / Nm_Y$$

where μ_X and μ_Y are the averages of the income in the distributions before and after tax, respectively.

The Lorenz dominance (LD) of the distribution Y on the distribution X is defined as:

$$Y \; LD \; X \quad \equiv \quad L_Y(i/N) \geq L_X(i/N) \quad \forall i = 1,\ldots,N$$

$$\exists i : L_Y\left(\frac{i}{N}\right) > L_X\left(\frac{i}{N}\right)$$

We propose the following class of inequality change (redistribution) measures:

$$RE(X,Y,v) : R^{2N}_{++} \cup [0,1] \rightarrow R$$

where $v \in [0,1]$ is a normative parameter that represents a value judgement and the values are normalized. We impose the following assumptions:

2.1 *Anonymity (or symmetry)*

The inequality change measure is independent of which labels are assigned to incomes of the distributions. Let X, Y, J and K $\in$ D. If J = PM*X and K = PM*Y, where PM is the square N-dimension permutation matrix, then:

$$RE(X,Y,v) = RE(J,K,v)\ \forall v \in [0,1]$$

2.2 Monotonicity of redistribution on the normative parameter

Given any v_1 and $v_2 \in [0,1]$ and any X,Y∈ D:

$$v_1 \leq v_2 \quad \Rightarrow \quad RE(X,Y,v_1) \leq RE(X,Y,v_2)$$

2.3 *Differentiability of RE(X,Y,v) on X, Y and v*

Assumption 2.2 can be then written as:

$$\frac{\partial RE(X,Y,v)}{\partial v} \geq 0$$

2.4 *S-convexity (the "transfer principle") applied to inequality change measure*

RE(X,Y,v) is positive when the change between the initial and the final distributions is a transfer from a poorer individual to a richer one, without order change, and vice versa.

Suppose $X=(x_1,\ldots,x_i,\ldots,x_j,\ldots, x_N)\in D$, and $Y=(x_1,\ldots,x_i+d,\ldots,x_j-d,\ldots, x_N)$ where $d > 0$ is so that $x_i+d \leq x_j-d$. Then:

$$RE(X,Y,v) \geq 0 \quad \forall v \in [0,1]$$

This is equivalent to X and J ∈ D, if Y=B*X, where B is an N-dimensional bistochastic matrix (Atkinson, 1970; Dasgupta et al., 1973), then:

$$RE(X,Y,v) \geq 0 \quad \forall v \in [0,1]$$

that generates consistency with the Lorenz dominance as a sufficient condition. We restrict the redistribution class to the following stronger assumption:

2.5 *Complete parametrical class (Equivalence with Lorenz criterion)*

Given any X,Y∈ D:

$$Y\ LD\ X \Leftrightarrow \{RE(X,Y,v) \geq 0 \quad \forall v \in [0,1]\}$$

$$\{L_X(i/N) = L_Y(i/N) \quad \forall i\ \} \Leftrightarrow \{RE(X,Y,v) = 0 \quad \forall v \in [0,1]\ \}$$

The classical indices mentioned in footnote 1 satisfy the first property in one direction (Lorenz dominance as a sufficient condition), but not in the other direction (not as a necessary condition). In the case when Y neither dominates nor is dominated in terms of Lorenz dominance by X and when Lorenz curves of distributions X and Y do not coincide, there is always at least a critical value v* for which RE(X,Y,v*)=0. For v>v*, RE(X,Y,v)>0 and for v<v*, RE(X,Y,v)<0. The demonstration of this result is based on the fact that the partial derivative from RE(X,Y,v) with respect to v is non-decreasing and is positive when the Lorenz curves are identical. Note also that various cuts between Lorenz curves are reduced in terms of RE(X,Y,v) to one critical value v*.

2.6 *Relativity (Homogeneity of degree zero in incomes)*

RE(X,Y,v) is not altered by proportional change in all incomes of the distribution X and/or in all incomes of the distribution Y. Let X and Y $\in$ D and n and m >0,

$$X' = (nx_1,...,nx_N) \text{ and } Y' = (my_1,..,my_N),$$

$$RE(X,Y,v) = RE(X',Y,v) = RE(X,Y',v) \quad \forall v \in [0,1]$$

2.7 Transitivity

Given any A, B, C, E, F and G $\in$ D,

$$RE(A,B,v) \geq RE(C,E,v) \quad \forall v \text{ and } RE(C,E,v) \geq RE(F,G,v) \quad \forall v \in [0,1],$$

$$RE(A,B,v) \geq RE(F,G,v) \quad \forall v \in [0,1]$$

Proposition 1: Non-decomposability of RE into two inequality indices

Given any X,Y $\in$ D, then any RE(X,Y,v) measure that satisfies assumptions 2.2 and 2.5 (the latter implies, in turn, 2.1 and 2.4) cannot be written as a difference between two S-convex inequality indices:

$$RE(X,Y,v) \neq I(X,v) - I(Y,v)$$

where I(·,v) is any S-convex inequality index that is monotone with respect to v.

The proof is as follows. The result of imposing property 2.5 on an inequality change measure given by I(X,v)-I(Y,v) reduces the form of the measure basically to
$L_Y(i/N) - L_X(i/N)$ and this form is not compatible with the property 2.2.

A particular class:

One class of inequality change indices RE that verify the properties mentioned above takes the following form:

$$RE(X,Y,v) = \sum_{i'=1}^{N} w(i'/N,v)\left[L_Y(j/N) - L_X(j/N)\right]_{i'} \qquad \forall v \in [0,1]$$

where sub-index i' corresponds to the rank of the new distribution ordered by $[L_Y(j/N) - L_X(j/N)]$ and where w(.) is a weight function,[2] defined as:

[2] An alternative case (in a previous version of this paper) could be the following parametrical class of inequality change measures:

$$RE(X,Y,v) = \sum_{i'=1}^{N} \tfrac{2}{A}\left(\frac{i'}{N}\right)^{f(v)} \left[L_Y(j/N) - L_X(j/N)\right]_{i'} \qquad \forall v \in (-1,1)$$

where A is the term of normalization:

$$v = \frac{i'}{N} \qquad w\left(\frac{i'}{N}, v\right) = 1$$

$$v \neq \frac{i'}{N} \qquad w\left(\frac{i'}{N}, v\right) = 0$$

Note that the multiplication of the vector of differences by w(.) (which corresponds in fact with the multiplication by the identity matrix) does not change the increasing order i'. Furthermore, the resulting vector of indices RE(X,Y,v) corresponds exactly to the vector of ordered differences $[L_Y(j/N) - L_X(i/N)]_{i'}$ but is receiving another interpretation as a vector of inequality change measures, depending on the parameter *v*.

The interpretation of this parameter of sensitivity to redistribution is the following. The larger is v (equal to i'/N), the higher is RE(X,Y,v) since we are only taking into account (in the weighting scheme) the difference corresponding to a particular i', and the larger is *v*, the larger is i'/N and, by construction, the larger is RE(X,Y,v).

This difference corresponds to a change in the percentage of total income for a defined poorer percentage of the population. Since the differences are ordered, we know that the (i'/N) of the population has a lower increase in its part of total income. Thus, given a Lorenz curves difference, a particular *v* value is the percentage of the population whose Lorenz curves differences are not greater than the particular RE(X,Y,v) associated with *v*.

Finally, a welfare property is postulated. If $\mu_X = \mu_Y$, then:

$$RE(X,Y,v) \geq 0 \ \forall v \Leftrightarrow W(Y) \geq W(X) \qquad \forall W(.) \in W^*$$

where W* is the set of W(.) that are increasing and S-concave.

The proof of this property is obtained by application of the theorem of Atkinson (1970) and Dasgupta, Sen and Starrett (1973). An extension offered by Shorrocks (1983) permits extension to additional cases, in which the income means of the two distributions X and Y are not identical, if we apply this methodology to the generalized Lorenz curves.

$$A = \sum_{i'=1}^{N} (i'/N)^{f(v)}$$

where $v \in (-1,1)$ and where $\phi(v)$: $(-1,1) \rightarrow (-\infty, +\infty)$, $\phi'(v) > 0$ and being $\phi(v)$ an anti-symmetrical function. A particular operative case is:

$$f(v) = \frac{v}{\left(1 - v^2\right)^{\frac{1}{2}}}$$

This resulting class is a generalization of the re-formulated version of the index proposed by Reynolds-Smolensky (1977).

3. A COMPLETE PARAMETRICAL CLASS OF PROGRESSIVITY MEASURES

Let X $\in$ D and T = (T_1,...,T_N)$\in R_+^N$, the associated distribution of taxes ordered by X such that Y$\in$ D and t = (t_1,..., t_N)$\in$(0,1), the associated tax mean rates, defined as $t_i = T_i/x_i$. We denote the average tax rate by μ_t.

The concentration curve of the tax T ordered by X is defined as:

$$L_{T,X}(j/N)=\sum_{i=1}^{j}T_i/\sum_{i=1}^{N}T_i$$

We define the proportional tax equivalent to T as:

$$PT=(m_t x_1,...,m_t x_N) \qquad with \quad m_t=\frac{m_T}{m_X}$$

where μ_T is the average tax T.

Note that the Lorenz curve of distribution X coincides with the concentration curve of the proportional tax:

$$L_X\left(\frac{i}{N}\right)=L_{PT}\left(\frac{i}{N}\right) \qquad \forall i=1,...,N$$

Given two tax schemes T^1 and $T^2 \in R_+^N$, T^1 dominates in terms of concentration curves (CD) T^2 if and only if:

$$T^1 CD\, T^2 \equiv L_{T^2}(i/N)\geq L_{T^1}(i/N)\; \forall i=1,...,N$$
$$\exists i \big| L_{T^2}(i/N) > L_{T^1}(i/N)$$

The complete parametrical of progressivity indices is defined similarly to the class of redistribution indices.

$$P(X,T,v): R_{++}^{2N}\cup[0,1]\rightarrow R$$
and
$$P(X,T,v)=\sum_{i''}^{N} w\left(\frac{i''}{N},v\right)\left[L_X\left(\frac{i}{N}\right)-L_{T,X}\left(\frac{i}{N}\right)\right]_{i''} \qquad \forall v=[0,1]$$

where i" is the rank associated with the ordered distribution [L_X (i/N) - $L_{T,\ X}$ (i/N)].[3]

P(X,T,v) has a parallel structure to RE(X,Y,v) and also verifies the following assumptions:

---

[3] The particular case, parallel to the case of RE (see footnote 2), is:

$$P(X,T,v)=\sum_{i'=1}^{N}\frac{2}{A}(i''/N)^{f(v)}[L_X(i/N)-L_{T,X}(i/N)]_{i''} \qquad \forall v\in(-1,1)$$

This is a generalization of the progressivity index of Kakwani (1976).

3.1 *Anonymity (or symmetry)*

The progressivity measure is independent of which labels are assigned to incomes of the distributions. Let X, Y $\in$ D and T $\in R_+^N$. If Y = PM*X, where PM is the square N-dimension permutation matrix, then:

$$P(X,T,v) = P(Y,T,v)\ \forall v \in [0,1]$$

3.2 Monotonicity of progressivity on the normative parameter

Given any v_1, $v_2 \in$ [0,1], any X$\in$ D and any T $\in R_+^N$:

$$v_1 \leq v_2 \qquad P(X,T,v_1) \leq P(X,T,v_2)$$

3.3 *Differentiability of P(X,T,v) on X, T and v*

Assumption 3.2 can be written as:

$$\frac{\partial P(X,T,v)}{\partial v} \geq 0$$

3.4 *Complete parametrical class (equivalence with concentration dominance)*

Given any v $\in$ [0,1], any X$\in$ D and any T $\in R_+^N$, P(X,T,v) complies with the principle of dominance of the concentration curves, as a necessary and sufficient condition:

$$PT\ LD\, T \Leftrightarrow \{P(X,T,v) \geq 0 \quad \forall v \in [0,1]\}$$

$$\{L_X(i/N) = L_{T,X}(i/N) \quad \forall i\} \Leftrightarrow \{P(X,T,v) = 0 \quad \forall v \in [0,1]\}$$

In case the concentration curves of T and PT cross, that is, T neither dominates nor is dominated by PT, a critical v always exists, v**, for which P(X,T,v**) = 0. For v>v**, P(X,T,v)>0 and for v<v**, P(X,T,v) < 0.

Note that the partial derivation from P(X,T,v) with respect to v is positive when the concentration curves do not coincide (assumption 3.2). In this context, a particular value of v indicates the percentage of the population with no higher progressivity than the value of P associated with this v value.

3.5 *Relativity (Homogeneity of degree zero in incomes)*

P(X,T,v) is not altered by a proportional change in all incomes of the distribution X. Let X $\in$ D, T $\in R_+^N$ and n > 0,

$$X' = (nx_1, ..., nx_N),$$

$$P(X,T,v) = P(X',T,v)\ \ \forall v \in [0,1]$$

3.6 Transitivity

For any X$\in$ D, and T^1, T^2 and $T^3 \in R_+^N$,

$$P(X,T^1,v) \geq P(X,T^2,v) \quad \forall v \in [0,1] \ \textit{and} \ P(X,T^2,v) \geq P(X,T^3,v) \quad \forall v \in [0,1],$$

$$P(X,T^1,v) \geq P(X,T^3,v) \quad \forall v \in [0,1]$$

Finally, note that the redistributive measure RE(X,Y,v) and the progressivity measure P(X,T,v) also verify the two following properties:

P.1 Decomposition of the RE index into the index of progressivity P, the average tax rate and an index of re-ordering R

Given any X, Y∈ D, and any T∈ R_+^N , the index of redistribution RE can be decomposed as follows:

$$RE(X,Y,v) = P(X,T,v)\frac{m_t}{(1-m_t)} - R(X,Y,v) \qquad \forall v \in [0,1]$$

where R (X,Y,v) is a non-negative index of re-ordering:

$$R(X,Y,v) = \sum_{i'=1}^{N} w(i'/N)\left[L_Y(i/N) - L_X(i/N)\right]_{i'} - \sum_{i''=1}^{N} w(i''/N)\left[L_Y(i/N) - L_X(i/N)\right]_{i''} \quad \forall v \in [0,1]$$

Note that R(X,Y,v) is an index of re-ordering in the same spirit as Atkinson (1980), Plotnick (1981), Duclos (1993) and Lerman and Yitzaki (1995). This index is positive if and only if some re-ordering happens; and it is equal to zero if and only if re-ordering is not produced. Proof is based on Atkinson (1980).

P.2 Relation between the critical values of RE(X,Y,v) and P(X,T,v)

The critical values of the parameters of progressivity and redistribution are linked in the following way. Given any X,Y∈ D and T∈ R_+^N , $v^{**}<v^{*}$ if and only if R(X,Y,v) > 0 for any v, and $v^{**} = v^{*}$ if and only if R(X,Y,v) = 0 for any v.

Demonstration is only based on property P.1 and the fact that R(X,Y,v) is greater than or equal to zero.

4. CONCLUSION

In this paper, we have converted the comparison between the Lorenz curves due to taxation into a redistribution (or, more generally, into an inequality change) index defined for a range of normative parameters, that satisfies monotonocity with respect to the normative parameter and Lorenz equivalence. This proposed index defines a complete redistribution class and can be decomposed, and one of its components is an index of progressivity, which has been similarly derived.

These indices of inequality change and progressivity are based on a reweighting of the differences between Lorenz/concentration curves. They comply with the equivalence between dominance in terms of Lorenz/concentration curves and the signs of the indices for all the normative parameters (necessary and sufficient conditions). When the sign of the index does not change along all the range of parameters, then there is Lorenz/concentration dominance (necessary condition). This last condition is intrinsically linked with the fact that the index of inequality change cannot be decomposed into two S-convex relative inequality indices.

The property of equivalence (in its necessary condition) is not satisfied by the traditional S-convex inequality indices of the literature such as the generalizations of the Gini coefficient, proposed by Donaldson and Weymark (1980) and Yitzaki (1983), Atkinson indices (Atkinson (1970) or the general Entropy indices (Cowell, 1977).

Finally the parametrical form has the following property, a cross of the Lorenz/concentration curves always corresponds to at least one critical value of the parameter for which the index is equal to zero. For values lower than this critical value, the index is negative and for higher values than this critical value, the index is positive. Possible multiple crosses between curves are reduced to only one change in the sign of the index.

REFERENCES

ATKINSON, A.B. (1970), "On the Measurement of Inequality", *Journal of Economic Theory*, 2, 244-263.

ATKINSON, A.B. (1980), "Horizontal Equity and the Distribution of the Tax Burden", *The Economics of Taxation*, (Eds. H.J. Aaron and M.J. Boskins), Washington D.C., Bookings.

COWELL, F.A. (1977), *Measuring Inequality*, Oxford: Philip Allen.

DASGUPTA, P., SEN, A. and D. STARRETT (1973), "Notes on the Measurement of Inequality", *Journal of Economic Theory*, 6, 180-187.

DONALDSON, D. and J.A. WEYMARK (1980), "A Single-Parameter Generalization of the Gini Indices of Inequality", *Journal of Economic Theory*, 22, 67-86.

DUCLOS, J.Y. (1993), "Progressivity, Redistribution and Equity, with Application to the British Tax and Benefit System", *Public Finance*, 48, 350-65.

KAKWANI, N. (1976), "Measurement of Tax Progressivity: An International Comparison", *Economic Journal*, 87, 71-80.

LERMAN, R.I. and S. YITZAKI (1995), "Changing ranks and inequality impacts of taxes and transfers", *National Tax Journal*, 48, pp. 45-59.

PFÄHLER, W. (1987), "Redistributive Effects of Tax Progressivity: Evaluating a General Class of Aggregate Measures", *Public Finance*, 42, 1-31.

PLOTNICK, R. (1981), "A Measure of Horizontal Inequity", *The Review of Economics and Statistics*, 63, 283-288.

REYNOLDS, M. And E. SMOLENSKY (1977), *Public Expenditure, taxes and the Distribution of Income: The United States 1950, 1961, 1970*, New York: Academic Press.

SHORROCKS, A.F. (1983), "Ranking Income Distributions", *Economica*, 50, 1-17.

YITZAKI, S. (1983), "On an Extension of the Gini Coefficient", *International Economic Review*, 24, 617-628.

NORMAS DE PUBLICACIÓN DE PAPELES DE TRABAJO DEL INSTITUTO DE ESTUDIOS FISCALES

Esta colección de *Papeles de Trabajo* tiene como objetivo ofrecer un vehículo de expresión a todas aquellas personas interasadas en los temas de Economía Pública. Las normas para la presentación y selección de originales son las siguientes:

1. Todos los originales que se presenten estarán sometidos a evaluación y podrán ser directamente aceptados para su publicación, aceptados sujetos a revisión, o rechazados.

2. Los trabajos deberán enviarse por duplicado a la Subdirección de Estudios Tributarios. Instituto de Estudios Fiscales. Avda. Cardenal Herrera Oria, 378. 28035 Madrid.

3. La extensión máxima de texto escrito, incluidos apéndices y referencias bibliográfícas será de 7000 palabras.

4. Los originales deberán presentarse mecanografiados a doble espacio. En la primera página deberá aparecer el título del trabajo, el nombre del autor(es) y la institución a la que pertenece, así como su dirección postal y electrónica. Además, en la primera página aparecerá también un abstract de no más de 125 palabras, los códigos JEL y las palabras clave.

5. Los epígrafes irán numerados secuencialmente siguiendo la numeración arábiga. Las notas al texto irán numeradas correlativamente y aparecerán al pie de la correspondiente página. Las fórmulas matemáticas se numerarán secuencialmente ajustadas al margen derecho de las mismas. La bibliografía aparecerá al final del trabajo, bajo la inscripción "Referencias" por orden alfabético de autores y, en cada una, ajustándose al siguiente orden: autor(es), año de publicación (distinguiendo a, b, c si hay varias correspondientes al mismo autor(es) y año), título del artículo o libro, título de la revista en cursiva, número de la revista y páginas.

6. En caso de que aparezcan tablas y gráficos, éstos podrán incorporarse directamente al texto o, alternativamente, presentarse todos juntos y debidamente numerados al final del trabajo, antes de la bibliografía.

7. En cualquier caso, se deberá adjuntar un disquete con el trabajo en formato word. Siempre que el documento presente tablas y/o gráficos, éstos deberán aparecer en ficheros independientes. Asimismo, en caso de que los gráficos procedan de tablas creadas en excel, estas deberán incorporarse en el disquete debidamente identificadas.

Junto al original del Papel de Trabajo se entregará también un resumen de un máximo de dos folios que contenga las principales implicaciones de política económica que se deriven de la investigación realizada.

PUBLISHING GUIDELINES OF WORKING PAPERS AT THE INSTITUTE FOR FISCAL STUDIES

This serie of *Papeles de Trabajo* (working papers) aims to provide those having an interest in Public Economics with a vehicle to publicize their ideas. The rules governing submission and selection of papers are the following:

1. The manuscripts submitted will all be assessed and may be directly accepted for publication, accepted with subjections for revision or rejected.
2. The papers shall be sent in duplicate to Subdirección General de Estudios Tributarios (The Deputy Direction of Tax Studies), Instituto de Estudios Fiscales (Institute for Fiscal Studies), Avenida del Cardenal Herrera Oria, nº 378, Madrid 28035.
3. The maximum length of the text including appendices and bibliography will be no more than 7000 words.
4. The originals should be double spaced. The first page of the manuscript should contain the following information: (1) the title; (2) the name and the institutional affiliation of the author(s); (3) an abstract of no more than 125 words; (4) JEL codes and keywords; (5) the postal and e-mail address of the corresponding author.
5. Sections will be numbered in sequence with arabic numerals. Footnotes will be numbered correlatively and will appear at the foot of the corresponding page. Mathematical formulae will be numbered on the right margin of the page in sequence. Bibliographical references will appear at the end of the paper under the heading “References” in alphabetical order of authors. Each reference will have to include in this order the following terms of references: author(s), publishing date (with an a, b or c in case there are several references to the same author(s) and year), title of the article or book, name of the journal in italics, number of the issue and pages.
6. If tables and graphs are necessary, they may be included directly in the text or alternatively presented altogether and duly numbered at the end of the paper, before the bibliography.
7. In any case, a floppy disk will be enclosed in Word format. Whenever the document provides tables and/or graphs, they must be contained in separate files. Furthermore, if graphs are drawn from tables within the Excell package, these must be included in the floppy disk and duly identified.

Together with the original copy of the working paper a brief two-page summary highlighting the main policy implications derived from the research is also requested.

ÚLTIMOS PAPELES DE TRABAJO EDITADOS POR EL
INSTITUTO DE ESTUDIOS FISCALES

2000

1/00 Crédito fiscal a la inversión en el impuesto de sociedades y neutralidad impositiva: Más evidencia para un viejo debate.
Autor: Desiderio Romero Jordán.
Páginas: 40.

2/00 Estudio del consumo familiar de bienes y servicios públicos a partir de la encuesta de presupuestos familiares.
Autores: Ernesto Carrilllo y Manuel Tamayo.
Páginas: 40.

3/00 Evidencia empírica de la convergencia real.
Autores: Lorenzo Escot y Miguel Ángel Galindo.
Páginas: 58.

Nueva Época

4/00 The effects of human capital depreciation on experience-earnings profiles: Evidence salaried spanish men.
Autores: M. Arrazola, J. de Hevia, M. Risueño y J. F. Sanz.
Páginas: 24.

5/00 Las ayudas fiscales a la adquisición de inmuebles residenciales en la nueva Ley del IRPF: Un análisis comparado a través del concepto de coste de uso.
Autor: José Félix Sanz Sanz.
Páginas: 44.

6/00 Las medidas fiscales de estímulo del ahorro contenidas en el Real Decreto-Ley 3/2000: análisis de sus efectos a través del tipo marginal efectivo.
Autores: José Manuel González Páramo y Nuria Badenes Pla.
Páginas: 28

7/00 Análisis de las ganancias de bienestar asociadas a los efectos de la Reforma del IRPF sobre la oferta laboral de la familia española.
Autores: Juan Prieto Rodríguez y Santiago Álvarez García.
Páginas 32.

8/00 Un marco para la discusión de los efectos de la política impositiva sobre los precios y el *stock* de vivienda.
Autor: Miguel-Ángel López García.
Páginas 36.

9/00 Descomposición de los efectos redistributivos de la Reforma del IRPF.
Autores: Jorge Onrubia Fernández y María del Carmen Rodado Ruiz.
Páginas 24.

10/00 Aspectos teóricos de la convergencia real, integración y política fiscal.
Autores: Lorenzo Escot y Miguel-Ángel Galindo.
Páginas 28.

2001

1/01 Notas sobre desagregación temporal de series económicas.
Autor: Enrique M. Quilis.
Páginas 38.

2/01 Estimación y comparación de tasas de rendimiento de la educación en España.
Autores: M. Arrazola, J. de Hevia, M. Risueño, J.F. Sanz.
Páginas 28.

3/01 Doble imposición, “efecto clientela” y aversión al riesgo.
Autores: Antonio Bustos Gisbert y Francisco Pedraja Chaparro.
Páginas 34.

4/01 Non-Institutional Federalism in Spain.
Autor: Joan Rosselló Villalonga.
Páginas 32.

5/01 Estimating utilisation of Health care: A groupe data regression approach.
Autor: Mabel Amaya Amaya.
Páginas 30.

6/01 Shapley inequality descomposition by factor components.
Autores: Mercedes Sastre y Alain Trannoy
Páginas 40.

7/01 An empirical analysis of the demand for physician services across the European Union.
Autores: Sergi Jiménez Martín, José M. Labeaga y Maite Martínez-Granado
Páginas 40.

8/01 Demand, childbirth and the costs of babies: evidence from spanish panel data.
Autores: José M.ª Labeaga, Ian Preston y Juan A. Sanchis-Llopis
Páginas 56.

9/01 Imposición marginal efectiva sobre el factor trabajo: Breve nota metodológica y comparación internacional.
Autores: Desiderio Romero Jordán y José Félix Sanz Sanz
Páginas 40.

10/01 A non-parametric decomposition of redistribution into vertical and horizontal components.
Autores: Irene Perrote, Juan Gabriel Rodríguez y Rafael Salas.
Páginas 28.

11/01 Efectos sobre la renta disponible y el bienestar de la deducción por rentas ganadas en el IRPF.
Autora: Nuria Badenes Plá.
Páginas 28.

12/01 Seguros sanitarios y gasto público en España. Un modelo de microsimulación para las políticas de gastos fiscales en sanidad.
Autor: Ángel López Nicolás.
Páginas 40.