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**FISCAL VISIBILITY ESTIMATES FOR OECD COUNTRIES WITH TWO AND
THREE LEVELS OF TERRITORIAL GOVERNMENT LEVELS**

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I. INTRODUCTION

Improvements in the efficient allocation of resources between the private and public sectors of an economy - as well as among its several public sub-sectors - can be reached insofar as both public revenue and expenditure possess *visibility*, that is to say, the *burden* of public revenue and the *benefit* of public expenditure should be fully noticeable by individuals¹.

Concerning public revenue, this property of visibility has changed in the course of history, depending on both economic (as the development level of a country) and political (as mechanisms of fiscal illusion used by politicians, bureaucrats, and interest groups to overcome taxpayers' resistance) factors [Wagner, 1976; Borcharding, 1977; Buchanan and Wagner, 1977; Fiorina and Noll, 1978; Pommerehne and Schneider, 1978; Brennan and Buchanan, 1980; Frey and Pommerehne, 1982; Oates, 1988; Tullock, 1989; Tabellini and Alesina, 1990; Dunleavy, 1991; Mueller, 1993; Roig-Alonso, 1998; Roig-Alonso, 2003]. In a similar way, the compliance with such required property by fiscal systems now in force might differ remarkably among OECD countries.

With regard to public expenditure, the final or intermediate, the public or private nature, the spacial effects or dimensions, the administration costs, and other inherent characteristics of publicly provided goods and services represent major factors determining their benefit visibility [Weingast, Shepsle, and Johnsen, 1981; Solano, 1983; Hamilton, 1983; Becker, 1983, 1985; Mueller and Murell, 1985, 1986; Mueller, 1987; Henrekson, 1992; Roig-Alonso, 1998; Roig-Alonso, 2003].

In any case, it is convenient to dispose of logical and general indicators permitting the measuring, as exactly as possible, of the extent to which the required property of visibility is achieved at all times by local, state, central/federal or confederal, supranational, and general fiscal sub-systems and systems of countries.

This contribution presents results and conclusions concerning:

- A) The definition of visibility of public expenditure benefit in an operational way.
- B) The identification of relevant factors generating problems of invisibility of public expenditure.
- C) The construction of indicators to carry out historical and international comparisons.

In addition to this, new estimates relating to some selected OECD member countries are offered by using statistical data and information from the International Monetary Fund.

A policy implication of these estimates is confirmed: allocation improvements could be obtained in these OECD countries by implementing changes and reforms aiming to raise the current values of public revenue and expenditure visibility.

II. INDEX OF BURDEN VISIBILITY OF TOTAL PUBLIC REVENUE

In general, for every level, **L**, of territorial public administrations of an economy, a visibility index, V_L^R , of its total public revenue, **R**, can be defined in such a way that $0 \leq V_L^R \leq 1$, based on the following formula:

$$V_L^R = \sum_{i=1}^n x_{iL}^R y_{iL}^R$$

where:

- a) **n** = number of types of public revenue **R** for level **L** of territorial public administrations;
- b) x_{iL}^R = relative financial weight of public revenue **R** of type **i** for level **L** of territorial public administrations, with **i** = **1, 2, ..., n**; that is to say:

$$0 \leq x_{iL}^R = \frac{GF_{iL}^R}{\sum_{i=1}^n GF_{iL}^R} \leq 1$$

with GF_{iL}^R = absolute quantity of public revenue R of type i for level L of territorial public administrations;

c) y_{iL}^R = visibility or perceptibility (for the policy intended - or legal - revenue-provider) factor of burden of public revenue R of type i to which level L of territorial public administrations is entitled, with $0 \leq y_{iL}^R \leq 1$.

III. BURDEN VISIBILITY OF A SPECIFIC PUBLIC REVENUE

An objective estimate of y_{iL}^R - factor of perceptibility of the direct burden by a policy intended - or legal - revenue-provider of a public revenue R of type i for level L of territorial public administrations - can be defined according to the following criteria:

$$y_{iL}^R = v_{iL}^R p_{iL}^R m_{iL}^R q_{iL}^R i_{iL}^R$$

where:

a) v_{iL}^R = voluntary ($v_{iL}^R = 0$) or coercive ($v_{iL}^R = 1$) nature of public revenue R of type i for its policy intended - or legal - revenue-provider (coerciveness parameter), with $0 \leq v_{iL}^R \leq 1$.

b) p_{iL}^R = full ($p_{iL}^R = 0$) or null ($p_{iL}^R = 1$) proportionality of the quantity of public revenue R of type i - the burden of which is borne by a policy intended - or legal - revenue-provider - to the cost of efficiently producing the good or service *specifically* received by him in return for his burden (proportionality parameter), with $0 \leq p_{iL}^R \leq 1$.

c) m_{iL}^R = full ($m_{iL}^R = 1$) or null ($m_{iL}^R = 0$) information to the policy intended - or legal - revenue-provider on the concept of the direct burden he is bearing when providing public revenue R of type i (concept-information parameter), with $0 \leq m_{iL}^R \leq 1$.

d) q_{iL}^R = full ($q_{iL}^R = 1$) or null ($q_{iL}^R = 0$) information to the policy intended - or legal - revenue-provider on the quantity of the direct burden he is bearing when providing public revenue R of type i (quantity-information parameter), with $0 \leq q_{iL}^R \leq 1$.

e) i_{iL}^R = intermediate ($i_{iL}^R = 0$) or final ($i_{iL}^R = 1$) position of the policy intended - or legal - revenue-provider in relation to his direct burden (burden-shifting

parameter), with $0 \leq i_{iL}^R \leq 1$.

In any case, all V_L^R , x_{iL}^R , y_{iL}^R , v_{iL}^R , p_{iL}^R , m_{iL}^R , q_{iL}^R and i_{iL}^R are continuous variables ranging from 0 to 1, i and L are subscripts for the type of revenue and level of territorial public administration respectively and R is a superscript for public revenue.

IV. INDEX OF BENEFIT VISIBILITY OF TOTAL PUBLIC EXPENDITURE

The social benefit of a publicly supplied good or service is equal to its social production cost when these four conditions are simultaneously met:

- A) Resources of an economy are Pareto-efficiently allocated in both public and private sectors and sub-sectors.
- B) Private and public production of goods and services of such an economy is technically efficient (which means that a maximum output can be obtained out of full employment level of inputs).
- C) Production is made at constant returns to scale.
- D) There is no consumer surplus.

When one or several of the previous conditions are not kept, the social cost of publicly supplying a good or service has to be corrected upward or downward in order for it to approximate its social benefit in money terms.

In any case, it is possible to consider the accounting production cost of a publicly supplied good or service as a first estimate of its social benefit in money terms, trying to identify final beneficiaries by applying a set of imputation criteria according to the economic nature of every type of good or service. In such a case, we should remember that every publicly supplied good or service can be:

- A) Public (rival consumption is null), private (rival consumption is full), or mixed (rival consumption is partial).
- B) Intermediate (production resource) or final (consumption resource).

Besides, a final good or service can be complementary, substitute, or independent in relation to the available personal income of a final consumer, and its re-distributive incidence will be regressive, progressive, or proportional.

According to income-elasticities of demand, publicly supplied substitute goods are inferior (negative coefficient), whereas complementary goods are normal (positive coefficient).

In most cases a policy intended - or legal - consumer or user is quite aware of his personal benefit from a publicly supplied private good (for instance, a money grant), has an incomplete notion of the social benefit from a mixed good (like an education or health service), and fails to properly perceive the social benefit of a public good (defense, law and order, etc.). So, he faces important difficulties for assessing, in money terms, the social benefit - and even the countable cost - from many publicly supplied goods and services.

Usually, the problem of evaluating benefits of public supplied goods and services turns out to be complicated because the following considerations have to be taken into account:

- A) Many types of publicly supplied services (*complex goods*) simultaneously have a) intermediate and final, b) public and private, c) substitute and complementary components, and these different parts are to be identified, characterized, and measured in separate ways.
- B) The number and variety of types of publicly supplied goods and services is greater than that corresponding to types of public revenue.
- C) A good or service can be supplied by a level of territorial public administration out of funds collected and granted by another level of territorial public administration.

Similarly to the case of public revenue, for every level of territorial public administrations, L , a general index, V_L^E , of benefit visibility of total public expenditure, E , can be defined in such a way that $0 \leq V_L^E \leq 1$, based on the following formula:

$$V_L^E = \sum_{f=1}^q x_{fL}^E y_{fL}^E$$

where:

- a) q = number of types of public expenditure E performed by level L of territorial public administrations;
- b) x_{fL}^E = relative financial weight of public expenditure E of type f performed by level L of territorial public administrations, with $f = 1, 2, \dots, q$; that is to say:

$$0 \leq x_{fL}^E = \frac{GF_{fL}^E}{\sum_{f=1}^q GF_{fL}^E} \leq 1$$

with $\mathbf{GF}_{fL}^E$ = absolute quantity of public expenditure $\mathbf{E}$ of type $\mathbf{f}$ performed by level $\mathbf{L}$ of territorial public administrations;

c) $\mathbf{y}_{fL}^E$ = visibility or perceptibility (by the policy intended - or legal - consumer) factor of benefit of public expenditure $\mathbf{E}$ of type $\mathbf{f}$ performed by level $\mathbf{L}$ of territorial public administrations, where $0 \leq \mathbf{y}_{fL}^E \leq 1$.

V. BENEFIT VISIBILITY OF A SPECIFIC PUBLIC EXPENDITURE

An objective estimate of $\mathbf{y}_{fL}^E$ (factor of perceptibility by a policy intended - or legal - consumer of the direct benefit of a public expenditure $\mathbf{E}$ of type $\mathbf{f}$ performed by level $\mathbf{L}$ of territorial public administrations) can be defined according to the following criteria:

$$\mathbf{y}_{fL}^E = \mathbf{v}_{fL}^E \mathbf{p}_{fL}^E \mathbf{m}_{fL}^E \mathbf{q}_{fL}^E \mathbf{i}_{fL}^E$$

where:

a) $\mathbf{v}_{fL}^E$ = null ($\mathbf{v}_{fL}^E = 0$) or full ($\mathbf{v}_{fL}^E = 1$) consumption of a publicly supplied good of type $\mathbf{f}$ by its policy intended - or legal - user or beneficiary (consumption parameter), with $0 \leq \mathbf{v}_{fL}^E \leq 1$.

b) $\mathbf{p}_{fL}^E$ = full ($\mathbf{p}_{fL}^E = 0$) or null ($\mathbf{p}_{fL}^E = 1$) proportionality of cost of efficient production of the publicly supplied good of type $\mathbf{f}$ to a *specifically required monetary burden* borne by the policy intended - or legal - user or beneficiary (proportionality parameter), with $0 \leq \mathbf{p}_{fL}^E \leq 1$.

c) $\mathbf{m}_{fL}^E$ = full ($\mathbf{m}_{fL}^E = 1$) or null ($\mathbf{m}_{fL}^E = 0$) information to the policy intended - or legal - consumer or user on the concept of the direct benefit he is receiving when public expenditure $\mathbf{E}$ of type $\mathbf{f}$ is being performed (concept-information parameter), with $0 \leq \mathbf{m}_{fL}^E \leq 1$.

d) $\mathbf{q}_{fL}^E$ = full ($\mathbf{q}_{fL}^E = 1$) or null ($\mathbf{q}_{fL}^E = 0$) information to the policy intended - or legal - consumer or user on the quantity of the direct benefit he is receiving when public expenditure $\mathbf{E}$ of type $\mathbf{f}$ is performed (quantity-information parameter), with $0 \leq \mathbf{q}_{fL}^E \leq 1$.

e) $\mathbf{i}_{fL}^E$ = intermediate ($\mathbf{i}_{fL}^E = 0$) or final ($\mathbf{i}_{fL}^E = 1$) position of the policy intended - or legal - user or beneficiary of the publicly supplied good of type $\mathbf{f}$ in relation to his direct benefit (benefit-shifting parameter), with $0 \leq \mathbf{i}_{fL}^E \leq 1$.

Similarly to the previous case of public revenue, all V_L^E , x_{fL}^E , y_{fL}^E , v_{fL}^E , p_{fL}^E , m_{fL}^E , q_{fL}^E and i_{fL}^E are continuous variables always ranging from 0 to 1, f and L are subscripts for the type of public expenditure and level of territorial public administration respectively and E is a superscript for public expenditure.

VI. ESTIMATES ON BURDEN VISIBILITY OF TOTAL PUBLIC REVENUE

Table 1 presents estimates on burden visibility of public revenue and grants of some European OECD countries and USA, obtained by applying index

$$V_L^R = \sum_{i=1}^n x_{iL}^R y_{iL}^R$$

previously defined, to the fiscal central/federal sub-systems now in force in these countries.

Such values have been calculated mainly from information and primary data on public cash flows provided by both the Commission of the European Communities², reflecting tax structures of - and the institutional situation in - every member country on January 1, 1992, and the International Monetary Fund³.

To obtain a sensitivity analysis, three hypotheses on minimum, plausible and maximum shifting of tax burden have been assumed, giving rise to the corresponding series of maximum, V_M , plausible, V_p , and minimum, V_m , values of weighted-visibility estimates of revenue burden for policy intended - or legal - revenue-providers. The initial values for the fiscal visibility parameters v , p , m , q , i_M , i_p , i_m have been deducted and imputed after carefully analysing all the information provided by both the International Monetary Fund and the Commission of the European Communities on the internal structure of each type of public revenue (Roig-Alonso, 2003).

TABLE 1
Estimates of Public Revenue Visibility in Selected OECD Countries:
Consolidated Central/Federal Government Level

Member Countries / Years	V_M	V_P	V_m
Austria, 1992	62.92%	42.93%	22,95%
Belgium, 1992	68.87%	46.72%	24.57%
Denmark, 1993	62.79%	46.76%	30.74%
Finland, 1990	66.70%	49.19%	31.68%
France, 1992	65.60%	43.51%	21.42%
Germany, 1992	56.28%	37.08%	17.88%
Greece, 1993	32.49%	25.74%	18.98%
Ireland, 1991	64.17%	46.01%	27.86%
Italy, 1993	57.45%	39.53%	21.61%
Luxembourg, 1991	56.22%	37.81%	19.41%
Netherlands, 1993	66.60%	47.33%	28.05%
Portugal, 1989	53.67%	36.57%	19.46%
Spain, 1991	66.88%	43.09%	19.30%
Sweden, 1992	65.51%	40.62%	15.73%
United Kingdom, 1992	63.68%	45.49%	27.31%
European Union (averages), several years	60.66%	41.89%	23.13%
U.S.A., 1996	80.89%	53.42%	25.95%

Footnotes for table 1:

V_M = maximum visibility estimates of revenue burden for the legal revenue provider.

V_P = plausible visibility estimates of revenue burden for the legal revenue provider.

V_m = minimum visibility estimates of revenue burden for the legal revenue provider.

- = non-existing government level for the year considered.

... = datum lacking for the year considered.

Source: own elaboration from data in *Government Finance Statistics Yearbook*, several editions, International Monetary Fund, Washington.

VII. ESTIMATES ON BENEFIT VISIBILITY OF TOTAL PUBLIC EXPENDITURE

In turn, table 2 presents estimates on benefit visibility of public expenditure and grants obtained by applying index

$$V_L^E = \sum_{f=1}^q x_{fL}^E y_{fL}^E$$

to the consolidated central/federal fiscal sub-systems in these OECD countries. Such values have been calculated mainly from information and primary data on public cash flows provided by the International Monetary Fund⁴.

As before, three hypotheses on minimum, plausible and maximum shifting of expenditure benefit have been assumed to obtain a sensitivity analysis, giving rise to the corresponding series of maximum, V_M , plausible, V_p , and minimum, V_m , values of weighted-visibility estimates of expenditure benefit for the policy intended - or legal - beneficiary of every type of good and service publicly provided. The initial approximate values for the fiscal visibility parameters v , p , m , q , i_M , i_p , i_m have been deducted and imputed after carefully analysing all the information facilitated by the International Monetary Fund on the internal structure of each type of public expenditure (Roig-Alonso, 2003).

TABLE 2
Estimates of Public Expenditure Visibility in Selected OECD Countries:
Consolidated Central/Federal Government Level

Member Countries / Years	V_M	V_n	V_m
Austria, 1995	44.25%	34.15%	24.07%
Belgium, 1988	40.30%	30.52%	20.63%
Denmark, 1995	40.88%	31.01%	21.33%
Finland, 1995	38.39%	28.76%	19.79%
France, 1993	41.35%	31.92%	18.17%
Germany, 1991	43.99%	33.85%	23.79%
Greece, 1995	37.60%	26.90%	16.29%
Ireland, 1994	37.99%	28.22%	18.47%
Italy, 1988	39.29%	29.73%	20.20%
Luxembourg, 1995	42.39%	32.85%	23.33%
Netherlands, 1996	40.85%	30.91%	21.15%
Portugal, 1988	35.46%	26.02%	16.58%
Spain, 1994	41.00%	30.80%	20.61%
Sweden, 1996	42.90%	33.05%	23.23%
United Kingdom, 1995	39.40%	29.43%	19.48%
European Union (averages), several years	40.40%	30.54%	20.47%
USA, 1996	35.84%	25.65%	15.55%

Notes for table 2:

V_M = maximum visibility estimates of expenditure benefit for the policy-intended or legal beneficiary.

V_p = plausible visibility estimates of expenditure benefit for the policy-intended or legal beneficiary.

V_m = minimum visibility estimates of expenditure benefit for the policy-intended or legal beneficiary.

Source: own elaboration from data in *Government Finance Statistics Yearbook*, several editions, International Monetary Fund, Washington.

VIII. CONCLUSIONS

The quality of public revenue and expenditure sub-systems and systems as policy instruments for efficiently allocating economic resources among private and public sectors and sub-sectors varies as a result of economic, political, and social factors. In the same way that an economic agent operating in a market needs to be able to compare the burden of a price he is paying for with the benefit of the good or service he is receiving in return for this price, it is a requirement for every taxpayer to be able to know and compare the burden of taxes he is bearing with the benefit of the publicly provided general or specific goods and services he is receiving in return for his payments for an efficient allocation of resources between the public and private sectors of an economy. If the burden of the public revenue is systematically less visible - or noticeable - than the benefit of the publicly provided goods and services for the economic agents of a country as a whole, a tendency towards a public over-provision of goods and services will take place. Quite the opposite will occur if the visibility - or perception - of benefit of the publicly provided goods and services is lower than that of the burden of the public revenue: a tendency to a public under-provision will prevail. That is why both the size and the pattern of a public budget can be strongly and systematically influenced, among other factors, by the visibility - or perception - of such burden and benefit by the economic agents: "While taxpayers may underestimate their burden, they may also underestimate expenditure benefits... there is a cross-current of forces and the net effect is by no means evident" (Musgrave and Musgrave, 1989, pp. 100-101). From this it follows that it is in the policy-makers' interest general interest to know both the sign and the intensity of the net effect of such tendencies in order to be able to design and implement corrective fiscal policies.

The indices of fiscal visibility presented in previous sections of this paper bring forward a general measurement methodology which can be used to make relevant quantified comparisons among member countries of the International Monetary Fund provided that detailed statistic figures on execution of public budgets as well as information about the nature of the different types of public administrations' revenue and expenditure programmes are available to researchers.

Estimates obtained from different assumptions on tax and expenditure shifting by applying these indices to measure the visibility of revenue burden and expenditure benefit of the central/federal sub-systems now in force in selected OECD countries show:

First. Low values of burden visibility for all these countries in general, especially for Greece (25.74% as plausible value). Such general low values of revenue visibility stem from the concurrence of several factors such as non-coerciveness, non-existence of specific requitals, lack of information on concepts and quantities, partial shifting of burden by tax-payers, intergovernmental grants, etc. U.S.A., with a plausible value of 53.42%, has the most visible central/federal sub-system.

Second. Still lower values of benefit visibility for the same countries, specially for USA, Portugal, Greece, Ireland, Finland, United Kingdom and Italy. Austria, with a plausible value of 34.15%, has the most visible central/federal sub-system, U.S.A. having the least visible one, with 25.65%.

Third. The burden visibility is higher than the benefit visibility in all countries excepting Greece, so that for the central/federal level governments in such countries there is a tendency to under-provide goods and services publicly. On the contrary, the burden visibility is similar to the benefit visibility for Greece.

Fourth. The burden visibility is higher than the benefit visibility in both the European Union and U.S.A., suggesting a tendency to publicly under-provide goods and services in such economies at this central/federal level of government.

Fifth. The plausible burden visibility in the European Union (41.89%) is lower than in U.S.A. (53.42%), showing a significant difference to be gradually corrected by Europeans for comparative economic efficiency reasons.

Sixth. Quite the opposite, the plausible benefit visibility in the European Union (30.54%) is higher than in U.S.A. (25.65%), with a significant difference to be gradually corrected, this time by American policy-makers.

Seventh. Common policy implications of these estimates seem straightforward for

both European OECD countries and USA: as both present revenue and benefit visibility are low in general, allocation improvements could be obtained by implementing changes and reforms to raise values in general and by approaching these two types of budget visibility to their optimal values (100.00%).

FOOTNOTES

¹By revenue visibility we mean visibility *of direct burden* of public revenue. Some types of public revenue (for instance, revenue from public property) do not involve any burden in the strict sense here reserved for this term. Symmetrically, by public expenditure visibility, visibility *of direct benefit* of public expenditure must be understood. Again, some types of public expenditure (for example, public purchases of private financial assets at market prices) might not carry any benefit with them.

²*Inventory of Taxes Levied in the Member States of the European Communities*, 15th edition, Commission of the European Communities, Luxembourg, 1993.

³*A Manual on Government Finance Statistics*, International Monetary Fund, Washington, 1986, and *Government Finance Statistics Yearbook 1994*, volume XVIII, International Monetary Fund, Washington, 1994.

⁴*A Manual on Government Finance Statistics*, International Monetary Fund, Washington, 1986.

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