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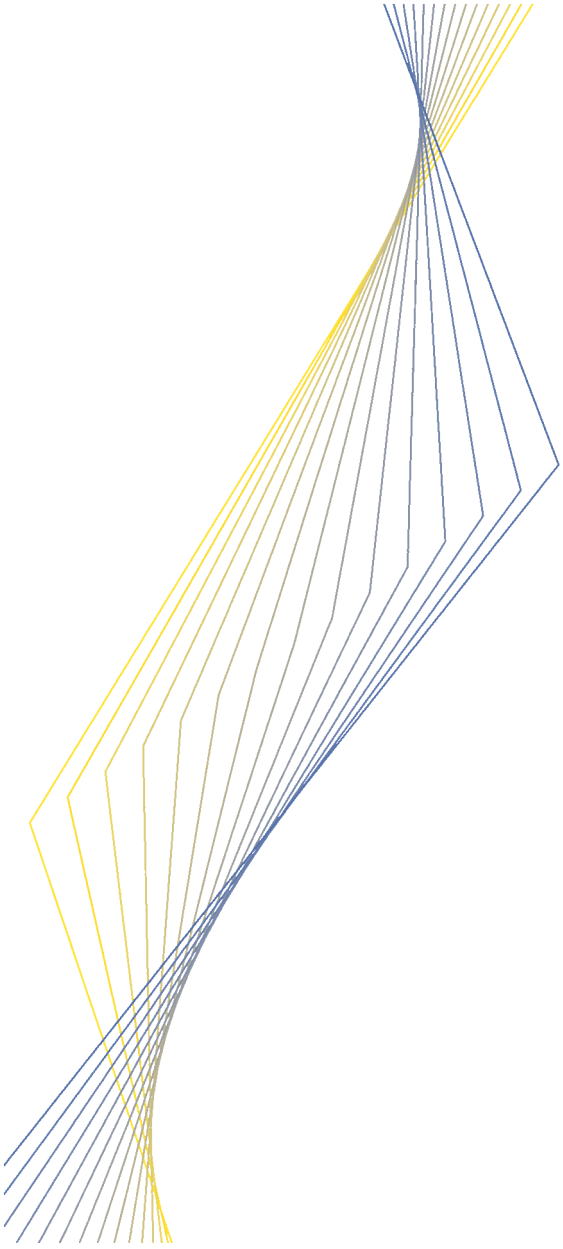

WORKING PAPER NO. 242

PUBLIC SECTOR EFFICIENCY: AN INTERNATIONAL COMPARISON[1]

BY ANTÓNIO AFONSO[2], LUDGER SCHUKNECHT[3] AND VITO TANZI[4]

July 2003

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Contents

Abstract

We compute public sector performance (PSP) and efficiency (PSE) indicators, comprising a composite and seven sub-indicators, for 23 industrialised countries. The first four sub-indicators are "opportunity" indicators that take into account administrative, education and health outcomes and the quality of public infrastructure and that support the rule of law and a level playing-field in a market economy. Three other indicators reflect the standard "Musgravian" tasks for government: allocation, distribution, and stabilisation. The input and output efficiency of public sectors across countries is then measured via a non-parametric production frontier technique.

Keywords: Government expenditure, Efficiency, Free Disposable Hull, Production possibility frontier.

JEL Classification Numbers: C14, H50.

Non-technical summary

In this paper we study the performance and the efficiency of the public sectors of 23 industrialised OECD countries. We compute public sector performance (PSP) and efficiency indicators (PSE) for the government as whole and for its core functions. When deriving performance indicators we distinguish the role of government in providing "opportunities" and a level playing field in the market process and the traditional "Musgravian" tasks of government. "Opportunity" indicators look at administrative, education, health, and public infrastructure outcomes. "Musgravian" indicators assess governments' performance in allocation, distribution, and stabilisation. A number of socio-economic indicators serve as proxies for performance.

In assessing the efficiency of public sectors, we look at total public spending and a number of spending categories as proxies for resource use. These are set in relation to performance indicators as they can be seen as reflecting the opportunity costs of public sector activities. The ratio of performance indicators and public spending yields indicators of efficiency for each country.

Finally, we use a non-parametric framework to compute a so-called production possibility frontier, and calculate input efficiency and output efficiency scores in order to rank the sample countries in terms of public spending efficiency.

We find that the difference in overall performance is moderate across the sample countries. Countries with "small" public sectors on average report the highest scores for overall performance, and especially for administrative and economic performance. Countries with large public sectors show more equal income distribution. Some countries managed to deliver a significant relative improvement in

public sector performance over the last decade (notably, Greece, Portugal, Spain and Ireland).

Regarding public sector efficiency, countries with small public sectors report significantly higher indicators than countries with medium-sized or big public sectors. Overall efficiency is highest in Japan, Luxembourg, Australia, the United States and Switzerland. The results of the FDH analysis suggest that "average inefficiency" is about 20%.

However, all the results have to be seen as indicative and need to be interpreted with great care. Besides the occasional difficulty of data comparability, it is also not easy to accurately identify the effects of public sector spending on outcomes and separate the impact of spending from other influences. For instance, it is difficult to assess to what extent does higher life expectancy reflect public intervention rather than other factors such as climate, dietary habits, etc.

Robustness analysis that emulates the effect of different preferences as to the role of government by giving different weights to sub-indicators suggested that the overall results are not sensitive to moderate changes in the weights of sub-indicators. Finally, the discussion focuses on the overall indicators, while the comparison of the different sub-indicators across countries may provide further and more specific insights and lessons.

1. Introduction

The debate on the role of the state has shifted in recent years towards empirical assessments of the efficiency and usefulness of public sector activities. A growing academic literature has been investigating the stabilisation, allocation and distribution effects of public expenditure. It has also been assessing the role of rules and institutions, and the scope for privatising public sector activities (see e.g., Mueller (1997), Persson and Tabellini (2001), Shleifer and Vishny (1998), Strauch and Von Hagen (2000), Tanzi and Schuknecht (1997, 2000), Rodrik (2000), Gwartney et al. (2002)). Most studies conclude that public spending could be much smaller and more efficient than today. However, for this to happen, governments should adopt better institutions and should transfer many non-core activities to the private sector.

The measurement of public sector performance (defined as the outcome of public sector activities) and efficiency (defined as the outcome relative to the resources employed), however, is still very limited. The objective of this paper is to provide a proxy for measuring public sector performance and efficiency. To do this we will put together a number of performance indicators in the government's core functions. These include the summary functions defined by Musgrave (allocation, distribution, stabilisation) and a number of specific indicators that promote equality of opportunity in the market place. Economic philosophers from Adam Smith to Hayek and Buchanan have stressed the importance of rules of law in promoting "good" government and the "wealth of nations". Naturally they assume that the rules are "good" rules.

We will set these indicators in relation to the costs of achieving them. We will, hence, derive simple performance and efficiency indicators for 1990 and 2000 for the public sectors of 23 industrialised OECD countries. The performance index is then also used in a Free Disposable Hull (FDH) analysis, a rarely used non-parametric production frontier technique to estimate the extent of slack in government expenditures.

Note, however, that it is not only public expenditure but also tax and regulatory policies that affect the efficiency of the public sector. While expenditure is also a relatively good proxy of the tax burden, we ignore the composition of tax revenue and

other characteristics of tax systems.[5] Public spending may be closely related to regulation because large civil services, that often accompany large public spending, are likely to generate much regulation and vice versa.[6]

The paper is organised as follows. In Sections two and three we discuss and compute the public sector performance (PSP) and efficiency (PSE) indicators. Section four extends the efficiency analysis with the help of an FDH analysis and section five provides conclusions.

2. Public sector performance indicators

The study looks at 23 OECD countries for which we compiled data on various public expenditure categories and socio-economic variables, reflecting the effects/outputs/outcomes of government policies.[7]

Assume that public sector performance (*PSP*) depends on the values of certain economic and social indicators (*I*). If there are *i* countries and *j* areas of government performance which together determine overall performance in country *i*, PSP_i, we can then write

$$PSP_i = \sum_{j=1}^{n} PSP_{ij} \,, \tag{1}$$

with $PSP_{ij} = f(I_k)$.

Therefore, an improvement in public sector performance depends on an improvement in the values of the relevant socioeconomic indicators:

[5] For exemple, tax collection may impose significant welfare and compliance costs on taxpayers.
[6] However, Brennan (2000) and Tanzi (1998) have argued that regulations and tax expenditures can also become a substitute of public spending, and thereby be negatively correlated with the size of the public sector as measured by the level of public spending.
[7] One should be aware of the distinction between output and outcome. The number of hospital days per 1000 people is an output but full recovery from illness or life expectancy is an outcome. Even though we try to approximate outcomes rather than output (e.g. red tape, life expectance) the distinction is not always possible and we use both terms in an interchangeable way.

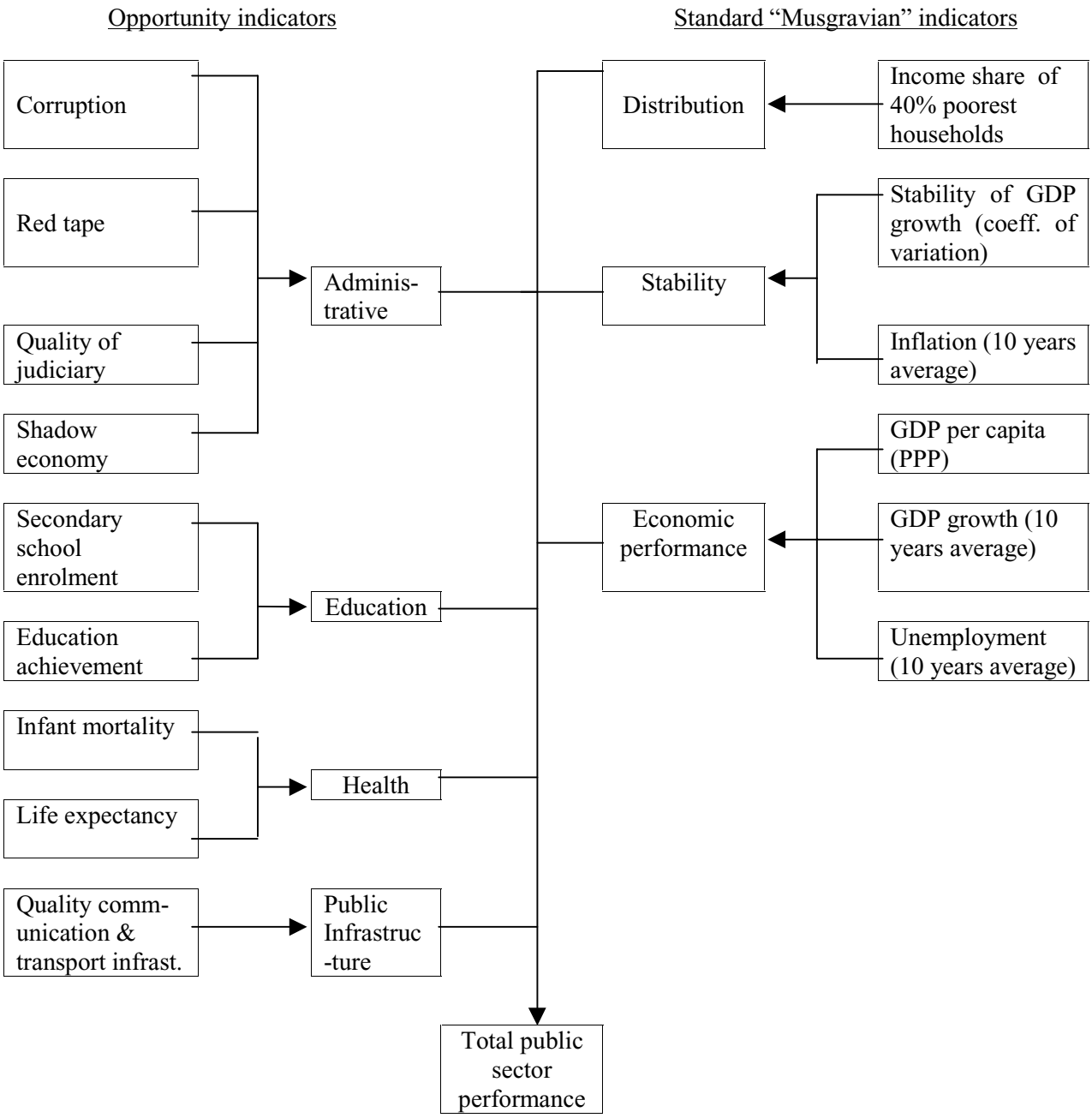
$$\Delta PSP_{ij} = \sum_{i=k}^{n} \frac{\partial f}{\partial I_k} \Delta I_k \ . \qquad (2)$$

Reasonably, the greater the positive effect of public expenditure on any of the selected sub-indicators, the greater will be the envisaged improvement in the *PSP* indicator. Accordingly, the changes that might occur in the economic and social indicators may be seen as changes in public sector performance.

As a first step, we define 7 sub-indicators of public performance. The first four look at administrative, education, health, and public infrastructure outcomes. A good public administration, with a well-functioning judiciary and a healthy and well-educated population, could be considered a prerequisite for a level playing field with well-functioning markets and secure property rights, where the rule of law applies, and opportunities are plenty and in principle accessible to all. High-quality public infrastructure is conducive to attaining the same objectives. These indicators, thereby, try to reflect the quality of the interaction between fiscal policies and the market process and the influence on individual opportunities this has. They could be called "process" or "opportunity" indicators. We adopt the latter terminology in the following.

The three other sub-indicators reflect the "Musgravian" tasks for government. These try to measure the outcomes of the interaction with and reactions to the market process by government. Income distribution is measured by the first of these indicators. An economic stability indicator illustrates the achievement of the stabilisation objective. The third indicator tries to assess allocative efficiency by economic performance. The conceptual separation is of course somewhat artificial, as for example health and education indicators could also be seen as indicators of allocative efficiency. Finally all sub-indicators are put together in a public sector performance indicator.

Figure 1. Total public sector performance (PSP) indicator



Before showing the result it is worthwhile illustrating how we derive these performance indicators. Figure 1 shows the socio-economic indices on which government has a significant if not exclusive influence and which, therefore, reflect as close as possible the outcomes of public policies (Annex Tables A and B provide primary data). In as much as possible we provide data for 1990 and 2000 (or the nearest available year), and in some instances, 10-year averages. This is because we are not so much interested in annual fluctuations but in structural changes in public sector performance. Many indices reflect "stocks" which change only very slowly

over time so that observations every 10 years suffice to reflect such structural changes. A case in point is for example per capita GDP and secondary school enrolment. Other indices, such as inflation or GDP growth, vary strongly and a 10-year average seems the best way to capture long-term trends and structural changes.[8]

Figure 1 also displays the composition of PSP indicators. As to the "opportunity indicators", administrative performance of government is measured as a composite of the following indices: corruption, red tape, quality of the judiciary, and the size of the shadow economy. The education indicator contains secondary school enrolment and the OECD educational attainment indicators in order to measure both the quantity and quality of education. The health performance indicator contains infant mortality and life expectancy. The public infrastructure indicator contains a measure of the communication and transport infrastructure quality. All these indicators change slowly so that observations every 10 years provide a good impression of changes over time except in the case of public infrastructure where period averages have been used.

As to the standard "Musgravian" general indicators, income distribution is proxied by the income share of the poorest 40 per cent of the households. Economic stability is measured by the stability of output growth (coefficient of variation) and average inflation (10-year average). Economic performance comprises per-capita GDP (PPP), GDP growth (10-year average), and unemployment (10-year average). The total PSP indicator combines the seven sub-indicators. Note that some indices also capture the effect of regulation rather than expenditure policies and some indices are only partly the result of government policies (for example, private provision and financing of health and education play an important role in some countries).

We compile the performance indicators from the various indices giving equal weight to each of them. For example, red tape, efficiency of the judiciary, corruption and size of the shadow economy each contribute 25 per cent to the administrative performance indicator. This of course introduces a strong assumption. For those indicators where higher numbers are less favourable (e.g., infant mortality, inflation),

[8] There are few instances where actual and trend growth deviate by 0.4/0.5% for the 10-year averages. However, when using trend rather than actual growth in the calculation of indices, results change very little even for the economic performance indicator.

we use the inverse of the original values. In order to facilitate the compilation, we normalised the values and set the average for all indices equal to 1. The values for each country are then recalculated relative to the average. Table 1 presents the results for the constructed PSP indicators for the year 2000.

Table 1. Public sector performance (PSP) indicators (2000)

	Opportunity indicators				Standard "Musgravian" indicators			Total public sector performance (equal weights 1/)
Country	Adminis-tration	Education	Health	Infra-structure	Distribu-tion	Stability	Economic perform.	
Australia	1.17	1.02	0.94	1.00	0.87	1.31	1.00	1.04
Austria	1.21	1.00	0.98	1.10	1.22	1.28	1.01	1.12
Belgium	0.73	1.00	0.94	0.91	1.17	1.10	0.83	0.95
Canada	1.11	1.05	0.95	1.16	0.92	1.00	0.92	1.02
Denmark	1.16	1.00	1.03	1.03	1.19	1.10	0.91	1.06
Finland	1.26	1.07	1.04		1.18	0.75	0.73	1.01
France	0.72	1.03	1.03	1.01	0.90	1.12	0.70	0.93
Germany	1.02	0.98	1.01	1.01	0.98	0.91	0.81	0.96
Greece	0.60	0.94	0.93	0.81	0.97	0.55	0.69	0.78
Iceland	1.02	0.98	1.25			0.59	1.29	1.03
Ireland	1.06	0.94	0.88	1.00	0.89	1.22	1.40	1.05
Italy	0.52	0.96	0.93	0.84	1.10	0.76	0.69	0.83
Japan	0.87	1.09	1.12	1.09	1.20	1.40	1.18	1.14
Luxembourg	1.05	0.81	0.95			1.22	2.04	1.21
Netherlands	1.16	1.04	0.97	1.09	1.00	1.42	1.06	1.11
New Zealand	1.18	1.03	0.89		0.62	0.99	0.84	0.93
Norway	0.97	1.04	1.09	0.94	1.17	1.45	1.26	1.13
Portugal	0.54	0.94	0.90	0.75	0.92	0.64	0.92	0.80
Spain	0.77	1.00	1.10	0.86	1.02	0.82	0.67	0.89
Sweden	1.16	1.07	1.19	1.10	1.17	0.69	0.91	1.04
Switzerland	1.32	0.97	1.14	1.23	0.95	0.79	1.09	1.07
United Kingdom	1.00	1.05	0.91	0.99	0.79	0.78	0.84	0.91
United States	1.15	1.00	0.82	1.08	0.76	1.14	1.20	1.02
Average	0.99	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Small govs 2/	1.11	1.01	0.98	1.08	0.94	1.17	1.17	1.07
Medium govs	0.93	0.98	1.00	0.93	0.92	0.89	1.03	0.97
Big govs	0.99	1.02	1.01	1.01	1.12	1.03	0.85	1.01
EU 15 3/	0.88	1.00	0.99	0.98	0.98	0.93	0.80	0.94
Euro area 3/	0.84	0.99	1.00	0.97	1.00	0.96	0.78	0.93

1/ Each sub-indicator contributes 1/7 to total indicator.
2/ Small governments: public spending <40% of GDP in 2000. Big governments: public spending >50% of GDP in 2000. Medium governments: 40%< public spending <50% of GDP in 2000.
3/ Weighted averages according to the share of each country GDP in the relevant group.

Indicators suggest notable but not extremely large differences in public sector performance across countries (with a few exceptions). Countries with the highest values for sub-indicators include Switzerland (administration and infrastructure), Japan (education), Iceland (health), Austria (distribution), Norway (economic stability) and Luxembourg (economic performance). Countries such as Luxembourg,

Japan, Norway, Austria, and the Netherlands report high total PSP indicators. The latter is true both for a PSP indicator with equal weights for the sub-indicators and for different weighting, suggesting that the findings are relatively robust to moderate changes in weighting.[9]

Looking at country groups, small governments (industrialised countries with public spending below 40 % of GDP in 2000) on balance report better economic performance than big governments (public spending above 50 % of GDP) or medium sized governments (spending between 40 and 50 percent of GDP). Big governments feature more even income distribution whereas small governments perform better especially in the administrative, stability and economic performance domains. These results are consistent with those found in Tanzi and Schuknecht (2000).

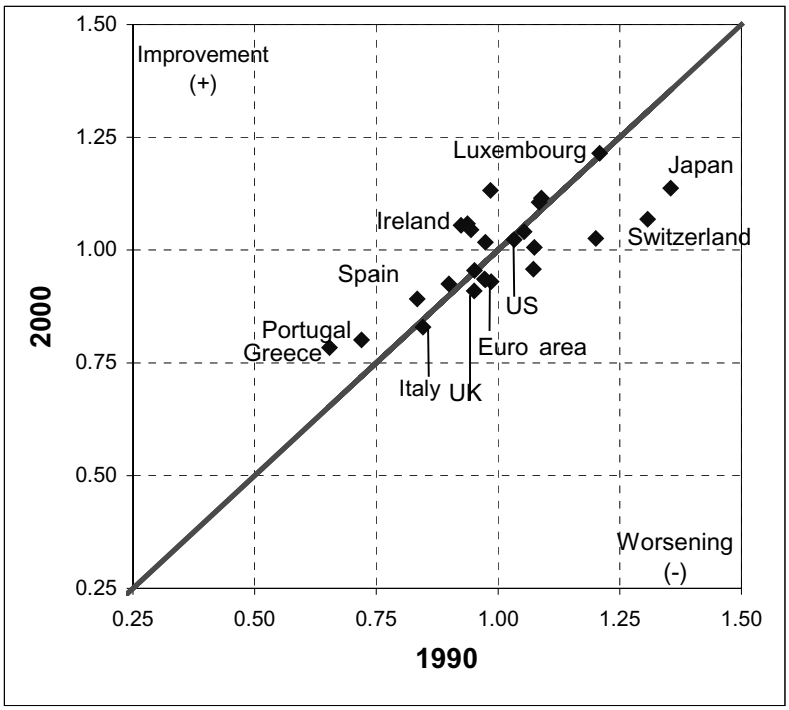
When comparing the main economic "players" of today, it is noteworthy that the US and particularly Japan report above-average performance in most sub-indices and for the total PSP measure. By contrast, the EU (weighted average) performs below average.

Taking advantage of the data set available, we performed a comparison between the PSP for 2000 and for 1990, in order to assess how public sector performance has changed over time[10] and the results are presented in Figure 2.

[9] For example, giving alternative weights to the sub-indicators does not change much the results in most cases. In the Appendix (Table A1) we present alternative weighting schemes. Rank correlations for PSP indicators with the tested changes in weights are in the [0.95 0.99] range. This weigthing of the variables is quite straightforward and economically intuitive (even though it is still somewhat ad hoc). It avoids the problem of lack of economic justification of a more complex statistical approach such as principal component analysis that might come to mind in this context.

[10] One should bear in mind that data are not fully comparable. E.g., some data are not available for some countries. For example the OECD PISA report on education achievement only covers 2000.

Figure 2. Public sector performance: 1990 and 2000



One can easily see that while some countries managed to deliver a relative improvement in public sector performance (all the countries located above and to the left of the diagonal line), some other countries showed a decrease in public sector performance (countries below and to right of the diagonal). Examples of the first group of countries are Greece, Portugal, Spain and Ireland. However, only Ireland succeeded in placing itself above the average of the 23 OECD country sample. Some countries experienced reductions in public sector performance. Especially Japan and Switzerland saw their performance fall in 2000 compared to 1990. This is also true for the EU and the euro area as a whole. However, one should be aware that progress in public sector performance made by the different countries over time is measured relative to other countries and not relative to its own past performance.

3. Public sector expenditure efficiency analysis

Public expenditure, expressed as a share of GDP, can be assumed to reflect the opportunity costs of achieving the public sector performance estimated in the previous

section.[11] In addition to total public spending we looked at average spending on goods and services, transfers, functional spending on education and health, and public investment. Data for 1990 and 2000 for these categories across countries are reported in Annex Table C. Public expenditures differ considerably across countries. Average total spending in the 1990s ranged from around 35 percent of GDP in the US to 64 percent of GDP in Sweden. The difference is mainly due to more or less extensive welfare programs. Public spending on health and education and on goods and services differs much less strongly across countries.

Based on the framework of equations (1) and (2), we now compute indicators of Public Sector Efficiency (*PSE*). We weigh performance (as measured by the PSP indicators) by the amount of relevant public expenditure, *PEX*, that is used to achieve a given performance level. The overall *PSE* indicator for any country *i*, is given by:

$$PSE_i = \frac{PSP_i}{PEX_i}, \tag{3}$$

with

$$\frac{PSP_i}{PEX_i} = \sum_{j=1}^{n} \frac{PSP_{ij}}{PEX_{ij}}. \tag{4}$$

Positive but declining marginal productivity of public expenditure would imply:

$$\frac{\partial PSE_{ij}}{\partial PEX_{ij}} > 0, \ \frac{\partial^2 PSE_{ij}}{\partial PEX_{ij}^2} < 0. \tag{5}$$

In order to compute efficiency indicators, public spending was normalised across countries, with the average taking the value of one for each of the six categories specified above. We focus on average expenditure over the 1990s, as we would assume a lagged effect from spending on performance. For example, public spending

[11] Proceeds from the sale of UMTS mobile telephone licences have been excluded from total expenditure since they were recorded as a temporary decline in expenditure.

on education (at least) over the previous decade, is assumed to affect educational achievement in the late 2000.

Before putting public sector performance and expenditure together it is worth stressing that not all expenditure categories are equally suitable indices for measuring the efficiency with which a certain performance is achieved. Goods and services spending are a rather crude approximation for what is needed to achieve administrative efficiency. Health and education spending seem better measures of the public sector inputs in these domains.[12] Similarly, transfers (social payments only) are probably suitable approximations for government spending to promote income equality, and public investment is likely to be closely connected with infrastructure quality.[13] Total spending may be a useful proxy for government stabilisation efforts because automatic stabilisers are larger in countries with "big governments" (Van den Noord (2000), Bouthevillain et al (2001)). Total spending is generally financed by distortive taxation. It can, hence, be used as a proxy for the efficiency (or inefficiency) of the state in affecting economic performance.

Before turning to Table 2, which reports the ratio of performance and expenditure indices as so-called Public Sector Efficiency (PSE) indicators it is worthwhile stressing a few caveats. Public spending across countries is not always fully comparable even though much progress has been achieved in this regard. For example, some countries' transfer payments are taxed, thereby overstating public spending compared to countries where such benefits are not taxed. Nevertheless, it is not possible to systematically assess and correct such problems. Moreover, comparing expenditure ratios across countries implicitly assumes that production costs for public services are proportionate to GDP per capita. While this approximation is likely to be quite good for labour intensive services (such as education or administrative efficiency) it is likely to be less so for infrastructure quality. In the absence of cross-

[12] Notice however, that it is not easy to accurately identify the effects of public sector spending on outcomes and separate the impact of spending from other influences. For instance, it is difficult to assess to what extent does higher life expectancy reflect public intervention rather than other factors such as climate, dietary habits, etc. The same argument could be made regarding infant mortality. On that line of reasoning, adverse geographical conditions may also impair on the quality and cost of a country communications infrastrucutre.

[13] Income distribution and stabilisation is also affected by the progressivity of the tax system, but this effect is very difficult to assess due to the lack of comparable and detailed enough data.

country data of different public service sector costs, this is nevertheless the best possible approximation.

Table 2. Public sector efficiency (PSE) indicators (2000) 1/

	Opportunity indicators				Standard "Musgravian" indicators			Total public sector efficiency (equal weights 2/)
Country	Adminis-tration	Education	Health	Infra-structure	Distribu-tion	Stability	Economic perform.	
Australia	1.21	1.06	1.05	1.05	1.80	1.59	1.22	1.28
Austria	1.22	0.93	1.07	0.98	0.93	1.17	0.92	1.03
Belgium	0.64	0.96	0.85	1.11	0.71	0.87	0.65	0.83
Canada	1.00	0.84	0.86	1.27	1.39	1.01	0.93	1.04
Denmark	0.86	0.74	0.76	1.62	1.05	0.89	0.74	0.95
Finland	1.22	1.07	1.03		1.19	0.79	0.77	1.01
France	0.61	0.99	0.90	1.00	0.64	1.01	0.63	0.83
Germany	1.01	1.09	0.93	1.27	0.85	0.88	0.78	0.97
Greece	0.79	2.25	1.05	0.87	1.04	0.61	0.78	1.06
Iceland	1.06	1.12				0.65	1.42	0.85
Ireland	1.10	0.90	0.88	0.96	0.90	1.20	1.38	1.05
Italy	0.54	1.11	0.93	0.75	0.95	0.68	0.62	0.80
Japan	1.25	1.12	1.34	0.68	1.60	1.99	1.68	1.38
Luxembourg	1.10	0.88	0.98			1.19	1.99	1.23
Netherlands	0.90	0.85	0.95	1.52	0.56	1.15	0.85	0.97
New Zealand	1.20	1.02	0.85	0.00	0.68	0.97	0.82	0.93
Norway	0.95	0.86	0.96	0.88	1.32	1.40	1.22	1.09
Portugal	0.74	1.31	1.46	0.66	1.28	0.73	1.05	1.03
Spain	0.97	1.49	1.33	0.81	1.12	0.95	0.78	1.06
Sweden	0.81	0.75	0.83	1.19	0.94	0.51	0.68	0.82
Switzerland	1.86	1.01	1.21	1.07	1.68	1.05	1.45	1.33
United Kingdom	0.94	1.10	1.01	1.68	0.98	0.84	0.91	1.06
United States	1.30	0.92	1.05	1.40	1.15	1.46	1.55	1.26
Average	1.01	1.06	1.01	1.09	1.08	1.03	1.04	1.04
Small govs 3/	1.34	1.00	1.11	1.03	1.43	1.46	1.45	1.26
Medium govs	0.98	1.19	1.05	1.06	1.08	0.92	1.07	1.03
Big govs	0.85	0.93	0.92	1.17	0.87	0.88	0.73	0.90
EU 15 4/	0.84	1.09	0.97	1.18	0.87	0.88	0.77	0.94
Euro area 4/	0.82	1.11	0.97	1.06	0.84	0.90	0.74	0.92

1/ These indicators are the expenditure weighted "counterparts" of the indicators of Table 1.
2/ Each sub-indicator contributes 1/7 to total indicator.
3/ Small governments: public spending <40% of GDP in 2000. Big governments: public spending >50% of GDP in 2000. Medium governments: 40%< public spending <50% of GDP in 2000.
4/ Weighted averages according to the share of each country GDP in the relevant group.

We find significant differences in public sector efficiency across countries. Japan, Switzerland, Australia, the United States and Luxembourg show the best values for overall efficiency. Looking at country groups, "small" governments post the highest

efficiency amongst industrialised countries. Differences are considerable as "small" governments on average post a 40 percent higher scores than "big" governments.[14]

In summary, we find that differences in efficiency are much more pronounced than in performance across countries, with "small" governments clearly outranking the others. This illustrates that the size of government may be too large in many industrialised countries, with declining marginal products being rather prevalent. But given the non-extreme differences in performance as outlined above, the incidence of "negative" marginal products of public spending may be more limited.

4. Measuring input and output efficiency via an FDH analysis

4.1 The FDH analysis

In a final step, we use the information from previous sections to measure the "wastefulness" of public spending across countries, i.e. the input and output efficiency of expenditure. To this end, we apply a so-called FDH analysis, which is a non-parametric technique that was first proposed by Deprins, Simar, and Tulkens (1984).[15] In the FDH framework it is possible to rank the efficiency of producers by comparing each individual performance with a production possibility frontier. Along this production possibility frontier one can observe the highest possible level of output/outcome for a given level of input. Conversely, it is possible to determine the lowest level of input necessary to attain a given level of output/outcome. This allows identifying inefficient producers both in terms of input efficiency and in terms of output/outcome efficiency.

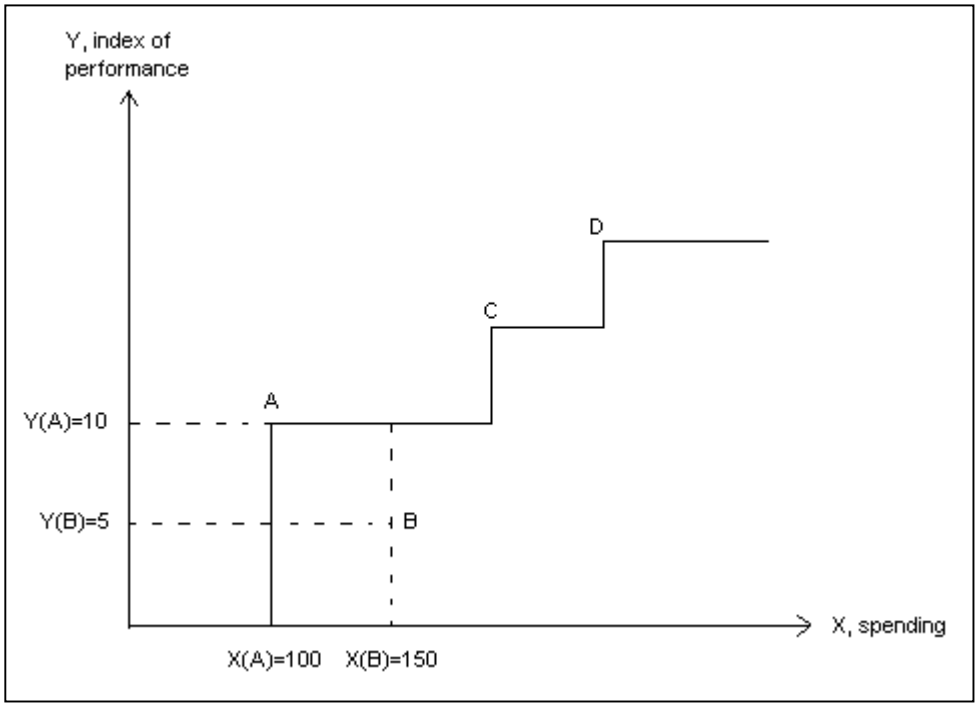
A few other studies that apply FDH analysis to assess public spending efficiency include Vanden Eeckhaut, Tulkens and Jamar (1993) who studied the efficiency of public spending in Belgian municipalities, and Fakin and Crombrugghe (1997) who assessed the efficiency of government expenditures as regards some specific public

[14] The PSE indicators are also quite robust to different weightings as can be seen in the Appendix (Table A2).

[15] For an overview of the FDH analysis see for instance Tulkens (1993). Another non-parametric approach that might be used to assess public expenditure efficiency would be Data Envelopment Analysis (DEA). This technique, developed by Charnes, Cooper and Rhodes (1978), implies a convex production frontier, an hypothesis which is not required in the FDH approach. For an overview of non-parametric approaches see for instance Simar and Wilson (2003).

services in OECD and Central Europe countries. Gupta and Verhoeven (2001) use FDH analysis to measure the efficiency of government expenditure on education and health in a set of countries in Africa. Clements (2002) assessed the efficiency of education spending in the European Union. St. Aubyn (2002) reports results of FDH analysis applied to education and health spending in OECD countries. The FDH methodology can be well illustrated graphically (Figure 3).

Figure 3. Production possibility frontier



Assume four countries, A, B, C and D that use a certain amount of public expenditures, measured on the horizontal axis in monetary units. The countries are then assumed to achieve a certain level of public spending performance, measured on the vertical axis.

The efficiency of the four countries is obviously different. For instance, country B uses more input than country A [X(B)>X(A)], but produces less output [Y(B)<Y(A)]. Therefore country B is relatively inefficient in comparison with country A. On the other hand, country A is efficient in relation to country B, and it is placed on the production possibility frontier. This means there are no other countries besides country A that deliver the same level of output with a lower level of input. Similarly,

countries C and D are efficient and are also on the production possibility frontier. No other country is inefficient compared to them.[16]

This framework allows the calculation of the production possibility frontier, and input efficiency and output efficiency scores in order to rank the several countries in terms of public spending efficiency. These efficiency scores will be set between 0 and 1, and all the countries placed on the production possibility frontier will be assigned the maximum score of 1. Note that this approach is likely to underestimate inefficiencies, as the countries on the production possibility frontier are efficient by definition (even though they too may have scope for savings). The input efficiency score of a given country indicates how much less input this country could use to achieve the same level of output. Additionally, the output efficiency score of a given country would tell how much more output the country should be able to produce with the same amount of resources that it is currently using. [17]

4.2. FDH-based expenditure efficiency analysis

We now conduct an FDH efficiency analysis of public expenditure to our sample of 23 OECD countries. Public spending as a percentage of GDP in 2000 measures the input and as output we use the public sector performance indicator already determined in section 2. The production possibility frontier for our set of countries is presented in Figure 4.[18] One can see that the most efficient countries, positioned on the production possibility frontier, are the US, Japan, and Luxembourg. Australia, Ireland and

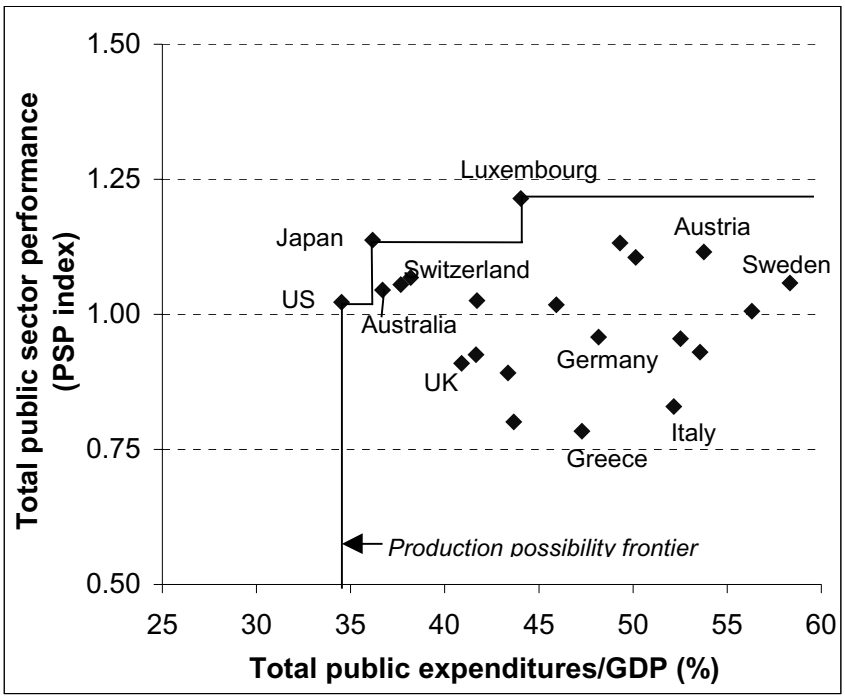
[16] Gupta and Verhoeven (2001) would call countries such as C and D "independently efficient", and country A "not independently efficient."

[17] Figure 3 illustrates that country B's input efficiency score is given by X(A)/X(B), which is 0.5, smaller than one, since B is the interior of the production possibility frontier. This implies that the excess use of inputs by inefficient country B is 50 per cent of the necessary inputs to achieve the same level of performance of country A. Country B's output efficiency score is Y(B)/Y(A). In this case, the loss of output of country B relative to the most efficient country turns out to be also 50 per cent (since for country B one can calculate Y(B)/Y(A)=5/10=0.5). The production possibility frontier for the example in Figure 3 is as follows: $Y = f(X) = \begin{cases} 0, & X < 100 \\ 10, & 100 \le X < X(C) \\ Y(C), & X(C) \le X < X(D) \\ Y(D), & X \ge X(D) \end{cases}$.

[18] One must be aware of the scaling when interpreting the chart. A doubling in PSP is not necessarily a doubling of welfare or utility.

Switzerland come very close to the frontier while the other countries are further removed and therefore less "efficient".

Figure 4. Production possibility frontier, 23 OECD countries, 2000



The figure shows that the EU countries are mostly well inside the production possibility frontier. They mostly report a much higher ratio of public expenditure-to-GDP than the US, but nevertheless often report lower public sector performance indicators.

The results both for input efficiency and output efficiency are presented in Table 3, where we report the respective efficiency scores along with each country's ranking.

Table 3. Efficiency scores: public expenditures as a % of GDP in 2000 and Public Sector Performance indicator (see Table 1)

Country	Input efficiency		Output efficiency	
	Score	Rank	Score	Rank
Australia	0.99	4	0.92	7
Austria	0.67	17	0.92	8
Belgium	0.66	19	0.79	18
Canada	0.75	12	0.84	13
Denmark	0.62	21	0.87	11
Finland	0.61	22	0.83	14
France	0.64	20	0.77	20
Germany	0.72	16	0.79	17
Greece	0.73	14	0.65	23
Iceland	0.87	7	0.90	10
Ireland	0.96	5	0.93	6
Italy	0.66	18	0.68	22
Japan	**1.00**	**1**	**1.00**	**1**
Luxembourg	**1.00**	**1**	**1.00**	**1**
Netherlands	0.72	15	0.91	9
New Zealand	0.83	9	0.81	15
Norway	0.73	13	0.93	5
Portugal	0.79	11	0.70	21
Spain	0.80	10	0.78	19
Sweden	0.57	23	0.86	12
Switzerland	0.95	6	0.94	4
United Kingdom	0.84	8	0.80	16
United States	**1.00**	**1**	**1.00**	**1**
Average	0.79		0.85	
EU15 average	0.73		0.82	
Non-EU15 average	0.89		0.92	
Small governments 1/	0.98		0.96	
Medium governments 1/	0.81		0.82	
Big governments 1/	0.65		0.83	
EU 15 2/	0.72		0.78	
Euro area 2/	0.70		0.78	

The values in bold signal the countries located on the production possibility frontier.
1/ See notes of Tables 1 and 2.
2/ Weighted averages according to the share of each country GDP in the relevant group.

The Table shows that input efficiency scores start at 0.57 and output efficiency scores at 0.65. The average input efficiency of the 15 EU countries is 0.73 meaning that they should be able to attain the same level output using only 73 per cent of the inputs they are currently using (or about 35% of GDP rather than close to 50%). The output efficiency score implies that with given public expenditures, public sector performance is 82 percent (or 18 percent less) of what it could be if the EU was on the production possibility frontier (and more if the countries on the production possibility frontier also have scope for expenditure savings). By contrast, the non-EU OECD

countries report more public expenditure efficiency. An average input efficiency score of 0.89 implies only roughly 11 percent "waste".

It is also now possible to focus on some specific interesting cases, such as Sweden. It reports a PSP indicator of 1.04, above the average of the country sample. High public spending pushes down the PSE indicator to a value of only 0.82, well below the average. The input efficiency score of 0.57 suggests that little more than half the current spending would be sufficient to achieve the same public sector performance. The situation is similar in some of the other countries with "big governments", namely France, Germany and Italy where public expenditures account for around 50 per cent of GDP. Indeed, with the exception of Luxembourg, all two other countries located on or near the production possibility frontier belong to the group of "small government" countries, with a public expenditures-to-GDP ratio below the 40 per cent threshold.

5. Conclusion

We developed indicators of public sector performance for 23 industrialised countries. For that purpose we used a number of socio-economic indicators as proxies for performance, and total spending and a number of spending categories as proxies for resource use. We find moderate differences in the public sector performance (PSP) indicators across industrialised countries. Unsurprisingly, countries with small public sectors report the "best" economic performance while countries with large public sectors show more equal income distribution.

When weighing performance by the resources used to achieve it, i.e. public expenditure, there are important differences across countries in the resulting public sector efficiency (PSE) indicators. Countries with small public sectors report significantly higher PSE indicators than countries with medium-sized or big public sectors. All these findings suggest diminishing marginal products of higher public spending.

The results that we get from the production-frontier-related FDH analysis, which uses the PSP indicators, are also in line with the aforementioned conclusions. Small

governments tend to show better results. Spending in big governments could be, on average, about 35 per cent lower to attain the same public sector performance. The calculations also point out that EU 15 countries show relatively low public sector efficiency when compared with the US and also the average of the other OECD countries in the sample. EU 15 countries are using 27 per cent more public spending than the "most efficient" countries with similar PSP indicators. Spending for the average of the other OECD countries is "only" 11 percent higher than necessary.

However, all the results have to be seen as indicative and need to be interpreted with great care for the reasons outlined above. In our interpretation, we mainly focussed on the overall PSP and PSE indicators to which we also applied the FDH analysis. This is appropriate to gain an overall impression. The comparison of the different opportunity and standard "Musgravian" sub-indicators across countries and the detailed assessment of differences may provide further and more specific insights and lessons.

Finally, it seems important to bear in mind that by using a non-parametric approach, and in spite of FDH being an established and valid methodology, differences across countries are not statistically assessed, which can be considered as a limitation of such methodology. Additionally, scale economies may also play a role in public sector policies being able to deliver better outcomes.

Appendix

In order to assess the sensitivity of the results for public sector performance and efficiency, we used alternative weighting schemes. We computed PSP and PSE indicators that can give more weight to, inter alia, opportunity, equality, stability and economic performance sub-indicators. One could argue that these indicators emulate people with different intensities of preferences. The results, presented in Table A1 and in Table A2, confirm that the conclusions presented in the main text are generally not changed. Rank correlations with the tested changes in weights are in the [0.95 0.99] range for PSP indicators and in the [0.96 0.99] range for PSE indicators.

Table A1 – Total public sector performance (PSP), 2000, different weights

Country	Baseline 1)	Weighting of sub-indicators with emphasis on:			
		Opportunity 2)	Equality 3)	Stability 4)	Economic performance 5)
Australia	1.04	1.04	1.01	1.10	1.03
Austria	1.12	1.11	1.14	1.15	1.09
Belgium	0.95	0.94	1.00	0.99	0.93
Canada	1.02	1.03	1.00	1.01	1.00
Denmark	1.06	1.06	1.09	1.07	1.03
Finland	1.01	1.05	1.04	0.96	0.95
France	0.93	0.93	0.92	0.97	0.88
Germany	0.96	0.97	0.96	0.95	0.92
Greece	0.78	0.79	0.82	0.73	0.76
Iceland	1.03	1.04	1.03	0.95	1.07
Ireland	1.05	1.04	1.02	1.09	1.13
Italy	0.83	0.83	0.89	0.81	0.80
Japan	1.14	1.12	1.15	1.20	1.15
Luxembourg	1.21	1.17	1.21	1.22	1.35
Netherlands	1.11	1.10	1.08	1.18	1.09
New Zealand	0.93	0.96	0.86	0.94	0.91
Norway	1.13	1.11	1.14	1.20	1.16
Portugal	0.80	0.80	0.83	0.76	0.83
Spain	0.89	0.90	0.92	0.87	0.84
Sweden	1.04	1.06	1.07	0.96	1.01
Switzerland	1.07	1.09	1.04	1.01	1.07
United Kingdom	0.91	0.93	0.88	0.88	0.89
United States	1.02	1.02	0.96	1.05	1.06
Average	1.00	1.00	1.00	1.00	1.00
Small govs	1.07	1.06	1.04	1.09	1.09
Medium govs	0.97	0.97	0.97	0.95	0.97
Big govs	1.01	1.01	1.03	1.01	0.97
EU 15 *	0.94	0.94	0.95	0.93	0.91
Euro area *	0.93	0.94	0.95	0.94	0.90

1) Equal weights assigned to each sub-indicator (1/7), as in Table 1.
2) 2/3 assigned to opportunity indicators and 1/3 to "Musgravian indicators". This means 1/6 assigned to each of the 4 opportunity indicators and 1/9 to each of the 3 "Musgravian indicators".
3) 1/3 assigned to the distribution indicator and 2/3 to the other indicators. This means that each of the other 6 indicators will have a weight of 1/9.
4) 1/3 assigned to the stability indicator and 2/3 to the other indicators. This means that each of the other 6 indicators will have a weight of 1/9.
5) 1/3 assigned to the economic performance indicator and 2/3 to the other indicators. This means that each of the other 6 indicators will have a weight of 1/9.

* Weighted averages according to the share of each country GDP in the relevant group.

Table A2 – Total public sector efficiency (PSE), 2000, different weights

Country	Baseline 1)	Weighting of sub-indicators with emphasis on:			
		Opportunity 2)	Equality 3)	Stability 4)	Economic performance 5)
Australia	1.28	1.24	1.40	1.35	1.27
Austria	1.03	1.04	1.01	1.06	1.01
Belgium	0.83	0.84	0.80	0.84	0.79
Canada	1.04	1.03	1.12	1.04	1.02
Denmark	0.95	0.96	0.97	0.94	0.90
Finland	1.01	1.04	1.05	0.97	0.96
France	0.83	0.84	0.79	0.87	0.78
Germany	0.97	0.99	0.94	0.95	0.93
Greece	1.06	1.10	1.05	0.96	0.99
Iceland	0.85	0.83	0.85	0.82	0.95
Ireland	1.05	1.03	1.01	1.08	1.12
Italy	0.80	0.80	0.83	0.77	0.76
Japan	1.38	1.32	1.43	1.52	1.45
Luxembourg	1.23	1.19	1.23	1.22	1.35
Netherlands	0.97	0.99	0.88	1.01	0.94
New Zealand	0.93	0.96	0.88	0.93	0.91
Norway	1.09	1.05	1.14	1.16	1.12
Portugal	1.03	1.04	1.09	0.97	1.04
Spain	1.06	1.08	1.08	1.04	1.00
Sweden	0.82	0.84	0.84	0.75	0.79
Switzerland	1.33	1.32	1.41	1.27	1.36
United Kingdom	1.06	1.09	1.05	1.01	1.03
United States	1.26	1.24	1.24	1.31	1.33
Average	1.04	1.04	1.05	1.04	1.03
Small govs	1.26	1.23	1.30	1.30	1.30
Medium govs	1.03	1.04	1.04	1.01	1.03
Big govs	0.90	0.92	0.90	0.90	0.87
EU 15 *	0.94	0.96	0.93	0.93	0.90
Euro area *	0.92	0.93	0.90	0.91	0.88

1) Equal weights assigned to each sub-indicator (1/7), as in Table 2.
2) 2/3 assigned to opportunity indicators and 1/3 to "Musgravian indicators". This means 1/6 assigned to each of the 4 opportunity indicators and 1/9 to each of the 3 "Musgravian indicators".
3) 1/3 assigned to the distribution indicator and 2/3 to the other indicators. This means that each of the other 6 indicators will have a weight of 1/9.
4) 1/3 assigned to the stability indicator and 2/3 to the other indicators. This means that each of the other 6 indicators will have a weight of 1/9.
5) 1/3 assigned to the economic performance indicator and 2/3 to the other indicators. This means that each of the other 6 indicators will have a weight of 1/9.

* Weighted averages according to the share of each country GDP in the relevant group.

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Annex – Data and sources

Annex Table A - Opportunity indicators

	Corruption 1/		Red tape 1/		Quality of judiciary 1/		Shadow Economy 2/		School enrolment 3/		Education achievement		Infant mortality		Life expectancy		Public Communic. and transports quality	
	1990	2001	1990	2001	1990	2001	1989/90	1999/2000	1990	1998	1995	2000	1990	2000	1990	2000	1980-89	1990-95
Australia	6.57	8.21	4.13	4.94	7.84	8.51	10.1	14.3	78.6	88.9	519	530	8.0	5.3	78.8	78.9	3.5	3.0
Austria	5.24	6.92	4.86	4.12	7.33	9.04	6.9	9.8	91.1	88.2		514	7.8	4.8	77.9	78.2		3.3
Belgium	5.52	5.22	3.76	2.78	6.18	5.70	19.3	22.2	87.7	88.0	550	508	7.9	5.3	78.0	78.2	2.8	2.7
Canada	7.50	7.78	4.59	4.63	8.44	8.49	12.8	16.0	88.7	93.7	521	532	6.8	5.2	79.0	78.9	3.1	3.5
Denmark	9.16	9.03	4.74	5.04	8.42	8.59	10.8	18.0	86.8	89.5		497	7.5	4.3	75.9	76.4	3.1	3.1
Finland	7.79	9.53	5.46	6.38	8.42	8.70	13.4	18.1	93.0	94.8		540	5.6	4.2	77.3	77.5		
France	6.03	4.22	4.09	1.76	6.20	5.85	9.0	15.2	85.8	94.2		507	7.3	4.4	78.5	78.9	2.8	3.0
Germany	7.58	6.91	4.81	3.87	8.17	8.23	11.8	16.0		87.8		487	7.0	4.5	77.0	77.4	3.4	3.0
Greece	2.82	3.00	1.90	2.34	5.00	6.15	22.6	28.7	82.7	86.4		460	9.7	5.4	77.9	77.9	2.6	2.4
Iceland		9.03		6.28		8.28				85.4		506	5.9	3.1	79.2	79.5		
Ireland	6.98	5.54	5.30	5.64	8.09	7.57	11.0	15.9	79.9	77.0		514	8.2	5.9	76.1	76.3	2.8	3.0
Italy	2.56	3.53	2.76	1.97	3.16	3.56	22.8	27.1		88.3	491	473	8.2	5.3	78.3	78.7	2.3	2.5
Japan	5.46	4.27	5.32	2.62	7.76	6.25	8.8	11.2	96.8	98.6	581	543	4.6	3.8	80.6	80.7	3.5	3.3
Luxembourg	5.52	7.37	3.76	4.11	6.18	7.47				67.6		436	7.3	5.0	76.9	77.0		
Netherlands	8.13	7.97	5.42	4.69	8.13	8.28	11.9	13.1	83.6	92.6	529		7.1	4.9	77.7	77.9	3.4	3.3
New Zealand	8.43	8.76	6.27	4.34	7.89	8.26	9.2	12.8	85.0	90.3	501	531	8.3	5.9	77.4	78.2		
Norway	7.35	8.07	4.00	3.03	8.20	8.30	14.8	19.1	87.7	96.4		501	6.9	3.9	78.5	78.6	3.2	2.8
Portugal	4.51	3.89	3.32	2.22	8.03	2.70	15.9	22.7		87.6		456	10.9	5.5	75.4	75.6	2.0	2.2
Spain	3.78	5.57	3.18	3.97	2.89	4.43	16.1	22.7		91.6		487	7.6	3.9	77.9	78.2	2.3	2.6
Sweden	7.63	8.61	4.63	5.58	7.06	8.52	15.8	19.2	85.3	99.5		513	6.0	3.4	79.3	79.6	3.3	3.3
Switzerland	7.89	7.16	6.11	5.36	8.70	8.02	6.7	8.6	79.8	83.1		506	6.8	3.7	79.6	79.7	3.6	3.7
United Kingdom	8.00	6.83	5.97	3.14	7.51	7.40	9.6	12.7	79.1	93.7	498	528	7.9	5.6	77.2	77.3	2.9	3.0
United States	6.53	6.55	5.31	3.73	7.61	7.07	6.7	8.7	85.8	90.2	492	499	9.4	7.1	76.9	77.1	3.8	3.3
Average	6.4	6.7	4.5	4.0	7.1	7.2	12.7	16.7	85.7	89.3	520.2	518.2	7.5	4.8	76.2	78.1	3.0	3.0

1/ Scale 1-10.

2/ In percentage of GDP.

3/ Ratio of the number of children of official school age enrolled in school, to the population of the corresponding official school age.

Annex Table B – Standard "Musgravian" indicators

	Income distribution 1/		Coefficient of variation of growth		Average inflation		Per capita income 2/		Average economic growth		Average Unemployment	
	1980s 3/	1990s 3/	1980s	1990s	1980s	1990s	1990	2000	1980s	1990s	1980s	1990s
Australia	15.50	17.90	1.2	2.5	8.4	2.5	15530	25420	3.1	3.6	7.5	8.9
Austria		25.20	1.6	2.3	3.8	2.4	15710	24690	2.4	2.4	3.3	5.2
Belgium	21.60	24.10	1.3	1.6	4.9	2.1	15530	24910	2.0	2.2	9.5	8.7
Canada		18.95	1.1	1.3	6.5	2.2	17400	27320	2.9	2.9	9.4	9.5
Denmark	17.40	24.50	0.8	1.5	6.9	2.1	15820	27070	1.6	2.3	7.1	7.4
Finland	18.40	24.20	2.1	0.5	7.2	2.2	15220	23200	3.1	2.1	4.9	11.9
France		18.60	2.2	1.4	7.4	1.9	15970	21980	2.5	1.9	9.0	11.2
Germany		20.10	1.2	1.3	2.9	2.6	17010	23630	2.2	1.9	6.8	7.7
Greece		19.90	0.3	1.3	19.5	11.1	8680	15250	0.7	2.3	6.6	9.5
Iceland			0.9	0.9	39.2	4.3	16210	27070	2.8	2.7	0.8	3.3
Ireland		18.30	1.5	2.1	9.3	2.3	10940	26610	3.6	7.3	14.2	12.0
Italy	18.80	22.70	2.1	1.4	11.2	4.2	15180	22890	2.3	1.6	8.4	10.7
Japan	21.90	24.80	3.1	1.0	2.5	1.2	16950	24920	4.1	1.5	2.5	3.0
Luxembourg			1.4	1.9	4.8	2.2	22320	43110	5.0	5.4	1.4	2.5
Netherlands		20.65	1.2	2.8	2.9	2.4	15390	26310	2.3	2.9	8.0	5.8
New Zealand	15.90	12.70	1.0	1.2	11.9	2.1	12360	18740	1.9	2.8	4.3	7.9
Norway	19.00	24.00	1.2	2.9	8.3	2.4	16220	30730	2.4	3.6	2.8	4.8
Portugal		18.90	1.1	1.3	17.6	6.0	9120	16590	3.3	2.8	7.7	5.6
Spain		21.05	1.5	1.6	10.2	4.2	11320	18230	2.9	2.7	17.5	19.6
Sweden	21.20	24.10	1.7	1.0	8.0	3.5	16320	22940	2.2	2.3	2.5	6.2
Switzerland	16.90	19.60	1.2	0.7	3.3	2.3	19670	28360	2.1	0.9	0.7	3.4
United Kingdom		16.35	1.4	1.3	7.4	3.7	14860	23290	2.7	2.3	9.6	7.9
United States	15.70	15.70	1.4	2.2	5.6	3.0	21340	35030	3.2	3.2	7.3	5.8
Average	18.4	20.6	1.4	1.6	9.1	3.2	15438	25143	2.7	2.8	6.6	7.8

1/ Share of 40% poorest.2/ GDP at current market prices per head of population (in 1000 PPS).
2/ GDP at market prices per head of population (in 1000PPS).
3/ Or nearest available year. Precise year varies and depends on data availability.

Annex Table C – Expenditures categories (% of GDP)

	Total expenditure 1/		Goods and services		Education		Health		Social transfers		Public investment	
	1980s	1990s	1980s	1990s	1980s	1990s	1980s	1990s	1980s	1990s	1980s	1990s
Australia	37.4	36.7	19.1	18.6	5.1	5.1	5.0	5.6	7.2	8.6	3.0	2.5
Austria	49.7	53.8	19.4	19.9	5.6	5.6	5.1	5.8	19.6	19.6	3.6	2.6
Belgium	57.9	52.5	22.6	21.2	5.5	4.6	6.1	6.6	24.6	19.3	2.6	1.6
Canada	45.1	45.9	21.7	21.2	6.6	6.7	6.2	6.7	9.8	12.0	2.9	2.5
Denmark	56.3	58.3	26.6	25.9	7.1	7.8	7.5	6.9	16.9	19.2	2.0	1.8
Finland	43.4	56.3	20.3	23.0	5.2	7.1	5.6	6.1	14.7	20.8	3.7	3.0
France	50.3	53.6	23.0	23.6	5.5	5.8	6.4	7.3	21.0	20.0	3.2	3.2
Germany	47.1	48.2	19.8	19.5	4.7	4.7	6.1	7.7	17.0	18.4	2.5	2.3
Greece	40.5	47.3	15.0	14.7	2.2	2.7	4.9	4.7	13.8	15.4	3.0	3.4
Iceland	41.2	41.7	18.8	22.0	4.6	5.5		6.8	7.0	7.5	4.3	4.1
Ireland	46.1	37.7	18.9	16.0	5.5	5.1	5.6	5.2	14.6	11.8	3.3	2.5
Italy	50.6	52.2	18.9	18.8	4.5	4.4	5.6	5.9	17.3	17.9	3.5	2.5
Japan	31.9	36.2	13.7	15.0	5.1	3.6	4.7	5.3	11.2	10.0	5.1	5.7
Luxembourg	46.6	44.0	18.8	17.7	4.8	3.5	5.4	5.7	20.5	15.4	4.7	4.5
Netherlands	56.3	50.1	25.5	23.5	6.4	5.1	5.7	6.3	26.7	18.7	2.3	2.6
New Zealand	46.4	41.7	19.2	18.5	5.3	6.9	5.8	6.1	13.4	13.6	2.1	2.1
Norway	46.8	49.3	20.1	21.5	6.4	7.7	6.3	6.8	13.1	15.3	3.4	3.3
Portugal	39.5	43.7	14.5	18.9	3.8	5.2	3.4	4.7	10.7	12.7	3.6	3.9
Spain	39.0	43.4	15.6	17.9	3.5	4.5	4.6	5.5	13.6	14.1	3.4	3.6
Sweden	60.8	63.5	28.0	27.8	7.4	7.6	8.0	7.1	18.5	20.4	2.9	2.8
Switzerland	34.1	38.2	13.9	15.1	5.0	5.6	5.3	7.0	8.4	11.2	3.7	3.1
United Kingdom	42.3	40.9	20.9	19.5	5.0	5.2	5.0	5.7	12.0	13.7	1.9	1.6
United States	35.3	34.5	17.4	15.4	5.7	5.1	4.4	6.0	9.9	11.3	2.5	2.6
Average	45.4	46.5	19.6	19.8	5.2	5.4	5.6	6.2	14.8	15.1	3.2	3.0

1/ All general government, averages for the period.

Annex Table D – Variables and series

Variable	Sources, notes	Series
Corruption	World Economic Forum: The World Competitiveness Report 1990, item "10.22 Corruption (for 1990) World Economic Forum, The World Competitiveness Yearbook 2001, item 2.3.16 Bribing and corruption (for 2001).	Values divided by 10 for better comparison.
Red tape	World Economic Forum: The World Competitiveness Report 1990, item "6.21 Regulatory environment (for 1990) World Economic Forum, The World Competitiveness Yearbook 2001, "Bureaucracy" (for 2001).	Values divided by 10 for better comparison.
Efficient judiciary	World Economic Forum: The World Competitiveness Report 1990, item "10.04 Confidence in administration o justice" (for 1990) World Economic Forum, The World Competitiveness Yearbook 2001, "Justice" (for 2001).	Values divided by 10 for better comparison.
Size shadow economy	Schneider (2002)	Currency demand approach, (in % of official GDP), reciprocal value (1/x).
Secondary school enrolment	based on WDI 2001	Secondary school enrolment
Education achievement	OECD, Education at a glance, 2001 PISA report, 2000	Mathematical achievement, grade eight (page 309). Simple average of reading, mathematics and science scores.
Infant mortality	WDI 2001	Mortality rate, infant (per 1,000 live births), reciprocal value (1/x).
Life expectancy	WDI 2001	Life expectancy at birth, total (years).
Communications and transport quality	Center for Institutional Reform and the Informal Sector (IRIS) based on reports from Business Environmental Risk Intelligence (BERI).	
Income distribution	Worldbank: World Development Report 1995, 2000/2001 2000 Annual Report (for 1990), 2002 Annual Report (for 2000).	Poorest 40 % (when two surveys within the time range of 86-98 were available the average was calculated).
Coefficient of variation of growth	European Commission, Ameco	Based on GDP at constant market prices (1.1.0.0.ovgd), reciprocal value (1/x).
Standard deviation of inflation	OECD, Main Economic Indicators	Based on "CPI, all items" (CPALTT01.IXOB), reciprocal value (1/x).
Per capita income	European Commission, Ameco	Ameco, GDP at current market prices per head of population (in 1000 PPS) (1.0.212.0.hvgdp).
Average economic growth	European Commission, Ameco	Based on GDP at constant market prices (1.1.0.0.ovgd).

Unemployment	OECD, Economic Outlook	Unemployment rate (UNR), reciprocal value (1/x).
Total public expenditure	European Commission, Ameco	Total expenditure; general government (UUTG/UUTGF).
Goods and services	European Commission, Ameco	Final consumption expenditure of general government at current prices (UCTG).
Public education	Based on WDI 2001	Public spending on education, total (% of GNI, UNESCO).
Public health	OECD, Social Expenditure database	Public expenditure on health (item 11) (for 1980 - 1999).
Transfers and subsidies	European Commission, Ameco	Social transfers other than in kind (UYTGH/UYTGHF)
Public investment	European Commission, Ameco	Gross fixed capital formation at current prices; general government (UIGG).

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