Challenges in the Measurement of Public Sector Productivity in OECD Countries

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ABSTRACT

Productivity is one of the main engines of economic growth. While most existing work on productivity has focused on the private sector, there is great value in better understanding productivity in the public sector, given government's important role in the provision of goods and services and its substantial contribution to overall GDP. However, the measurement of public sector productivity as a first step towards better understanding its dynamics is fraught with challenges, as the public sector differs substantially from the private sector in some of its key characteristics. This article examines current country practices and challenges to measure public sector productivity and identifies five areas to further enhance measurement efforts: (i) improvements to input measurement and cost accounting, (ii) standardization and comparability of measures, (iii) output measurement beyond the education and health sectors, (iv) a typology of activities at the micro level, and (v) intra-governmental co-ordination on productivity measurement. The article also calls for further research on the policy drivers for public sector productivity to delve deeper into how governance frameworks can be mobilized to achieve greater public sector productivity in support of effective public governance and ultimately the well-being of citizens.

Productivity, understood as the volume of output produced for each unit of input, is one of the main engines of economic growth. While most OECD work on productivity developments has focused on the private sector, there is great value in better understanding productivity in the public sector, given that government is a main provider of goods and services to citizens and government production is responsible for a substantial share of GDP. However, understanding public sector productivity poses several challenges. The public sector differs substantially from the private sector in some of its key characteristics.

This article examines current practices and challenges to measure and improve public sector productivity and suggests ways forward to address measurement challenges and delve deeper into how governance frameworks and processes can be mobilized to achieve greater

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public sector productivity that supports effective public governance and ultimately the well-being of citizens.

Productivity refers to how much output is produced for each unit of input, calculated as the ratio of a volume measure of output to a volume measure of input use (OECD, 2016a).[2] Raising productivity — the ability of economic actors to produce more outputs with better-combined inputs, or use fewer inputs to provide the same outputs — is the engine of economic growth.

Improving public sector productivity is high on many countries' political agendas.[3] OECD countries are facing significant demographic challenges with their aging populations and increasing dependency ratios that will affect both the demand for public services and the capacity to deliver them. In order to accommodate these developments, either more resources are needed or the productivity of the public sector has to increase. Also, most OECD countries are still experiencing fragile public finances with high debts and continuing deficits, so there is still a need for retrenchment over the medium term. Public managers are obliged to maximize the return to the public, including making the most out of the available talent in the public sector, and are accountable to the citizens for the efficient operations and results achieved of the public sector.

UK estimates show that different rates of growth in public sector productivity have significant effects on the public sector debt relative to GDP (DCLG, 2015). Moreover, trust in government is also declining in OECD countries, especially in those countries that were the hardest hit by the last economic and financial crisis. The provision of better quality public services through better resource utilization — which means increasing productivity — could help improve citizens' views on government, and more specifically on the public institutions providing these services.

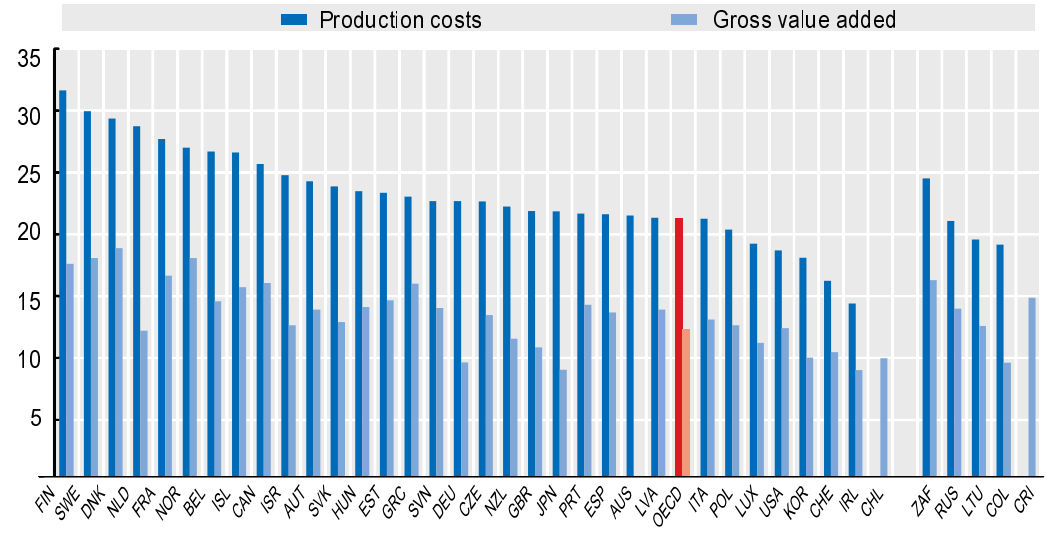
Public sector productivity has a significant impact on the performance of the national economy and societal well-being. First and foremost, the public sector is a major direct producer of goods and services: on average government production costs represents 21.9 per cent of GDP across OECD countries and gross value added of government amounted to 12.3 per cent of GDP in 2015 (Chart 1).[4] Governments are the main, and sometimes only, providers of key goods and services, such as education, health, social services, transportation and infrastructure. In fact, OECD governments are responsible for 70 per cent of final consumption expenditures[5] on health goods and services and for 84 per cent of final consumption expenditures on education. In addition, the public sector is a key enabler of the

2 As such, the concept of productivity is distinct from related concepts like "value for money", which "implies that reforms must lead to better quality of services for citizens and businesses or to savings, or to both" (OECD, 2015c), or cost-effectiveness, which refers to the extent to which an activity attains its desired objectives (OECD, 2013).

3 Public sector in this analysis refers to "general government" as defined in the System of National Accounts, which does not include public corporations that produce primarily for the market. It encompasses central government, state and regional government, local government and social security funds. "Government units are unique kinds of legal entities established by political processes that have legislative, judicial or executive authority over other institutional units within a given area. Viewed as institutional units, the principal functions of government are to assume responsibility for the provision of goods and services to the community or to individual households and to finance their provision out of taxation or other incomes, to redistribute income and wealth by means of transfers, and to engage in non-market production (EC, IMF, OECD, UN and World Bank 2009:4:17).

4 Production costs encompass compensation of employees, goods and services used and financed by government (e.g. outsourcing) and other production costs, which include the consumption of fixed capital (depreciation of capital) and other taxes on production less other subsidies on production. Gross value added is the difference between gross output and intermediate consumption.

Chart 1: Government Production Costs and Gross Value Added as Percentage of GDP, 2015



Source: OECD National Accounts Statistics (database). Data for Australia are based on a combination of Government finance statistics and OECD National Accounts data provided by the Australian Bureau of Statistics.

Note: The full names of the non-OECD countries are: ZAF: South Africa, RUS: Russian Federation, LTU: Lithuania, COL: Colombia, CRI: Costa Rica. Please note that the country codes used are official ISO codes, which are available at: https://www.iso.org/obp/ui/#search.

Both numerator and denominator of Chart 1 are in nominal terms. Thus, the GDP is in nominal terms. The OECD average is calculated as a weighted average where the weight is represented by the denominator of the ratio (i.e. the GDP of the countries).

proper functioning of the economy and society. For example, investment in education and in infrastructure both impact the productivity of the economy as a whole. A well-performing public sector also contributes to higher overall productivity through good quality regulation, the absence of corruption, and sound public financial management.

Public sector productivity cannot be understood without the ability to measure it, which requires good quality and, if possible, internationally comparable input and output measures of public sector services. Considerable progress has been made in the last two decades in the measurement of public sector inputs and outputs in the framework of the System of National Accounts by National Statistical Offices (NSOs), governments and their departments, national Productivity Commissions, international organizations, such as Eurostat or the OECD. But there is still much to be done.

To date, the lack of measures to appropriately capture public sector productivity building on, and going beyond, the System of National Accounts, has meant that major policy decisions are being taken without adequate understanding of their implications for the economy as a whole. Too often, improving public sector productivity is equated simply with spending or staff cuts. The term productivity is often misused as a syn-

5 Final consumption expenditure represents the amount spent by governments, non-profit institutions and households on goods and services consumed. The corporate sector does not incur any final consumption expenditure because it only produces final goods for sale in the market. Expenditures are attributed to the institutional unit (government, non-profit institution or household) that bears the costs (note that non-profit institutions represent a very small portion of the total consumption). Compared to total expenditures, final consumption expenditures exclude spending on goods and services not consumed during the year, such as investment goods, and exclude social benefits provided to households which are not tied to the consumption of specific goods and services, such as pension payments.

onym for austerity program, rather than searching for strategic agility, improving the mix and use of inputs, and enhancing the quality of outputs for better public outcomes. A better understanding of public sector productivity measurement challenges can therefore provide insights into how public sector productivity can be improved.

This article is based on a short survey carried out by the OECD at the end of 2016 and early 2017 on country practices in productivity measurement.[6] The survey was designed as a mapping exercise to collect basic information on countries' general efforts to measure public sector productivity from a managerial perspective. Data presented are self-reported and aim at capturing countries' (exploratory) managerial efforts to measure public sector productivity rather than measuring public sector productivity in their national accounts systems. The survey was sent to senior budget officials and productivity commissioners in OECD member and partner countries to collect information on (i) the methodologies applied to measure public service productivity, (e.g. use of cost accounting and quality adjustment); (ii) targeted sectors, organizations and functions; (iii) main organisations responsible for this work; and (iv) the use of productivity measures in government. Thirty OECD member and two partner countries responded to the survey.

The article first presents an overview of existing efforts to measure public sector productivity, followed by an analysis of the specificities of productivity measures for the public sector. It concludes with five concrete suggestions to enhance existing measures of public sector productivity and reflects on the role of measurement to support further research on ways to improve public sector productivity.

Which Aspects of Public Sector Productivity Be Measured?

Productivity in the public sector can be measured at several levels depending on the focus of the inquiry. At the macro level, the productivity of the whole public sector is calculated, which allows for the estimation of the public sector's contribution to the performance of the whole economy and to a more accurate estimate of GDP growth. At the meso level, the focus is on the productivity of the various policy sectors, such as education or health. At the micro level, the performance of individual organizations — e.g. ministries, agencies, hospitals, schools, municipalities — as well as key activities and functions, e.g. shared services, procurement or waste collection etc. — can be compared not only within countries but also across countries. Measurement on all three levels face similar methodological challenges, such as the identification of the concrete services provided, separating out the inputs expended on those services and effective ways to capture changes in quality over time, etc. A recent OECD survey has collected information on countries' current efforts to measure public sector productivity on the different levels.[7]

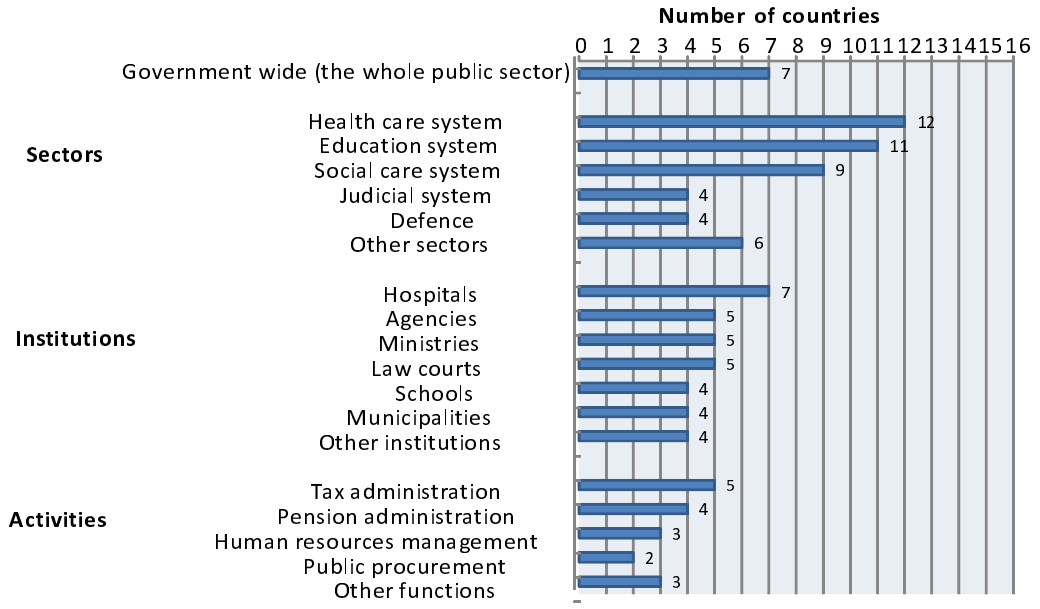
Macro level

Macro level measurement of productivity is useful to establish trends over time in one country, and also compare those trends across countries. It is less useful for management purposes, as macro-level data encompasses a diverse set of activities of numerous units. Given its aggregate

6 The artcile also draws on a review of recent developments in the measurement of public sector productivity commissioned by the OECD (Robano, 2016) and a paper prepared for the Meeting of the Performance and Results Working Party (Dunleavy, 2016).

7 See Box 1 in the online Appendix available at: http://www.csls.ca/ipm/32/Lau%20Appendix.pdf

Chart 2: Measurement of Public Sector Productivity at Different Levels



Source: 2016 OECD Survey on Measures of Productivity in OECD and Partner Countries

nature, it also masks countervailing developments in different parts of the public sector and, as a result, it is not actionable as it cannot clearly be attributed to a particular part of the public sector.

The productivity of the whole public sector[8] is measured only in a few OECD countries according to the OECD survey.[9] In 2015, only seven countries (Australia, Denmark, the Netherlands, New Zealand, Portugal, South Africa and the United Kingdom) reported measures of the productivity of the whole public sector (Chart 2). The UK released the first total public sector productivity estimate in 2009 (for current measurement efforts, see Box 1) and Denmark started its measurement in 2014 (for details, see Box 1). Finland has stopped measuring productivity of the whole public sector and concentrates on measuring it only for the municipalities, where the greatest productivity gains can be realized.

Meso level

At this level, most efforts to identify direct output measures by countries and by international organizations have focused on two policy sectors that provide individual services: education and health.[10] Direct output indicators allow the measurement of productivity of these services. These indicators facilitate the understanding of the contribution of these policy sectors to the productivity of the public sector

8 Please note that the OECD mapping survey does not distinguish between individual and collective services when referring to the public sector.

9 At the same time, many OECD countries indicated that they have some form of measurement of the outputs of government or specific sectors of government. This is due in part to the Eurostat requirement for EU member countries to measure and report the outputs of their non-market services. Although such measures do not represent full-fledged productivity measures that relate outputs to the inputs used to generate them, this is an important first step towards measurement of public sector productivity.

10 See Box 1, Table 1 and 2 in the online Appendix available at: http://www.csls.ca/ipm/32/Lau%20Appendix.pdf

Box 1: Report on Public Sector Efficiency - United Kingdom

The UK government carried out its first comprehensive review of public sector efficiency in 2014-2015. Based on UK and international experience, the review gathered existing evidence on efficiency trends and drivers and identified areas for achieving further efficiency improvements.

The report defines public sector productivity as a key component of public sector efficiency. Public sector efficiency refers to the "entire process of turning public money into desired outcomes." It can be divided into "technical efficiency", which focuses on "doing things right", e.g. by doing things at lower costs or producing more outputs from what is currently done at the same cost; and "allocative efficiency", concentrating on "doing the right things", i.e. finding ways of achieving desired outcomes at less cost. Public sector productivity is defined as the relation of "how much output is produced for each unit of input", and hence forms part of technical efficiency.

The analysis shows that public sector productivity growth is essential for delivering fiscal consolidation. Although market sector productivity growth has outstripped productivity growth in the public sector between 1997 and 2010, public sector productivity has grown by 3.7 per cent since 2010. A one per cent increase in annual public sector productivity would imply a reduction in public sector net debt of 64 per cent of GDP by the first quarter of 2060. The report presents productivity trends in all areas of public sector activity, including a wide range of frontline services. Output measures are quality-adjusted for some health and education services.

The analysis revealed a number of problems and challenges in measuring public sector efficiency. These include a lack of comprehensive and comparable evidence, the definition and measurement of output quality, and the attribution of changes in outcomes to changes in outputs. According to the report, sharing evidence, examples and best practice across government has proved useful for informing action to further improve efficiency. The report also recommends the use of triangulation, i.e. to not rely on a single measure, but to draw on a range of evidence when analyzing public sector efficiency. As a result, the UK government has produced an Efficiency Toolkit providing guidance on improving efficiency in the public sector, and a number of practical steps to disseminate the report's findings and induce follow-up conversations on the topic are suggested.

Source : Department for Communities and Local Government (DCLG) (2015); Robano (2016)

and the whole economy. Furthermore, countries' performances can be benchmarked through international comparisons.

In 2015, 11 countries reported measuring the productivity of education, and 12 countries measuring the productivity of health care services. Among the countries that reported measuring public sector productivity, only Israel, Poland and Portugal report not having undertaken measurement efforts in either of these sectors according to the OECD survey. With the spread of output measurement in these sectors in OECD countries and advances in price measurement and further successful standardization efforts, the education and health sectors are ripe for productivity measurement in a standardized way.

Micro level

Governments are also interested in how well — i.e. how effectively and efficiently — their organizations work and carry out their key functions. Productivity measurement at the micro-level is most useful for managerial purposes, as managers should be accountable only for the performance of units that they control. It is also

Box 2: Measurement of Government Outputs and Productivity in Denmark

The Government of Denmark in 2014 moved from the use of an input-based method to an output-based method for measuring the volume of general government production. A total of 18 volume indicators have been constructed to measure individual non-market services in the areas of health care, social protection, education, and recreation and culture. Only for collective services (e.g. defence, public order and safety, environmental protection), which account for about a fourth of general government output, is the input-based method still used. This implies that for collective services, any potential changes in productivity levels are not captured, as the output volume is measured by the volume of inputs.

The volumes of non-market services calculated based on the input- and the output-based method clearly differ from each other. Between 2008 and 2014, the volume growth is higher in five out of the seven years using the output method. This may suggest an increase in productivity, as the volume of services provided by the general government (output) increases more quickly than the volume of resources it consumes (input). However, the Government of Denmark points out that this conclusion may be misleading in the short run, as phenomena like changes in legislation may lead to rapid changes in output levels implying productivity increases (e.g. new legislation resulting in greater numbers of students) that are not matched immediately by the corresponding necessary input-resources (e.g. buildings, teachers).

Results based on the output-based method show that general government contributes significantly to general economic activity in Denmark. General government production represents about 15 per cent of the whole economy. Labour productivity, measured as the gross value added per hour worked without quality adjustments, increased by 1.0 per cent in general government over the 2005-2014 period, while it increased in the market economy by 5.2 per cent.

Statistics Denmark worked in close co-operation with the Ministry of Finance and the responsible line ministries, such as the Ministry of Education and the Ministry of Health, to select, develop and validate the output indicators. Academic experts were also involved in the elaboration of the methodology.

Eurostat is another important partner for Denmark in their work on measuring government output. Participation in Eurostat task forces on the development of measurement methodologies have been an important input for Statistics Denmark's approach to measuring the volume of government services. In line with EU requirements, the Government of Denmark is currently not applying quality adjustments to the volume measures used. However, Denmark is involved in efforts to scope methods for quality adjustments in the future through a working group in Eurostat as well as within Statistics Denmark.

Source: Statistics Denmark (2013), "General Government Output and Productivity 2008-2014." http://www.dst.dk/en/Statistik/Publikationer/VisPub?cid=18684.

useful for making comparisons over time and for target setting within an organization. It allows comparing their performance to each other within a government and to similar organizations in other governments. Certain functions — such as tax or pension administration or foreign policy — are carried out only by a single organization in each country, so bench-

marking them can only be done internationally.

Considerable work has been done for example on the international comparison of tax administrations since 2006 in OECD countries (OECD, 2015b). However, while the mandate of these tax administrations might be similar, their functioning and productivity is largely dependent on the tax policies and the tax codes that they administer. As a result, international comparisons of their efficiency/productivity could pinpoint changes that might be necessary not only in tax administration, but also in tax policy.

In the same vein, the productivity of a hospital is strongly dependent on its case and function mix, the socio-economic background of its patients and other factors, and not just on how efficiently it carries out disease treatments. This is why comparisons of performance on disease treatments across hospitals should be interpreted with caution. However, the collection of productivity data for schools, hospitals or municipalities could also produce greater insights into the possible causes for their differences in performance. With the increase of the number of observations, more sophisticated econometric techniques can be applied, such as fixed effects regression analysis and stochastic frontier analysis (Dunleavy, 2016).

Governments may also want to compare how productive certain functions/practices are. This type of measurement is in its infancy. The selection of the functions for which analysis should be carried out could be based on the following principles:

- the functions are carried out by most governments;
- they contribute substantially to the productivity of the public sector;
- inputs and outputs of the function can be defined;
- administrative data on these inputs and outputs are readily available; and
- different models exist on how the function is carried out.

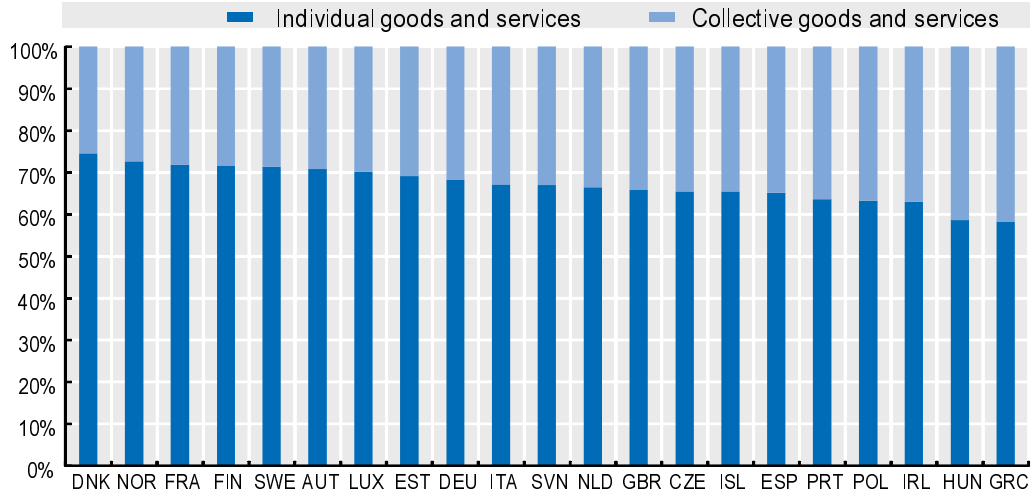
An area that fits these principles is the public procurement function. A pilot project on how to measure the productivity/value for money of the public procurement function is planned in a number of OECD countries as part of the OECD work on Civil Service Effectiveness.

Opinions on the usefulness of measuring the productivity of agencies diverge. Dunleavy (2016) advocates strongly for measuring productivity at the agency level and comparing productivity paths (trends over time). He considers transactional services the most promising area for productivity measurement and makes the case that the measurement of productivity of collective services — e.g. defence or police — is not insurmountable. He also argues that the long-run inability to develop widely used measures of government productivity reflects on one hand a considerable failure of imagination and focus in economics and public management studies, and on the other hand some very sustained resistance by civil servants, public sector professionals and some politicians to the application of 'crude' and 'limited' measures of government activities.

Specificities of the Public Sector and its Impact on Productivity Measurement

The measurement of public sector productivity is rife with considerable difficulties that emanate from the specificities of the public sector. First, the public sector provides mainly services — such as education, health, social services, policing, etc. — and the measurement of service output is more complicated than the measurement of the production of goods, even in the private sector. Services are also heavily reliant on intangibles and tacit knowledge and are often process-based. Furthermore, a large share of government services are not bought and sold,

Chart 3:Government Expenditures on Individual and Collective Goods and Services in EU Countries as Percentage of Total Expenditures, 2011



Source: OECD National Accounts Statistics (database).

e.g. they are non-market goods and services and, as a result, market prices do not exist. Finally, a significant part of government services — representing close to 30 per cent of public spending — are collective goods which cannot be consumed individually (e.g. defence, police, environmental protection) (Chart 3).

Outcomes like societal well-being, economic growth and social inclusion are the ultimate goals of any public policy making. The measurement of policy outcomes is not particularly difficulties in many cases (e.g. citizens' health status, education levels of pupils). However, it is much more challenging to establish a clear link between public policy action and policy outcomes, as outcomes can be influenced by a range of other external variables beyond output changes that are difficult to track. For the time being, the European System of Accounts specifically excludes output measures adjusted for quality based on outcomes, in order to preserve the international comparability of results (EU, 2016: 38).

Input Measurement

Input indicators measure the amount of resources used for the production of outputs. Major input categories are compensation of employees, use of capital goods, use of intermediate goods (intermediate consumption) and taxes net subsidies. The basis of productivity measurement for the public sector and the underlying policy sectors is the data provided by the System of National Accounts (SNA) on inputs and outputs. Here, it is important to note that both measures need to be adjusted for price changes to arrive at an appropriate measure of productivity change, which refers to the change in the volume of outputs, as compared to the change in the volume of inputs. It should also be acknowledged that volume changes should reflect both changes in the quantity and changes in the quality of the inputs/outputs under consideration.

In the public sector, measurement of government inputs (Box 3) remains difficult for three main reasons:

- In most countries budgets are prepared on a cash basis and full overhead costs (including capital consumption and occupancy costs

Box 3: Measurement of Government Inputs

For inputs, the major methodological issues relate to the appropriate calculation of volume measures, especially for labour (compensation of employees) and the consumption of fixed capital.

The quantity of employee labour is defined as "an hour's work of a given type of level of skill" (EU, 2016). The price of labour includes all changes in compensation that are not related to skill-adjusted hours worked. The European Union (2016) suggests two methods for estimating volume changes for labour: (i) directly by measuring the quantity of hours worked, or (ii) deflating money wages and salaries. While the European Commission recommends using the latter approach, most countries use the quantity of hours worked as a measure of labour volume. The most significant challenge is adjusting the change of the labour volume measures for the different skill levels of the employees.

The measurement of capital inputs used by government is not widespread among. Schreyer and Mas (2013) note that, while capital depreciation is accounted for when measuring non-market output, no other capital input, such as the returns on capital invested, is computed.

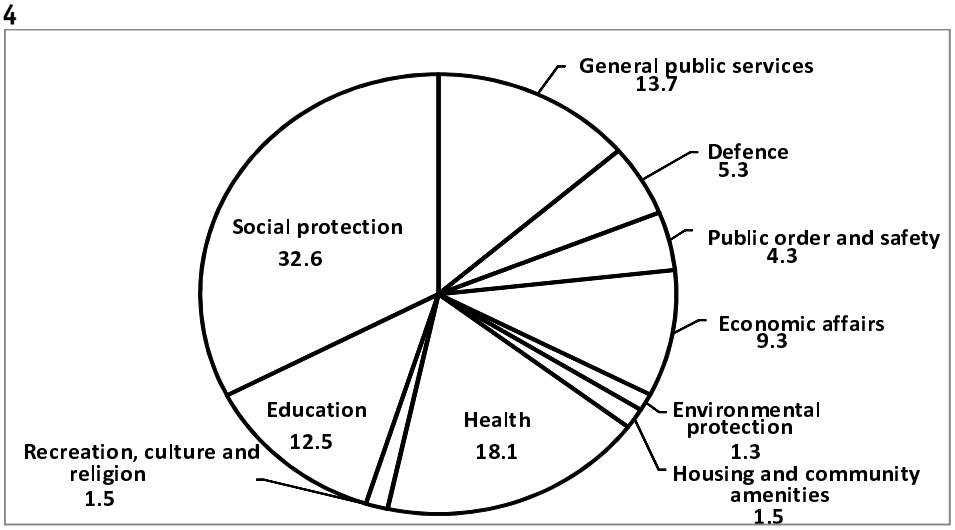
Accurate measurement of inputs at any level requires cost accounting, which in turn builds on an accrual-based accounting system that registers costs and not only cash-flows. By 2016, around three quarters of OECD countries have adopted full accrual accounting (Moretti, 2016). For costs to be apportioned to outputs, it is not only necessary to maintain a system of accrual accounting, but also to have a management accounting system that allocates costs to the different outputs. This requires a financial administration at the agency level that records the costs of all outputs produced, which are also needed for the calculation of output volumes.

for public buildings) incurred by government entities are not measured. Even for those countries that have adopted accrual budgeting or accounting, some assets (historical buildings) and the costs related to the increase of liabilities regarding future pensions and benefits to public servants may not be recorded in the accounts.

- Accounting rules are not consistent across government. Government entities do not always use the same rules in accounting for their operations; hence there exists little consistency in measuring costs.
- Cost accounting is little developed. Cost accounting consists of attributing costs (commonly called expenditures) to core outputs. Difficulties commonly arise in the public sector because: i) spending is presented in budget documents by administrative units or by nature of expenditure, instead of being allocated to outputs; and ii) significant costs, such as public infrastructure investment, are difficult to allocate to a specific administrative unit, and even more so, to a specific output (for example, IT systems).

Despite these difficulties, a number of countries have made significant progress in measuring inputs and linking them with outputs, either at the micro level (for example, the UK, see Box 2) or at the macro level (for example, France). For example, modern methods to estimate labour input include direct measures of hours worked, hours worked by the 'full-time equivalent' number of employees, or the hours paid. Using the total number of employees is not considered to be a suitable indicator. There are also several methods to adjust labour input measures for the different skills of employees, e.g. skill levels for certain types of work can be classified by educational level, occupation, salary or grade (EU, 2016:66).

Chart 4: Structure of General Government Expenditures by Function in OECD Countries, 2014



Source: OECD National Accounts Statistics (database); Eurostat Government finance statistics (database). Data for Australia are based on Government finance statistics provided by the Australian Bureau of Statistics.

Output Measurement

Outputs are the goods and services produced (e.g. number of hours children are taught). For productivity calculations final outputs should be measured (e.g. the products or services that are produced for the public or business) in order to avoid double counting. However, it is not easy to identify final outputs due to the absence of prices. Due to the peculiarities of the public sector, productivity was long considered constant based on the convention that in the public sector inputs equal outputs. With this convention, until not that long ago OECD countries measured the volume (i.e. economic value) of non-market services by the input-based method. This has changed in recent years with an increased interest and focus of policy makers on performance of the public sector.

Many countries measure activities now that reflect what the non-market units actually do with their inputs (ONS, 2005), but these are imperfect measures. For example, the treatment of appendicitis used to require an operation and a two-week hospital stay. Now, patients only need to stay in hospital for three days following the operation. Using an activities-based approach to measuring output, this would imply a decrease of output and productivity when it is clearly not the case.

In addition, the quantities of different outputs need to be added together using data on prices or, in the absence of prices, average unit costs. In current practice, aggregation of outputs is usually based on average costs to facilitate measurement. However, recently it has been suggested that replacing average costs by the time used to produce the output could better reflect marginal utility to consumers (Diewert, forthcoming). Such an approach, however, would require detailed and accurate information of the time needed to produce outputs.

With advances both in input and output measurement — and with the introduction of the output-based method,[11] some countries (e.g. the United Kingdom, Finland, New Zealand, and Australia) started measuring public sector productivity estimates. This is especially the case in some key policy sectors like education and health care, which provide services for individuals where outputs can be identified. However,

for collective services, the identification of outputs is extremely complicated, and the use of input method is still common practice (EU, 2016). Similarly, a lack of standardized methodologies presents a challenge to international comparisons of public sector productivity at one point in time. For now, only developments in public sector productivity over time within countries can be compared.

The Atkinson Review (ONS, 2005) was undertaken in the UK and pioneered important methodological developments that constituted a significant advance in the measurement of public sector outputs. Since 2006 Eurostat has been requiring EU members to measure and report the outputs of their non-market services, a prerequisite of productivity measurement. The OECD has also been working on providing advice on how to measure the volume of output for education and health services (OECD, 2010) in a first attempt to internationally standardize output measures for these two sectors, and to develop output price indexes for some services (e.g. health).

Government's spending on health care and education in OECD countries represented on average 18.1 per cent and 12.5 per cent of total government expenditure respectively in 2014 (Chart 4). These services also are very important for economic growth as well as for individual well-being. The data required to identify and measure the outputs are commonly based on administrative sources, for the most part readily available, but in some countries also complemented by survey data. Direct output volume measurement requires information on prices, or in the absence of prices unit costs — average costs per unit of output[12] — and quantities of homogeneous products.

The measurement of volumes has three dimensions: it needs to take account of variations in quantities, variations in the composition of the aggregate product, and variations in the quality of goods and services (EU, 2016). There are different practices followed by OECD countries to apply quality adjustment.[13]

Output measurement is critical to productivity measurement. While outputs refer to goods and services produced by the public sector, from a performance perspective, what really matters are the outcomes, i.e. the results that policy makers intend to achieve through the production of those public goods and services. Countries often have important differences in their definition of outputs and/or outcomes for the same activities. For example, in the case of education, in some countries the output is identified as the number of pupils; in others, the number of hours children are taught. But children go to school to learn. As a result, the outcome for education is considered to be the performance of students, in practice measured by standardized tests, such as PISA.

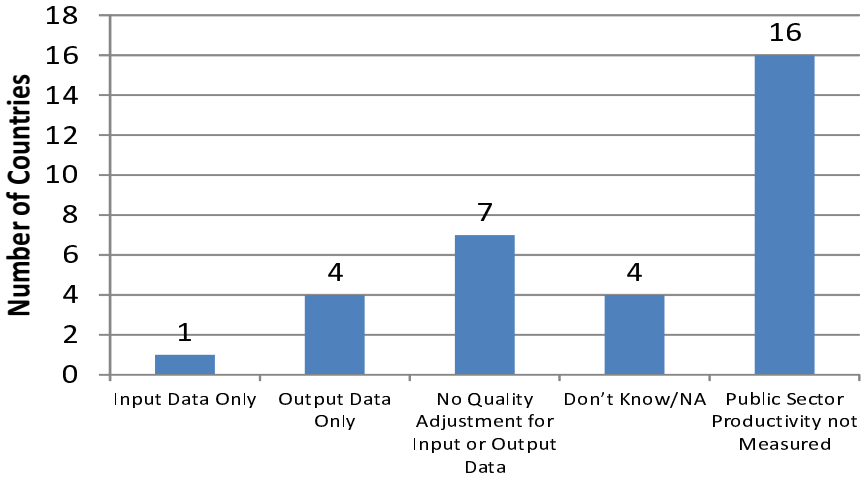
While the quality adjustment of outputs may seek to take achievement of outcomes into account in the measurement of outputs, in practice, it is often hard to delineate outputs and outcomes and even harder to identify outcomes that can be solely attributed to public sector activities and their outputs. For example, the achievement of students on standardized tests are not solely the results of the number of hours they are

11 In the output-based method units of quantity for non-market services are defined. By doing this, it is possible to apply the general principles for calculating volume indices for those services. This can be done in two ways: directly by calculating a weighted average of quantity changes in a homogeneous number of representative outputs/activities (i.e. direct volume) or by deflation, using as deflator of a price index and unit cost index (i.e. indirect volume).

12 The average costs per unit of output does not include changes in the prices of intermediate products (Lorenzoni, 2015).

13 See Box 2 in the online Appendix available at: http://www.csls.ca/ipm/32/Lau%20Appendix.pdf

Chart 5: Use of Quality Adjustment for Government Input and Output Measurement in OECD Countries



Note: The countries for 'not measured' include: Austria, Belgium, Canada, Costa Rica, Czech Republic, Estonia, Italy, Japan, Latvia, Luxembourg, Mexico, Norway, Slovenia, Spain, Sweden and Switzerland. 'Don't know' is comprised of countries: South Africa, Netherlands, Israel and Finland. 'No quality adjustment for input or output data' countries include: Portugal, Poland, Germany, France, Denmark, Chile and Austria. While 'input data only' is New Zealand and 'output data only' countries include: UK, Slovak Republic, Ireland and Hungary.

Source: 2016 OECD Survey on Measures of Productivity in OECD and Partner Countries.

taught; other factors, such as the income level and educational attainment of the parents, the quality of teachers, and class size, also having an impact. This is the called the attribution problem that is associated with identifying the contribution of outputs to outcomes in the public sector.

The OECD survey on public sector productivity measurement asked countries whether they are carrying out explicit quality adjustment (i.e. applying a numerical correction to the level of outputs based on the resulting outcome(s)) to their input and output measures. Quality adjustment does not constitute a widespread practice among OECD countries (Chart 5). Only 5 of the 16 countries that measure public sector productivity report making use of quality adjustment. Hungary, Ireland, the Slovak Republic and the United Kingdom apply quality adjustments to output data, while New Zealand reports using quality adjustment for input measures.

Future Steps in Government Productivity Measurement

The examples of countries that have undertaken steps to measure productivity in the whole public sector show that while the task is very difficult and complicated, it can be done. However, without proper output and input volume measurements, productivity cannot be calculated. Future OECD work could focus on the following five areas: (i) improvements to input measurement and cost accounting; (ii) standardization and comparability of measures; (iii) output measurement beyond the education and health sectors; (iv) a typology of activities at the micro level; and (v) intra-governmental coordination on productivity measurement.

The standards for input measurement are better developed than for output measurement, although even in this area more work can be done. The key to measuring productivity in the public sector at any of the three levels — macro, meso and micro — is the existence of a reliable

cost accounting system that is able to separate out the input costs to the various outputs. Different steps can be taken to move this agenda forward: i) harmonizing accounting methods in the public sector, in order to ensure consistency in measuring costs; ii) designing new public sector financial IT systems not only as accounting tools, but as enablers for productivity measurement; iii) using feedback/knowledge of public managers to understand which cost data are meaningful and useful to improve productivity in their specific area of work.

Much more effort can be undertaken with regards to output measurement. Given that it is easier to identify the final outputs for individual services for individuals, it is most developed for education, health care and social care services. Next steps to be taken include broadening output measurement to other individual services. Developing methodologies to measure collective service outputs still seems a rather distant goal and will take a considerable amount of resources and time. Mixed methods using the output method for some key services and the input method for the remainder can provide interim solutions.

A standardization of measurement practices would also be useful to enhance comparability. International organizations, such as the European Commission and the OECD, have contributed to developing a methodology for price and volume measurement in national accounts. The work is the most advanced for the health care and education services. In order to compare productivity in these sectors across countries, further standardization of input and output measurement is needed. This might require some countries to change the indicators they currently use, e.g. from the number of pupils to the number of pupil hours taught.

There is little known about how countries measure productivity at the microlevel, i.e. the organization/function level. Most frequently, existing micro level measurements exist in the education and health area in the form of league tables comparing the performance of individual schools and hospitals. However, the measurement of productivity or value for money of various government functions would be equally beneficial. There is great interest from countries in this microlevel measurement and great scope for learning from each other. The UK example (see Box 2) shows how this could be carried out. The OECD Secretariat is planning case studies to look at how productivity/value for money can be measured for the procurement function and for digitalization.

Finally, intra-governmental co-ordination is essential to advance measurement efforts. Institutional responsibilities for measuring public sector productivity are different across countries. Frequently, efforts are led by National Statistical Offices with the involvement of line ministries, who are in the best position to decide on the most important final outputs to be counted in their area. The assignment of clear responsibility for public sector productivity measurement to a specific institution and providing it with adequate resources to fulfil this task can help clarify roles and facilitate co-ordination of data collection. Productivity Commissions, as for example in Australia and New Zealand, or Productivity Boards have measured productivity in specific public sector domains (Dougherty and Renda, 2017), and could also play a useful role in co-ordinating and promoting productivity measurement in the public sector.

Conclusion

The drivers of public sector performance and productivity are manifold. While this presents a number of challenges, it also means that governments can mobilize various tools and improve different processes to increase public sector productivity. This article lays the groundwork for

further OECD research to better understand public sector productivity and how it can be improved. It suggests several ways forward to address measurement challenges and to delve deeper into how governance frameworks and processes can be mobilized to achieve greater public sector productivity.

As a first step, efforts should be made to accurately measure the productivity of the public sector to help focus attention on public sector productivity as a policy objective, to support benchmarking and to identify and compare possible strategies to improve productivity. Further development and standardization of measures of government output and the inputs used to generate them beyond the education and health sectors are worthwhile. Furthermore, there is great value and interest in assessing public sector productivity in greater detail on the microlevel, i.e. evaluating closely the productivity of individual government organizations and functions.

Additional research on the policy drivers for public sector productivity is also required. These include implementing digital government strategies, strategic human resource management, creating an enabling environment conducive to innovation, and understanding better the impact of budgeting and regulatory practices. New approaches should be able to consider the complexity of trade-offs and tensions. An example is associated with the increasing uptake by public sectors of new technologies that go beyond pure financial decisions, such as convenience and personal data protection, or leveraging the economies of scale inherent to cloud computing. And there are ways to assess the impact on productivity and public value creation brought about by new forms of deploying technology (e.g. shared ICT services and how they contribute to public sector productivity) or sharing and processing data.

Only by better understanding the internal workings of the 'black box' by which governments transform inputs into outputs and ultimately public outcomes can we map the drivers of productivity, promote the diffusion of innovations to strengthen public sector productivity and improve public sector effectiveness. This task is made more difficult by the rising complexity of government relationships and partnerships, in a context of co-design and co-delivery. Boundary crossing activities and effects (for example, when productivity increases take place through the collaboration of organizations, sectors and citizens) are frequently not accounted for in current measurement systems.

So while innovation is certainly a vector for improving productivity in the public sector, as it is in the private sector, it also represents a measurement challenge as innovation projects in general can have multiple actors, at both the same and different levels of the public sector. Thus it can be difficult to isolate the specific impact and effect of particular project and/or particular organisation within a project.

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