# Measuring Public Sector Productivity in Malta

Kevin Vella, Maria Mifsud and Ritianne Demanuele\*

## **1. Introduction**

The general popular discourse on public sector productivity is often fraught with misconceptions and misinformed assumptions and beliefs. Popular statements like "production and productivity are derived from private activity alone" or that "transfer of resources to the public sector essentially diminish the productivity of a nation and its capacity to produce", represent a grave misinterpretation of economic theory and the role of the public sector in providing public goods which are essential in themselves for private sector development and the quest for a stronger level of economic development and economic well-being.

"What we measure shapes what we collectively strive to pursue - and what we pursue determines what we measure" (Stiglitz, Sen, Fitoussi; 2009). The lack of a complete statistical representation of public sector productivity, including in the national accounts statistics, confounds matters further. Beyond the contribution of collective services such as the provision of security, law and order, it is to be noted that individual services, particularly education, medical services, public housing or public sports facilities, also add value and improve living standards. These public services tend to be large in scale, and have increased considerably despite attempts to minimise the role of Government in a mixed economy particularly in the aftermath of the Washington consensus. However, these services remain badly measured, traditionally based on the inputs used to produce these services (such as the number of doctors) rather than on the actual outputs produced (such as the number of specific medical treatments). Making adjustments for quality changes is even more difficult. Because outputs are taken to move in tandem with inputs productivity change in the provision of these services is ignored. It follows that if there is positive (negative) productivity change in the public sector, our measures under (over) - estimate economic growth and real income (ibid.; 2009).

The aim of this paper is to provide a preliminary assessment of what is not measured in the national accounts, that is the outputs and inputs used in the provision of public services. This will enable the estimation of public sector productivity growth. Whilst it is beyond the scope of this exercise to produce statistical estimates supplementing inputbased estimates in the national accounts, such measure can be a useful indicator of productivity measures and can thus act as an important input in collective bargaining or simply as a measure of key performance indicators in the public sector. No attempt will be made to estimate productivity levels but merely to create an index of inputs and outputs and hence estimate a measure of public sector productivity gains or losses over the last decade.

#### 2. Literature Review

Productivity is a measure of the outputs one is able to generate for given inputs. It is extremely difficult to measure productivity in the delivery of public services, especially given that we are generally interested in public sector outcomes (i.e. effectiveness) (example better survival rates, life expectancy and standard of livings), rather than outputs themselves (example number of operations performed). The Office for National Statistics of the United Kingdom (ONS, 2016) analyses the outputs and inputs associated with the provision of healthcare, education, social care, public order and safety, the policy, defence and

#### Figure 1: Composition of Public Sector Employment by COFOG



other public services by weighting indices of volumes of outputs across the public services, and weighting indices of volume inputs in an attempt to come to an overall figure for productivity growth within the public sector. A methodology similar to that adopted by the ONS will be used in analysing the Public Sector Productivity Dimension of this study.

#### **3. Public Sector Inputs**

Since the aim of this exercise will be to provide a measure of labour productivity in the public sector, the production inputs considered will be limited to the labour input only. As a result, no complete evaluation of the contributors to public sector productivity can be made.

The labour inputs are disaggregated by the Classification of the Functions of Government (COFOG) based on unpublished estimates provided by the National Statistics Office (NSO). Health, Education and Social Protection generally represent around 60% of both total expenditure and employment. This is followed by economic affairs which account for around 12% of both employment and expenditure of general Government. Another 10% of employment (but 17% of total expenditure) is covered by general public services. Defence, public order and safety also represent a sizeable share of employment of around 13% even though their share of expenditure stands at around 5%).

Whilst a comparison of employment by COFOG with the Euro Area is not possible, a related comparison of expenditure as a share of Gross Domestic Product (GDP) suggests that public expenditure in Malta is generally comparable to that observed in the Euro Area except in the case of social protection and health which is generally lower. On the other hand, Malta tends to spend more on education and economic affairs relative to its output as measured by GDP.

Employment growth between 2005 and 2015 has averaged 1.4% per annum with a stronger element of growth in social protection, health and to some extent in education which was compensated by declines in other functions of public expenditure.





Figure 3: Average Annual Growth in Public Sector Employment by COFOG since 2005



## 4. Public Sector Outputs

For each COFOG category, a measure of output has been constructed based on a number of simplifying assumptions and easily available indicators. The indicators generally cover a mix of volumes and quality indicators. For each function the number of indicators could be more than one. For each COFOG category for which more than one indicator is identified a geometric mean of these indicators is undertaken thus obtaining an index for each category. Finally, an aggregate index of general Government output is obtained as a weighted average of the output indicators for each separate function, with the weights determined by the share of employment for each corresponding COFOG category. Most of the indicators identified for health and social protection were only available from 2005 so the index captures productivity gains in the last decade. What follows is a description of the indicators used in each COFOG category.

It is worth noting that although a separate functional indicator is constructed, the output may actually reflect the performance of more than one category. For instance, it is well known in the literature that social conditions can influence education performance and vice-versa.

In Education the volume indicator is represented by the total number of students enrolled in the education system. This indicator is supplemented by three quality indicators involving the inverse of the early school leaving rate, the tertiary education attainment and expenditure on R&D. The quality indicators are all indicators of progress used in the EU2020 strategy which are linked to a significant extent to the education function of Government. The output indicator thus constructed has increased by an annual average of 3.1% per annum between 2010 and 2015.

For Social Protection the population aged 62 and over is chosen as a proxy indicator to

capture the effect of ageing on the demands for social protection. This is justified by the rising importance of pension expenditure in national budgets. This volume indicator is complemented by the population at risk of poverty before social transfers and excluding pensions. This is then supplemented by quality indicators including the inverse of the s80s20 indicator of inequality and the inverse of the at-risk-of-poverty rate after social transfers. The overall indicator for social protection indicates that output has increased by an annual average of 1.0% per annum since 2010.

For Health the volume indicator is a composite indicator of both the in-patient and curative bed discharges multiplied by the length of stay. This is complemented by an indicator of longevity using the healthy life years and life expectancy at birth and another indicator of health portrayed by the population above 18 years which report to be in very good health. The overall indicator for health indicates output has increased by an annual average of 3.5% per annum since 2010.

In the case of Economic Affairs, potential output has been selected as the volume indicator on the presumption that economic activity creates more demand for economic management. Cyclical conditions are by definition excluded from this measure to emphasise stable and sustainable conditions. Labour productivity and innovation as proxied by R&D expenditure has been selected as quality indicators for economic affairs. The overall indicator for economic affairs indicates output has increased by an annual average of 3.5% per annum since 2010.

For Defence and Public Order and Safety a common indicator for the two separate functions was constructed. This is predominantly a volume indicator based on the assumption that this function provides protection to the population at large including tourists residing on the Island and asylum seekers, protection of possessions such as residential and commercial property and traffic management. Unfortunately, time series data related to crime was not available over a sufficiently long period to allow the compilation of an index since 2005. The variables selected were the following; population, tourist numbers, property contracts, number of car registrations and asylum applications. Output in these two functions increased by an annual average of 2.8% per annum since 2010 based on these indicators.

The Environment Protection function is determined by the population and the amount of economic activity generated by each individual as captured by GDP. Quality indicators used to measure this function were the inverse of the amount of greenhouse gas emissions (GHGE) generated and the indicator for resource productivity. Based on these indicators, output related to environment protection has actually declined by an average of 0.7% per annum since 2010. The decline is mainly due to the continued increase in GHGE which offset the improvements in resource productivity and demand for environment protection as measured by GDP.

For Housing and Community Care the amount of marriages has been chosen as a proxy indicator for the volume demand for housing services. As a quality indicator the proportion of the population at risk of poverty which benefits from no or reduced rental accommodation has been selected. Based on these indicators output for housing and community care has increased by an annual average of 3.7% per annum since 2010.

For Recreation and Cultural function, the consumption expenditure for recreation and culture, printed matter, package holidays, restaurants and hotels and personal care were chosen as a volume indicator. No quality indicator was selected. Output related to this function has increased by an annual average of 4.2% per annum since 2010.

In the case of General Public Services, it is difficult to identify a particular indicator as this generally facilitates the provision of the other main functions. It is assumed that the provision of public service is directly linked with the economic activity generated in the country as measured by GDP. This means that output is estimated to have increased by an average of 3.2% per annum since 2010.

The weighted average indicator for public sector output has increased by 3.0% since 2010.

## 5. Public Sector Productivity

To measure public sector productivity, we use the following formula to estimate the increase in output per labour input. OUT represents the output level, INP represents the labour input and PROD is the productivity estimate. All variables are specified in terms of annual growth rates.

$$PROD_{PSg} = \left[\frac{\left(1 + \frac{OUT_{PSg}}{100}\right)}{\left(1 + \frac{INP_{PSg}}{100}\right)} - 1\right] \times 100$$

Since we are working with indices rather than levels of observed output, only growth rates can be identified. Based on these indices real public sector labour productivity has increased by an annual average of 1.1% per annum since 2010. The evolution of output and labour inputs and the resulting productivity index (with 2005 equal to 100) are illustrated below.

**Figure 4: Public Sector Productivity** 



The value of public sector labour productivity can be estimated by the real public sector labour productivity together with a measure of the increase in prices related to public service provision. In the absence of a specific deflator from the output side, the GDP deflator is used as a measure of prices. The formula used is the following, where GDPp is the growth in the GDP deflator.

$$PRODV_{psg} = \left[ \left( 1 + \frac{PROD_{psg}}{100} \right) \times \left( 1 + \frac{GDP_p}{100} \right) - 1 \right] \times 100$$

This indicator is useful when comparing wage increases in the public sector. The value of productivity in the public sector is thus estimated to have increased by an annual average of 3.2% per annum since 2010.

#### **6. Limitations**

These estimates provide a relatively straightforward and easy to compute index of public sector labour productivity based on readily available statistics. However, there are a number of limitations which need to be kept in mind. Externalities involved in public service provision are not being measures. Given that we are estimating in general the provision of public goods which typically involve positive externalities the measure of public sector productivity is in this sense probably underestimating the true value of public service provision and thus should be regarded as a lower bound. In some cases, no measure of quality could be identified. The unpublished estimates of the COFOG employment levels are still being fine-tuned from NSO and can add some instability in the corresponding components. The use of a weighted average tends to detract from the more complex inter-dependencies and inter-relations between each function. Inter-temporal effects are also excluded from this analysis. Finally, the absence of an output deflator for public service provision constitutes another limitation of this analysis.

## 7. Conclusion

Whilst output is estimated to have increased by an annual average of around 3% during 2010-2015, labour inputs have increased by an annual average of 1.9% during the same period. This means that real productivity in the public sector has increased by at least 1.1% per annum during these past five years until 2015. This estimate is comparable and broadly consistent with the annual average real productivity growth of 1.2% recorded for the total economy.

Average per capita wage growth in the public sector is estimated to have increased by an annual average of 3.5% per annum between 2010 and 2015. This is only marginally higher than the estimated value of productivity increase estimated in this research article.

### References

Office for National Statistics, 2016, "Information Paper – Public Service Productivity Estimates: Total Public Services", (Newport United Kingdom: Office for National Statistics).

Barnett S., Schulman K., Shore R., 2004, "Class Size: What's the Best Fit?", Preschool Policy Matters, (New Brunswick Canada: National Institute for Early Education Research).

Clements B., Gupta S., Karpowicz I., and Tareq S., 2010, "Evaluating Government Employment and Compensation", Fiscal Affairs Department, (Washington: International Monetary Fund).

Stiglitz Joseph; Sen Amartya; Fitoussi Jean Paul, 2009, "Report by the Commission on the Measurement of Economic Performance and Social Progress".

Endnote:

<sup>\*</sup> The views expressed in this research article are those of the authors and do not necessarily reflect those of the Economic Policy Department, Ministry for Finance. The authors are grateful to the staff of the Economic Policy Department for helpful comments and suggestions.