



# ECFIN COUNTRY FOCUS

## Highlights in this issue:

- Public expenditure inefficiencies seem to predominate in tertiary education and healthcare provision
- Addressing institutional and structural impediments may lead to an improvement in efficiency

## The efficiency of public expenditure in Malta

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### Summary

Measuring public sector efficiency is not generally straightforward and presents a difficult empirical issue, specifically in terms of adequate measurement of costs and outcomes. This Country Focus attempts to measure the efficiency of public spending in Malta by applying two alternative non-parametric techniques: the Full Disposal Hull (FDH) and the Data Envelopment Analysis (DEA). The analysis is restricted to public spending on education and healthcare. Apart from their important contribution to welfare and economic growth, these two expenditure components together represent around 30% of total general government expenditure in Malta, suggesting that even incremental gains can lead to important improvements in budgetary resource allocations. For expenditure on education, the findings show that, whereas public expenditure in Malta appears relatively efficient at the primary and secondary levels of schooling, it is less so at the tertiary level. In the case of expenditure on health care, the results show that, even in the context of poor outcomes for the remaining Member States, the efficiency of public healthcare expenditure in Malta is weak.

### Introduction

Fiscal adjustment plays a very important role in strengthening macroeconomic stability. Nevertheless, ensuring lasting consolidation in the face of heightened pressures from globalisation and ageing populations requires an improvement in the quality of budgetary policies. This, in turn, would enhance economic growth potential. High-quality public finances would therefore help achieve the objectives of the Stability and Growth Pact and the Lisbon Strategy. A key aspect of improving the quality of public finances is the efficiency with which inputs, mostly in the form of public spending, are transformed into desired social outcomes. The objective of this Country Focus is to measure the efficiency of public spending on education and healthcare which together represent around 30% of total general government expenditure in Malta. The expenditure in these categories also exceeds the EU average by 1½ p.p. and ¾ p.p., respectively. The paper is structured as follows. The next section provides some stylised facts about public spending on education and healthcare in Malta. This is followed by an outline of the methodological framework for measuring the efficiency of public expenditure. Finally, the empirical results are presented followed by some conclusions.

### Public expenditure on education and healthcare: some stylised facts

Public spending on education in Malta amounts to around 5.5% of GDP, which is higher than the EU average (5.2%). A closer look at the composition of such

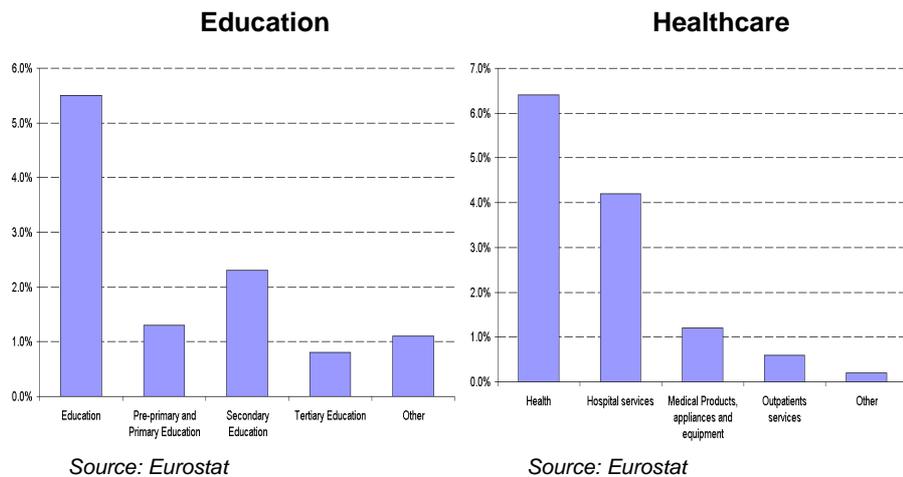
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Public spending on education in Malta is above the EU average...

...but the bulk goes into current expenditure

expenditure shows that more than 60% of public education expenditure goes to staff wages and salaries, which is slightly higher than the average for the EU. Another one-third is accounted for by "other current expenditure" which is higher than the average of the EU. Around 65% of the other current expenditure is composed of grants awarded to students attending post-secondary and tertiary institutes and subsidies to non-profit-making non-state schools. On the other hand, capital spending amounts to 5.4% of total education expenditure, which is significantly below the EU average. During the past few years, the cost of operating Malta's education system has been on the rise. While spending per student in euro purchasing-power standards (PPS) terms has been modest in Malta compared to the EU average, expenditure per student expressed as a share of per capita GDP (which represents the 'price' of public education provision) has been rising and has exceeded the EU average since 2003.

Figure 1: Public spending, 2006



Public health expenditure in Malta is higher than the EU average...

...with around half accounted for by wages and salaries.

Total healthcare expenditure in Malta is above the average for the EU Member States. Public spending accounts for around 80% of total health expenditure. At around 6.5% of GDP, public expenditure on healthcare is at par with the average for the EU. Public health provision in Malta is free at the point of use to all the population and is financed through general taxation. No user charges or co-payments apply, although a few health services are means-tested. Since 1998, public health spending has been on an upward trend, increasing from 4.6% of GDP in 1998 to 6.5% in 2006, which is equal to the average for the EU. For most of the past decade, the rise in health expenditure in Malta was influenced by capital outlays linked with the construction of a large-scale healthcare facility. Wages and salaries constitute around half of public health expenditure, compared to around 27% in the EU.

### Methodological framework

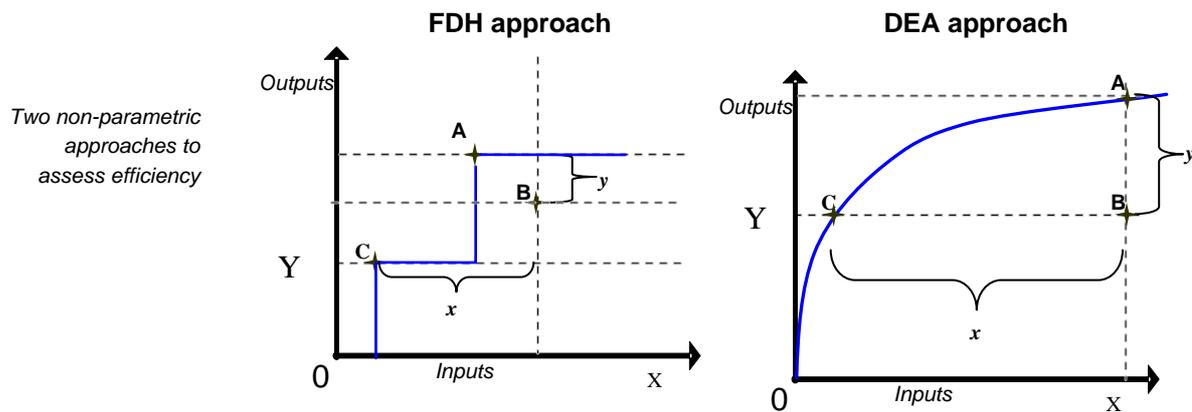
Governments can be regarded as producers combining resources to provide an array of goods and services. Combinations involving higher output for a given input or the same output for less input are viewed to be superior since they are more efficient. Efficiency cannot be directly observed. Therefore, various statistical techniques are used to measure efficiency. Most analyses aimed at measuring efficiency use non-parametric methods. These methods use the efficiency frontier as a benchmark. The efficiency frontier illustrates efficient combinations of inputs and outputs. In other words, it indicates feasible output levels given inputs and the scale of operations. The greater the output for a given input or the lower the input for a given output, the more efficient the activity is. This approach does not require assumptions about the specific functional form of the production function, since the shape and location of the frontier are determined by the data alone.

The two main non-parametric techniques applied in the literature<sup>1</sup> to measure the efficiency of government expenditure are the FDH and the DEA. The advantage of

these approaches is their transparency and their ability to handle multiple outputs. On the other hand, the main disadvantage of these approaches is their deterministic nature. In other words, the results tend to depend heavily on the composition and size of the sample as well as the selection of input and output variables used. Moreover, non-parametric methods tend to be sensitive to measurement errors, statistical noise and outliers.

The production frontier under the FDH approach takes the form of a vertical step-up connecting the most efficient input-output observations (see Figure 2 "A" and "C"). On the other hand, the DEA approach assumes a linear combination of inputs and outputs and typically postulates a convex frontier (see Figure 2 "A" and "C"). The difference between the two approaches implies that in FDH analysis, more observations tend to be identified as efficient than in DEA. This is because the FDH assumes that inputs and/or outputs can be disposed of freely.

**Figure 2: Production frontier**



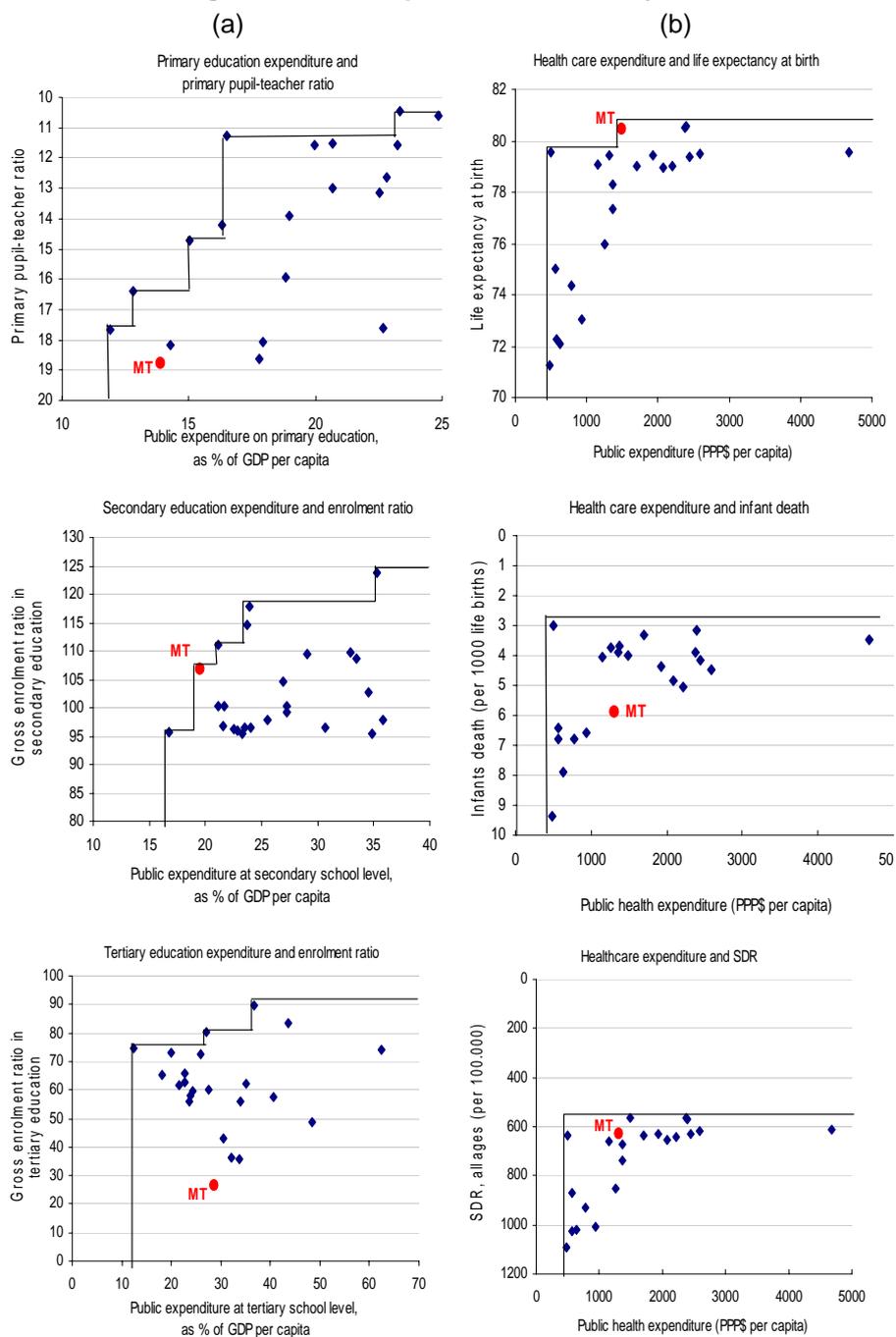
Efficiency scores indicate by how much an inefficient country can reduce input to obtain the same or higher level of output or enhance output without increasing input. Efficiency in the case of countries A and C in Figure 2 means that they have achieved the maximum amount of output that is achievable with the given amount of inputs. The example of country B illustrates that there are two options for reaching the efficiency frontier. The country can aim at maintaining the fixed level of output (Y) and adjust the amount of input. This is so-called input-efficiency. However, the country can also keep the input (X) unchanged and aim at improving the level of output. This is so-called output-efficiency.

### **Empirical results**

We use both non-parametric methodologies described above to assess the efficiency of public spending on education and healthcare. A cross-country analysis is carried out among EU Member States for which data are available.<sup>2</sup> The constant returns to scale variant of the DEA was dropped due to inconsistent results. The results for both education and healthcare public spending appear to be robust since broadly similar findings are obtained when using the FDH and DEA techniques. The detailed results are not shown here due to space constraints but are available for the interested reader upon request.

Under both methodologies, the input measure for education relates to public expenditure per student as a percent of per capita GDP, corresponding to each level of education.<sup>3</sup> Output is measured by the primary level student-teacher ratio, secondary level enrolment and tertiary level enrolment.<sup>4</sup> Figure 3a illustrates the efficiency frontier obtained with the FDH methodology for the different education levels. For healthcare, input is measured by per capita public expenditure expressed in purchasing-power-parity (PPP) terms, whilst the three output indicators used are life-expectancy at birth, infant deaths and standardised death rates (SDR).<sup>5</sup>

**Figure 3: Free Disposal Hull efficiency frontiers**



Source: UNESCO database

Source: WHO database

The efficiency frontier generated by the FDH technique for each healthcare indicator is shown in Figure 3b. Our main data sources are UNESCO for education and WHO for healthcare. The dataset used in the assessment refers to 2004, the year for which data are available for the largest number of countries.<sup>6</sup>

*Findings show that public education spending is efficient in the case of primary and secondary schooling...*

The results indicate that Malta spends relatively less than most Member States on primary education per student. Also, the primary school teacher-student ratio is low, such that Malta is slightly removed from the efficiency frontier. However, since the student-teacher ratio is only an indirect indicator of educational quality, the efficiency of primary education might be underestimated. This may be partly related to Malta's demographic profile. Specifically, the ratio of primary school age population to total population is 1 percentage point higher than in the EU, although it has been falling in the past few years.<sup>7</sup> As the declining trend in this population segment continues in

the coming years, and provided that the number of teachers at primary level remains unchanged, the student-teacher ratio in Malta could fall, potentially leading to a better educational attainment. Furthermore, Member States with a similar pupil-teacher ratio at primary level spend on average some 20% more than Malta. Public spending on secondary education also exhibits a high level of efficiency. Malta, along with four other Member States is located on the frontier. Although an above-average enrolment rate partly explains this performance, the main driver appears to be the comparatively low spending per secondary student as a ratio of GDP. Indeed, public expenditure on secondary schooling in Malta is around 25% less than the average. This is primarily a result of a higher-than-average class size which, in turn, may partly reflect a shortage of teachers at the secondary level. The recent reform in public education provision, whereby schools are grouped in networks,<sup>9</sup> is a welcome step and should enhance efficiency at primary and secondary level especially in view of the prospective decline in the school-age population.

*... but less efficient  
in the case of tertiary  
education...*

Tertiary education in Malta appears to produce far less efficient outcomes. Although most of the EU Member States also score poorly, Malta's performance is below average. A score of 0.44 denotes that at least the same level of output could be attained with 44% of the present level of expenditure per student, implying important scope for improving efficiency at this level of education. This gap seems to mainly reflect a low enrolment rate of tertiary students which, despite increasing during the past decade, stands at around one-third of the most efficient countries. According to the Lisbon scoreboard, Malta has persistently recorded poor results as far as educational attainment is concerned. Given the importance of tertiary education in the context of the goals set in the renewed Lisbon strategy, it would be meaningful to assess efficiency from the output side. In other words, compared to the relatively more efficient countries, how much could tertiary education output in Malta be increased with the same spending level. The reasons underlying the low efficiency of the tertiary education system could be manifold. For example, although higher than the EU average, the number of women per 100 graduating men is between 64% and 94% of the most efficient Member States suggesting that cultural barriers may be hampering participation, for instance, among females. In this context, the relatively generous grants awarded to tertiary education students, while increasing public spending, appear to be delivering less than satisfactory outcomes. The FDH technique shows that the current level of output, i.e. the tertiary education enrolment ratio, could be doubled if spending reached the efficiency of the benchmark Member States. Put differently, improving the efficiency of spending would allow the tertiary enrolment rate to rise to around 52%, instead of the current 26%. This suggests that a more efficient transformation of spending into tertiary educational output could lead to higher educational attainment levels in Malta.

*...suggesting ample  
scope for  
improvement.*

From an input perspective, the efficiency of public healthcare expenditure appears to be relatively weak in Malta. For all three indicators, Malta scores below average with an efficiency score of around 0.38 for each performance indicator. In other words, expenditure could be 62% lower and achieve an equivalent outcome. Although both methodologies produce similar results indicating a degree of robustness, efficiency scores should be interpreted cautiously.<sup>9</sup> Taking the life-expectancy rate indicator, Malta's relatively low efficiency score seems to be related to high public health spending per capita, which is around 17% above that of the most efficient Member States in the sample. Similar patterns are observed for the infant death rate and SDR indicators. In both cases, per capita expenditure in Malta is substantially higher than the best performers. These results seem to suggest that either public expenditure could potentially achieve better outcomes in Malta or that comparable outcomes could still be attained if health spending is lowered.

*Efficiency of public  
spending on  
healthcare is also  
weak.*

## **Conclusion**

This Country Focus applied non-parametric techniques to assess the public spending efficiency in Malta. Using a cross-country analysis of EU Member States, we estimate the efficiency scores of three output indicators each for expenditure on education and health. The findings show that, whereas public expenditure in Malta appears relatively efficient at the primary and secondary levels of schooling, it is less so at the tertiary level. These results seem to be confirmed when efficiency is assessed from the output side. It is argued that cultural impediments, for instance those hampering female participation in tertiary education, may partly explain the outcome. Similarly, the extent to which the cost incurred by government in giving

maintenance grants leads to further increase participation in tertiary education is doubtful.

Concerning health, the results show that, even in the context of poor outcomes for the remaining Member States, the efficiency of public healthcare expenditure in Malta is weak. Although the results are indicative and should therefore be interpreted with caution, the findings suggest that there is scope for rationalising tertiary education and healthcare spending without compromising outcomes. In these areas, Malta appears to perform inefficiently due to high spending rather than weak outcomes. It is therefore crucial to identify the institutional and structural factors that prevent Malta from achieving higher public spending efficiency in these areas.

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- <sup>1</sup> On education, see for example OECD (2007), Afonso et al. (2006), Clements (2002), Mattina, Gunnarsson (2007)
- <sup>2</sup> In the case of DEA, both the constant returns to scale and variable returns to scale are estimated.
- <sup>3</sup> Caution is needed in the interpretation of the empirical results in view of the proxy indicators used to measure outputs and inputs. For example, educational output might ideally be measured using such indicators as the OECD-Pisa performance scores but these are not available for Malta. Instead the indicators used-student-teacher ratio at primary level and secondary and tertiary enrolment rates – are at best proxy measures of educational performance, whose use is determined by availability. The same caveat applies to use of input measures such as expenditure per student, which has both cost and distributional aspects.
- <sup>4</sup> In the literature, enrolment and graduation are the mostly used indicators to gauge output at the tertiary level. In the case of Malta, 'tertiary level enrolment' is considered to be a more appropriate output indicator since grants given to tertiary level students (which are given to enrolled students and are not related to success) constitute a substantial proportion of public expenditure, at that level of education.
- <sup>5</sup> Standardised death rates is a weighted average of age-specific mortality rates and so enables a comparison of death rates between populations with different age structures by relating them to a standard population.
- <sup>6</sup> The estimation for both the FDH and DEA techniques was carried out using the Efficient Measurement System v1.3 software.
- <sup>7</sup> Moreover, at 21.7, the average class size at primary level in Malta is one of the highest among the EU.
- <sup>8</sup> Each school network will bring together a number of schools and will be considered as a legal entity with specific responsibilities, roles and functions with relative autonomy from the influence of the central authorities.
- <sup>9</sup> In the absence of disaggregated expenditure data directly linked to each performance indicator, the analysis for healthcare applies the same measure of input for the three output indicators. Therefore, in interpreting the results, reducing expenditure on one item would affect other health outcomes.

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