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Agenda

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Improving public sector efficiency: the £6 billion question

What is meant by efficiency savings in the public sector, and how, in light of the UK government's announced £6 billion cuts to public spending, can benchmarking approaches be used to identify where and how these efficiency savings might be made? As an illustrative example, benchmarking techniques are applied to secondary school data to identify inefficiencies and measure the potential for savings

The identification and realisation of efficiency savings in the public sector has been a highly publicised and, at times, contentious issue—particularly during the recent recession. Pressure on public finances has led many government departments to explore ways of reducing their costs without having a detrimental effect on the services and outputs they provide. Back in 2004, the Gershon Review made a number of recommendations for improving the efficiency of the public sector and for allowing resources to be reallocated to front-line services.[1] Gershon identified efficiency savings of £20 billion for 2007–08 in areas such as back-office functions (eg, HR), procurement, and through reducing the amount of time that front-line staff (eg, doctors) spend on non-core activities. More recently, the new coalition government announced cuts of £6 billion to non-front-line services in 2010–11, much of which is intended to be realised through efficiency savings.[2] Further details of these cuts and efficiency savings are expected to be announced in the forthcoming Budget.

This article outlines what is meant by efficiency savings in the public sector, before discussing the use of benchmarking techniques to identify both the scope for such savings in public services and where these savings can be made. This can in turn help inform spending decisions and policy. To illustrate the insight provided by such techniques, a benchmarking approach is applied to secondary school data, and the scope for efficiency savings across secondary schools in England is estimated.

Based on the data and the model developed, it is possible to identify those schools that are underperforming, given their expenditure and the socio-economic characteristics of pupils, and to highlight potential sources of best practice. The model used estimates that the best-performing schools in the study (in terms of grade improvements) would collectively be able to reduce their expenditure by around £97m without affecting the results achieved by pupils. When this analysis is extended to all the schools included in the study, £1.8 billion of efficiency savings are identified. These savings might be achieved without necessarily affecting grade performance. The results presented here are illustrative only, but highlight the use and potential of benchmarking techniques as a means of identifying efficiency savings in the public sector. Evidently, care is required in interpreting the results of any benchmarking analysis.

What is meant by efficiency savings?

Efficiency savings occur when the number of inputs required to produce a given output are reduced, or when outputs are increased without increasing inputs. In the public sector, inputs are typically defined as labour employed or expenditure on a particular service, while outputs may be defined as the 'quantity' of service provided (eg, number of surgical procedures) or the outcome of that service (eg, survival rates).

An example of an efficiency saving might be a reduction in the proportion of prisoners re-offending given a fixed expenditure on rehabilitation programmes. Some efficiency savings in the public sector may result in a reduction in expenditure and may therefore free up resources to be reallocated elsewhere or used to reduce the budget deficit. Efficiency may also be improved by reallocating inputs based on their respective prices (eg, salaries) to increase or improve outputs, or by altering the balance of outputs delivered to improve outcomes. For example, in a hospital, reallocation of expenditure from treatment programmes to prevention programmes may improve survival rates without increasing overall expenditure on a particular medical condition. Hence, 'efficiency savings' do not necessarily equate to 'cost reductions'.

Much of what the public sector produces is in the form of services, and it is therefore important to account for changes in the quality of outputs, as well as increases in the number of outputs, when assessing changes in efficiency. A reduction in expenditure on public sector services should not necessarily be classified as an efficiency saving if there is also a reduction in the quantity or quality of the services.[3] However—and this is particularly the case for public services—defining and measuring quality can be difficult, although it can be captured to some extent by measuring outputs through outcomes. For example, in a medical setting, quality-adjusted life years (QALYs) is a combined measure of the quantity and quality of life and can be used to indicate the outcomes of particular medical treatments or procedures. However, it is generally accepted that capturing the many facets of quality in public services is challenging, from both a conceptual and data availability perspective.

How can we identify efficiency savings?

Understanding current levels of inefficiency is a prerequisite to understanding what savings might be possible in the future. Benchmarking is one approach that can be used to identify both efficient and inefficient activities in the public sector. At a very simple level, comparisons of the ratio of inputs to outputs across units (eg, hospitals, schools, prisons, offices) can help identify the best-performing units and sources of best practice. Benchmarking approaches can also be used to estimate both the scope for the worst-performing and inefficient units to improve their efficiency, and the resulting savings from these improvements. Benchmarking can be undertaken at a functional level (eg, for a particular process) or at more aggregate levels. It can avoid the need to undertake detailed and time-consuming bottom-up reviews of activities and processes, and can quickly identify inefficient units or functions.

In the public sector, key performance indicators (KPIs) and other cost ratios are widely used as a relatively simple means of benchmarking within departments to set targets and monitor performance. Examples of KPIs include the cost of HR function per employee, tax debt collected per full-time employee, proportion of students achieving five or more A*–C GCSE grades or equivalent, and cost per episode of patient care. KPIs can be simple to calculate, use data that is generally relatively easy to collate, and provide a high-level view of performance. However, they may fail to take account of variations in quality, and a number of different KPIs may be required to capture the various activities undertaken by each department, resulting in numerous targets. Furthermore, these KPIs may not account for uncontrollable factors that vary between the units being assessed (eg, regional levels of deprivation, complexity of medical treatments), and which can affect the inputs required or the outputs achieved and therefore the overall relative performance of that unit. For example, a specialist medical centre may be assessed as efficient not as a consequence of good management, but rather due to a high volume of straightforward medical procedures relative to more complex procedures that require additional resources.

Alternative—and more sophisticated—benchmarking methods that may address this type of problem have been applied, to a limited degree, to public sector data.[4] These include statistical methods such as econometrics—including regression analysis and stochastic frontier analysis (SFA)[5]—and mathematical methods such as data envelopment analysis (DEA).[6]

These approaches have been applied in the regulated utility sectors both in the UK and internationally (eg, in water, energy and postal services) to estimate the efficient costs of operators. The techniques have the advantage of being able to simultaneously capture several inputs or outputs, account for differences in quality, and control for exogenous factors (ie, those that are beyond the control of management) that may affect the quantity of inputs or outputs. They do, however, require sufficient good-quality data.

Econometric approaches have the advantage of being able to identify cost drivers and measure the relationship between inputs and outputs. From an operational perspective, this can help inform policy- and decision-making. For example, econometrics may identify economies of scope and scale in the sector, which may in turn suggest efficiency savings that could be achieved by merging functions or activities. Econometrics can also be used to examine the impact of policy on efficiency and performance. For example, the impact of academy schools[7] on school efficiency may be determined through examining the distribution of school performance across schools with academy status.

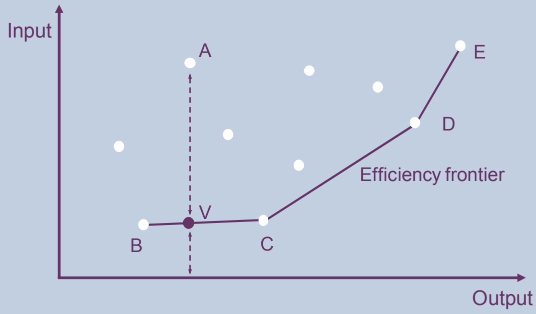
DEA, meanwhile, has the benefit of being able to identify 'peers'. These are efficient units with characteristics that are similar to the unit being assessed. The peers can be helpful in identifying examples of best practice, which can then be used to improve the efficiency of the inefficient units. An illustration is provided below of the application of benchmarking techniques to identify potential efficiency savings in the public sector, and to offer additional insight into how such savings might be achieved.

Data envelopment analysis

Data envelopment analysis (DEA) is a non-parametric technique (ie, it does not assume a particular functional relationship between cost and cost driver). Rather, it assumes that two or more units (eg, secondary schools) can be combined to form a composite unit with composite inputs and outputs—a 'virtual unit'. These virtual and actual units are then compared. If the virtual unit of comparisons is better than the actual unit because it achieves the same output with fewer inputs, or more outputs with the same input, the actual company is judged to be inefficient. DEA selects the efficient observations and constructs a frontier from them, ignoring those that turn out to be inefficient (ie, the frontier is defined by efficient units only).

In Figure 1, the DEA frontier is the line joining points B, C, D and E. The efficiency of unit A is given by the distance from A to point V. Point V is a 'virtual unit', made up of a weighted average of frontier units B and C. The DEA model presented in Figure 1 is for a simple one-input, one-output model. In practice, multiple inputs and outputs could be included.

Figure 1 Graphical example of DEA



Source: Oxera.

The results of DEA are based purely on observed data. This means that units are being compared against the best performers in the sample. The DEA comparisons are made relative to the closest part of the frontier to the observation being assessed, making the comparisons like-for-like and less dependent on a single observation that may have very different operating characteristics.

Case study: secondary schools

DEA is applied to secondary school expenditure and pupil achievement data for a sample of secondary schools in England to measure the scope for these schools to improve their efficiency. This case study is intended to be illustrative, and to demonstrate how benchmarking techniques may be used to identify the scope for efficiency savings across the public sector, and not just in education. Other benchmarking techniques are available and can also be applied across public expenditure.

In this example, efficiency is measured by assessing the value-added at GCSE level (relative to the previous stage of assessment at Key Stage 3 (KS3)) for a given expenditure per student. School and student characteristics that may affect achievement at GCSE, including the number of students with special educational needs and those whose first language is not English, are also included as inputs to the model to improve comparisons. The data used in the case study was collated by the Department of Education (previously the Department for Children, Schools and Families); 1,950 schools were included in the analysis. The results should not be interpreted as an accurate indication of the inefficiency of the secondary schools, and further analysis may be required.

The results of the analysis suggest that pupils in secondary schools could potentially improve their average GCSE score by an average of 43% without requiring additional expenditure.[8] The presence of inefficiencies identified in a number of schools means that increases in expenditure across secondary schools may not necessarily result in improvements in school standards. Instead, these schools may benefit from the adoption of best practice from the more efficient schools. The analysis is also able to highlight those schools that would deliver the largest improvements in GCSE results given additional expenditure as a result of being more efficient or subject to increasing returns to scale (ie, an increase in the inputs including expenditure will lead to a more-than-proportionate increase in GCSE scores). This type of analysis can assist in spending and policy decisions, and in maximising the outcomes from any additional expenditure.

In the model, 115 (or 6% of) schools are deemed to be efficient and may provide examples of best practice to improve efficiency across the sector. These could include particular processes and policies adopted by the efficient schools (eg, treatment of poor behaviour, academy status, head teacher performance, and professional development and training provided for teachers). The DEA model can also offer further insight as it is able to identify which of these efficient schools are the most comparable (ie, schools that can act as 'peers') for each of the inefficient schools to emulate. Table 1 below provides an example of the peers for one inefficient school, and the characteristics of these schools.

As Table 1 shows, Peers 1,2, 4 and 5 have similar characteristics to the inefficient school in the example, but achieve higher GCSE scores. Based on the average peer (ie, the weighted combination of Peers 1, 2, 3, 4 and 5), the inefficient school is estimated to be able to improve its average GCSE score by 223 points without additional expenditure. The next stage of the analysis is understanding how the peer schools achieve these better results so that these practices can be shared with the inefficient school.

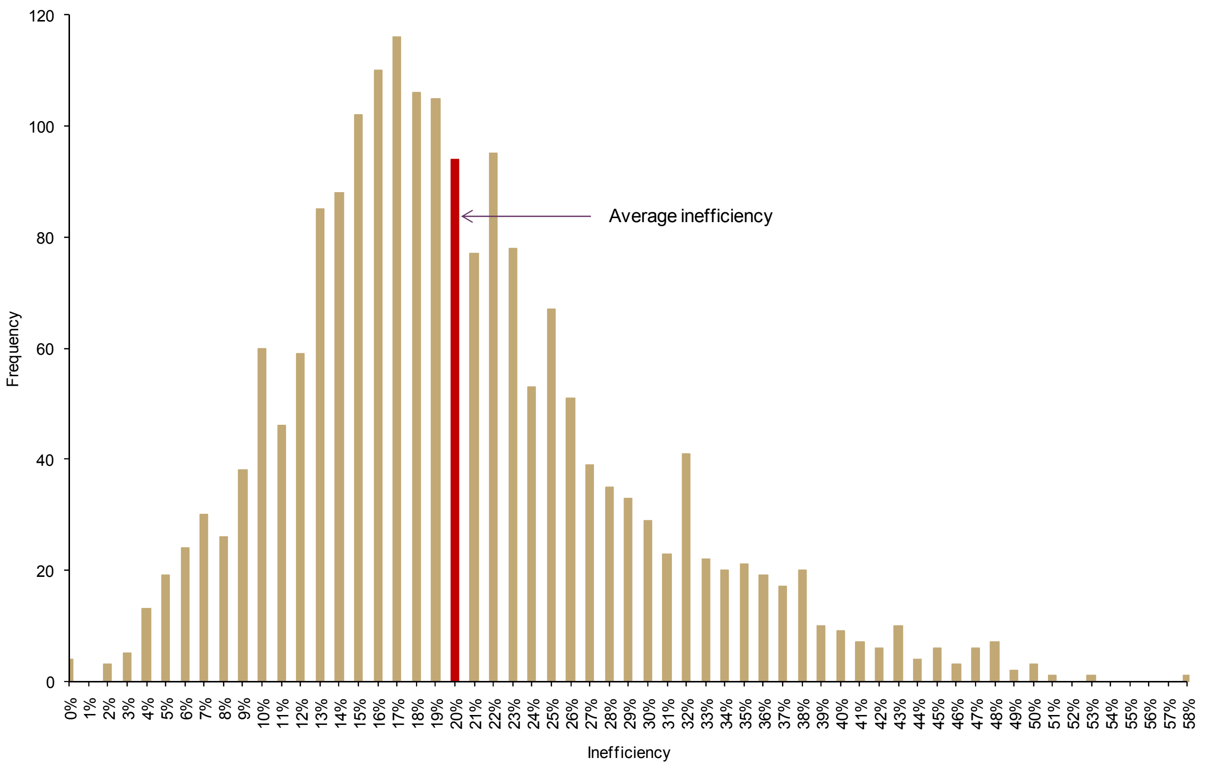
Table 1 'Peer' schools

School	Average KS3 score	Percentage of students who do not speak English as a first language	Number of students with special educational needs	Expenditure per pupil	Average GCSE score	Weight attached to peer[1]
Inefficient school	33.5	6.1%	40	£3,970	368.4	–
Peer 1	33.5	1.8%	35	£4,360	635.7	22%
Peer 2	31.4	15.5%	47	£4,258	585.6	25%
Peer 3	36.7	0.4%	37	£3,642	633.3	8%
Peer 4	33.4	5.3%	39	£3,861	578.0	24%
Peer 5	34.9	1.8%	37	£3,479	554.3	21%

Note: [1] A greater weighting indicates a school with more similar characteristics to the inefficient school. Characteristics do not receive equal weighting in determining the peers.
Source: Oxera analysis.

Additional analysis has estimated the scope for reducing expenditure across those schools that were found to add the most value between KS3 and GCSE relative to other schools with similar pupil characteristics. Concentrating on schools that already perform well in terms of value-added between KS3 and GCSE, this analysis concludes that these best-performing schools would be able to reduce their expenditure by between 1% and 40% while maintaining the same value-added (ie, GCSE results would not be affected). This equates to an efficiency saving of £97m across the selected schools only, or 16% of expenditure. For the remaining schools in the case study (ie, those adding relatively little between KS3 and GCSE), the focus may initially be on improving standards. However, if cost savings were to be considered at these schools with the focus on maintaining grades but at a lower cost, it is estimated that all the schools included in the study could collectively reduce their expenditure by £1.8 billion (20% of expenditure on average).

Figure 2 Distribution of cost inefficiency across secondary schools



Note: The inefficiency score presented here is an estimate of the percentage by which each school would need to reduce its costs in order to be considered efficient, based on the estimated DEA model. An inefficiency score of 0% indicates that a school is efficient.
Source: Oxera analysis.

However, a fixed percentage reduction across all schools would not be appropriate. As shown in Figure 2 above, a number of inefficient schools may be able to reduce costs further (ie, they have an inefficiency score of more than 20%) without affecting outcomes, but would have no incentive to do so, while more efficient schools (ie, those with an inefficiency score of less than 20%) may be harmed by the reduction in expenditure. Instead, cost reductions might be better targeted at individual schools and combined with the spread of best practice from the best-performing schools with similar characteristics.

Furthermore, care should be taken to ensure that the benchmarking analysis does not lead to potentially perverse incentives for schools (eg, 'teaching to the test'). This may be achieved by extending the model to provide a complete picture of the learning experience of pupils and the quality of teaching, and not just exam results. Care is also required in using the results of benchmarking as part of any incentive regime. Managers and practitioners within public services are often not motivated in quite the same way as the managers of profit-driven firms, and experience shows that any incentive regime should take account of this.[9]

Conclusion

This article has demonstrated the use of benchmarking techniques in estimating and identifying efficiency savings in the public sector. This can assist in targeting any cost reductions or additional expenditure and in reallocating expenditure to improve outcomes. It can also offer insight into the impact of particular policies (such as academy school status) on efficiency and performance. Benchmarking techniques can be applied to individual processes (eg, back-office activities) or to units such as police forces, schools, hospitals and departments across the public sector. As this article illustrates, it can be used to identify cost savings that are achievable without affecting the outputs and outcomes, thereby allowing front-line services to be targeted. However, careful consideration must be given to how any efficiency savings are targeted, and to the incentives in place for departments and managers to ensure that these potential savings are delivered, while avoiding any incentives that encourage undesirable behaviour or reductions in quality.

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[1] Gershon, P. (2004), 'Releasing Resources to the Front Line: Independent Review of Public Sector Efficiency', HM Stationery Office, July.
[2] HM Treasury (2010), 'Speech by the Chancellor of the Exchequer, Rt Hon George Osborne MP, Announcing £6.2billion Savings', May 24th.
[3] In practice, whether cost reductions that also reduce quality are classed as genuine efficiencies may depend on the value placed on quality by consumers and society at large.
[4] These are mainly academic studies. See, for example, Johnes, G. and Thanassoulis, E. (2008), 'An Analysis of Costs in Institutions of Higher Education in England', *Studies in Higher Education*, **33**:5, pp. 527–49; Maniadakis, N., Hollingsworth, B. and Thanassoulis, E. (1999), 'The Impact of the Internal Market on Hospital Efficiency, Productivity and Service Quality', *Journal of Health Care Management Science*, **2**:2, pp. 75–85; Thanassoulis, E. (1995), 'Assessing Police Forces in England and Wales Using Data Envelopment Analysis', *European Journal of Operational Research*, **87**, pp. 641–57; and Thanassoulis, E., Kortelainen, M., Johnes, G. and Johnes, J. (forthcoming), 'An Analysis of Costs in Institutions of Higher Education in England: DEA Approach, *Journal of the Operational Research Society*.
[5] For a more detailed discussion of SFA, see Oxera (2006), 'The Art of Noise: Recent Regulatory Developments in Measuring Efficiency', *Agenda*, October (available at www.oxera.com), or Kumbhakar, S. and Knox Lovell, C. (2000), *Stochastic Frontier Analysis*, Cambridge University Press.
[6] See Thanassoulis, E. (2001), *Introduction to the Theory and Application of Data Envelopment Analysis*, Kluwer Academic Publishers.
[7] State-funded schools that are set up and managed with the help of outside sponsors.
[8] Average GCSE score is based on total points achieved at GCSE for each school (eg, 52 points are awarded for an A) divided by the number of pupils on the roll at the end of Key Stage 4 (when GCSEs are taken).
[9] See, for example, Oxera (2007), 'When Economics Met Psychology: Rethinking Incentives', *Agenda*, March. Available at www.oxera.com.

If you have any questions regarding the issues raised in this article, please contact the editor, Dr Gunnar Niels: tel +44 (0) 1865 253 000 or email g_niels@oxera.com

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