

Measuring Productivity in the Health Sector

Abstract

Over the next few decades governments will increasingly need to balance the new and growing demands facing the health system with a tighter fiscal outlook. The best way to protect standards while responding to these pressures will be to lift productivity. This article draws on a recent New Zealand Productivity Commission inquiry into state sector productivity and discusses the implications of this work for the health sector. It begins by highlighting the importance of health sector productivity, particularly given the fiscal outlook. It then discusses recent efforts to measure productivity in the health system, before outlining possible next steps in measuring the sector's productivity.

Keywords health sector, productivity, measurement, New Zealand

Why this topic?

The performance of the health sector matters. Not only is it a major area of government expenditure (about 21% of core Crown expenses in 2017) and a major employer in New Zealand, it is important for living standards and economic growth. Productivity growth

in the private sector relies on a healthy, well-educated population, whose efforts depend on good physical and social infrastructure (Atkinson, 2005). Indeed, by supporting the acquisition of human capital, the feedback loop between health sector outputs and economic growth can potentially be quite large, raising

'the possibility that some investments in health might, in effect, "pay for themselves" through their impact on overall incomes quite apart from any improvement in welfare' (Cullen and Ergas, 2014, p.15).

Yet while New Zealand's health sector often ranks highly in international comparisons of outcomes (see, for example, Cumming, 2017; Fullman et al., 2018; Schneider et al., 2018), questions have been raised over its productivity. This can be illustrated with Statistics New Zealand (2017) data on industry-level productivity. This data is compiled for industries in the so-called 'measured sector' (private sector industries) and for a number of state sector industries (including the health sector). As these are industry measures, both public and private providers are included in the health sector and data is not routinely published for sub-sectors. The data also does not explicitly account for changes in the quality of outputs or in the environment facing producers (these issues are discussed in more detail in the section on measurement below).

Nonetheless, this data showed that between 1996 and 2017 increases in the productivity of the state sector were largely

driven by increasing inputs (staff numbers and funding). In health the average annual growth in outputs of 3.8% reflected growth in inputs of 3.0%, with labour productivity contributing 0.8%.¹ The growth rate of the sector's labour productivity during this 20-year period was around half that of the measured sector (private sector industries) of 1.5%, which suggests that in a sizeable part of the economy (health accounted for 6.4% of total industry output), productivity growth was lagging. This gap between measured sector and health sector labour productivity largely reflected lower capital productivity in the health sector (lower productivity of inputs such as land and buildings, inventories, and equipment).

When seen in the context of the Treasury's work on the long-term fiscal outlook, this industry-level data provides food for thought. For example, if the assumed health sector productivity in the Long-Term Fiscal Model (LTFM) was to increase by half a percentage point a year, then, under a historical spending scenario, government health expenditure in the final year of the model (2059–60) would be \$114.7 billion rather than \$137.2 billion. In other words, providing the same level of services in the lower productivity scenario requires 16.4% more government expenditure than in the higher productivity one.

Productivity is not only important for fiscal reasons. The impact of demographic and technological changes on the level and nature of demand for key public services has been well canvassed (see, for example, Treasury, 2016). As one example of how demand is changing, since 2002 there has been a significant increase in the average age of hospital inpatients, which has, in turn, had implications for the medical complexity of care (Fraser and Nolan, 2017). From 2002 to 2014 the mean age (at admission) of inpatients increased by about 3.4 months a year and the median by about 7.1 months a year. To put this in context, over this period the median age of the New Zealand population increased by around 2.7 months a year. Trends like this can be expected to continue. At the same time, growth in the aggregate labour force will slow and pressure on government budgets will increase.² The result is that health sector managers can expect their

Table 1: Fiscal Outlook in the Long Term Fiscal Model (Historical Spending Scenario)

Year	2017	2032
Total Crown revenue (excluding Gains) (\$b)	101.0	193.5
Less Total Crown expenses (excluding Losses) (\$b)	99.7	206.1
Less Minority interest share of operating balance before gains/(losses) (\$b)	0.5	0.7
Total Crown operating balance before gains and losses (OBEGAL) (\$b)	0.7	-13.3
Nominal GDP (expenditure measure) (\$b)	259.2	489.9
OBEGAL as % of GDP	0.3%	-2.7%
Total health expenses (\$b)	15.4	33.0
Total education expenses (\$b)	14.1	27.8

Source: Treasury Long Term Fiscal Model

services to face increasing pressure as growth in inputs becomes more constrained. To maintain the quality of services they will need to focus on lifting productivity and shifting 'resources from less socially valuable old things to more socially valuable new things' (Cullen and Ergas, 2014, p.4).

The fiscal outlook

The Treasury's LTFM provides a valuable picture of the longer-term fiscal outlook. The most recent (2016) version of this model shows that if governments maintain a historical spending scenario they will start running permanent structural deficits – based on the operating balance before gains and losses – from about 2024–25. This scenario is based on historical policy settings and accounts for demographic and non-demographic changes (e.g., assumptions regarding how healthily people age) (Piscetek and Bell, 2016). Treasury does not update the LTFM annually and it is possible that these projections are now on the pessimistic side, particularly given the recent growth in tax revenues.

Indeed, the Fiscal Strategy Model (FSM) prepared as part of Budget 2018 shows no sign of a structural deficit emerging over the projected period (the FSM goes to 2032). This reflects different assumptions for factors like economic growth (and, in turn, tax revenues) and approaches to modelling government expenditure in the two models. The FSM and LTFM have different purposes and it makes sense for them to employ different assumptions. Nonetheless, comparing projections for health expenditure (including a share of operating allowances)³ in the two models shows that the FSM

projects a lower level of growth in this expenditure between 2017 and 2032 (4.5% in the FSM versus 5.2% in the LTFM) and that it suggests that expenditure growth will be slower between 2022 and 2032 than between 2017 and 2022, while the LTFM estimates that expenditure growth in the later years will be higher. These figures are before inflation and, based on data collated by the Institute for Governance and Policy Studies and NZIER, compare to actual growth in core Crown health expenditure of 5.4% between 1996 and 2016 and 4.6% between 2006 and 2016 (Institute for Governance and Policy Studies, 2018).

The discussion above highlights a range of fiscal choices. Broadly speaking, governments will be restricted to health spending growth at levels seen over the last decade – which will be challenging given cost pressures from demographic and technological change – or face fiscal deficits and/or lower spending growth in other areas, and/or require faster-growing tax revenues. Yet these fiscal choices can be made easier if governments also focus on lifting productivity. As Wilkinson and Acharya noted, 'faster productivity growth makes everything more affordable' (by growing tax bases and bending down services' cost curves) (Wilkinson and Acharya, 2014, p.22).⁴ However, the scale of the increase in productivity required should not be underestimated. As a thought experiment, the author estimated how much the annual productivity growth rate for the health sector in the LTFM would need to increase to allow expenditure in 2032 to fall to a level consistent with real per capita spending in 2017. In other words, what health sector productivity increase would offset all of the impact of demographic and technological

change on spending, *ceteris paribus*? The result was an increase of 4.2%, which, in the context of a current growth rate of health sector productivity of 0.8%, would be a very tall order. Current productivity growth in the health system is a long way from where it needs to be.

The state of the art

Fortunately, health is an area where – both internationally and within New Zealand – relatively good progress has been made in the measurement of state sector productivity. Lau, Lonti and Schiltz (2017) showed that among OECD countries, health was the part of the state sector where governments were most likely to measure productivity. This, however, needs to be seen in the context of a general neglect of these measures, with only 12

been tough going. There are data gaps, missing paradigms, and communication issues. The analytical capacity and capability across the sector appears to be in short supply. Measures that are part of operational processes appear more enduring but that could be expected. Meaningful succinct measures to populate performance frameworks have been elusive. (p.5)

Knopf then contrasted the experience of productivity measurement with the development of health targets. She attributed the higher levels of support for the health targets vis-à-vis productivity measurement to technical constraints, perceptions of key stakeholders, and generic expectations around public sector monitoring frameworks. Productivity

making the best possible use of resources such as funding and labour. Measured properly it should account for changes in the quality of services (see the article by Gemmell, Nolan and Scobie in this issue of *Policy Quarterly*). A comprehensive performance framework for the state sector should include productivity as one dimension. Indeed, improving productivity is a key step towards improving the final outcomes of the health sector. It is not possible to achieve the best possible health outcomes for New Zealanders unless health services are productive. It may, for instance, be possible to decide what outcomes are desired and to perhaps even predict the likely contribution of specific outputs to these outcomes. But unless the health system can effectively convert the resources available into outputs, it will be unlikely to maximise desired outcomes.

However, as important as productivity is, it is necessary to also recognise what productivity measures do not show. As the Productivity Commission has noted (2017), an observed change in productivity may reflect factors outside the control of health sector managers. Indeed, one key difference between the state and private sectors is the greater requirement for accountability considerations in the state sector. The allocation of inputs (e.g., funds and workers) in the state sector rightly remains subject to public law and administrative requirements designed to ensure that they are used in a lawful, transparent and accountable manner. Yet, as the Productivity Commission (2015) noted, when agencies manage performance risk through highly specified contracts (that describe the inputs to be used, the processes to be followed and the outputs to be produced), they can reduce the incentives and opportunity for innovation, limit the flexibility of providers to respond to changing needs of clients, and limit the scope for providers to work together. This is especially important for the health sector, as models of care need to evolve as technological changes allow treatment of previously untreatable diseases, conditions that once required hospital care are able to be treated in other settings (such as primary care), and the need for minimum safe size leads to specialist and other services being concentrated in larger

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of 32 countries, including New Zealand, measuring health productivity.

Since 2013 Statistics New Zealand has published annual estimates of health productivity (their estimates go back to 1996). As well as these ‘national accounts’ measures, district health boards regularly measure their productivity over a range of services (District Health Boards, 2017). Other studies, including benchmarking exercises, have been undertaken by organisations such as the Health Research Centre at Victoria University of Wellington, the Health Roundtable and the Treasury. Yet this work on productivity has faced challenges. Knopf (2017) reviewed 15 examples of attempts to measure productivity by national health sector organisations over the past 20 years. She found that no progress in measurement over time was identifiable (p.3), and that:

Attempts to measure efficiency/productivity in the health sector have

measures were seen as not being meaningful or even being ‘negatively or intuitively wrong’, or creating the wrong incentives. She noted that there was a need to ‘advise on meaningful measures of efficiency and productivity (including developing the productivity story) that would be useful to the health sector’ (pp.5-6). Likewise, district health boards have noted the challenges posed by the lack of agreement on methodologies for measuring productivity (District Health Boards, 2017).

Productivity, reallocation and diffusion

The discussion above illustrates the problems that can arise when concepts like productivity are misunderstood. Often productivity is seen as being synonymous with increasing hours of work or cutting budgets. This is wrong. Productivity is a measure of the outputs produced for a given set of resources (inputs), or, in other words, the effectiveness with which inputs are transformed into outputs. It is about

settings (which can be reflected in scale effects or economies of scope).

This has two key implications for the measurement of health sector productivity. The first is that, as emphasised by the Productivity Commission (2017), productivity measures should be treated as one input into conversations about performance, rather than the sole factor with high-stakes impacts (e.g., not tied to financial incentives). The second is that there is likely to be value in a broader focus on innovation (especially the diffusion of new processes and technology) rather than just on productivity per se. Indeed, these two concepts are related. Research on the private sector shows that the two key drivers of productivity growth are diffusion and the reallocation of capital and labour (Conway, 2016). The forces of reallocation tend to be weaker in the state sector (reflecting lower levels of competition and a smaller role for consumer choice), which means diffusion of innovation needs to play a greater role in driving productivity growth (Dunleavy and Carrera, 2013). Fortunately, measuring diffusion in the state sector is often relatively straightforward, given the greater ability to directly observe activities or outputs. This contrasts with private firms, where innovation cannot often be directly observed, meaning measures of the number of firms engaged in innovative activity can range from 0.2% to 40% (Wakeman and Le, 2015).

The question of how to measure

While the preceding discussion highlights the importance of measuring health sector productivity, there are still outstanding questions regarding how to go about measuring productivity in the state sector (Productivity Commission, 2018). It would be naive to take methods developed for private firms and think they could simply be applied to the publicly funded health sector. But this does not mean that the productivity of health services cannot be measured. It simply means that the productivity of these services should often be measured differently to the ways in which it is measured in the private sector. For example, a general feature of service industries is that it is relatively difficult to measure outputs compared to measuring outputs of goods-producing

industries. And in the state sector there are additional considerations. As well as the accountability considerations discussed above, there is an absence of 'market clearing prices', as these services are often either provided without charge or partially subsidised (Dunleavy, 2016; Gemmill, Nolan and Scobie, 2017). In the private sector, data on prices plays a key role in measuring productivity by providing information about the relative value of different outputs (and changes in quality) and serving as weights when aggregating them (e.g., into industry or national measures). In the health sector this role can be filled through using cost weights to aggregate outputs, but it is important to recognise that these weights will reflect the

assessment of the health sector. It also reinforces the importance of considering what is driving observed changes in productivity, and, if necessary, how these results compare with other sources of evidence. This is why Atkinson emphasised the need to supplement productivity measures with independent evidence (what he called a process of 'triangulation' (Atkinson, 2005, p.51)).

An often-cited challenge in measuring health sector productivity is the need to account for differences that organisations face in their operating environments and for any changes in these environments over time. Key features that can be relevant include: the characteristics of the clients of the services (e.g., age, socio-economic

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value producers put on services and not how consumers value them (Productivity Commission, 2018).

There can also be differences in goals and, as also noted above, market structure. Compared to private sector firms, which may have goals like increased market share or shareholder value, some tasks in the state sector have relatively complex goals. As Tavich (2017) noted, in many cases standard productivity concepts are compatible with state sector tasks, but for others, using these standard measures is a challenge. She argued that it is possible that some useful measures could be developed for these other tasks, but this involves moving from productivity measures into other forms of performance assessment. This reinforces the conclusion that productivity measures should be just one element of a broader framework for the

background, pre-existing health status); the size and scope of the organisations (e.g., whether hospitals have specialist units); market structure (e.g., presence of other suppliers/competitors); and the overall performance of the economy. There is also the need to consider how the quality of services differs between organisations or changes over time. The importance of these dimensions can be illustrated in the examples below.

- Differences in operating environment: differences in the performance of general practices may, for example, reflect the socio-economic status of their patients as well as the performance of their staff. Failing to account for these differences could mean measures overstate the performance of practices that draw patients largely from advantaged backgrounds.

- Changes in quality over time: suppose that the number of patients treated in a public hospital grows at a slower rate than labour and capital inputs. Measuring productivity on this basis would tell a story of falling productivity. But also suppose that the quality of care increased and readmission rates fell. In this case the change in measured productivity would be missing an important part of the story.

There are several approaches to accounting for differences in operating environments (Productivity Commission, 2018). It could be possible to measure the outputs related to different population subgroups separately (segmenting the population) and treat them as distinct outputs; the providers studied could be compared to those from similar environments; and volumes of outputs could be adjusted for differences in the operating environment (e.g., severity of treatments as reflected in case-mix). There is also a sizeable literature on applying quality improvement approaches to healthcare (ibid.). Marshall (2009), for example, showed how statistical approaches first developed in the manufacturing sector could illustrate quality issues in healthcare.

A final concern regarding measuring productivity is a practical one: whether this will require the collection of new data (which comes with a cost). But valuable data already exists in the health system (District Health Boards, 2017) and it is possible to go a long way in measuring productivity by increasing the utilisation of existing data (Australian Productivity Commission, 2017; Downs, 2017). As district health boards have noted, the health sector 'has a range of IT systems that support the delivery of services in an operational context, for example theatres, radiology, laboratories. Often these systems do not feed directly into national collections but generally support clinical

coding processes and other analytical processes, such as costing and production planning' (District Health Boards, 2017). Greater utilisation of this data should be the focus. This requires thinking about data access, standards and linking: for example, whether the right people have access to the right data. As the New Zealand Nurses Organisation (2017) has noted, the better use of data is an important step in providing the care needed for patients.

Conclusion

This article has drawn on a recent Productivity Commission inquiry into state sector productivity (Productivity Commission 2017, 2018) and discussed the implications of this work for measuring productivity in the health sector. It shows how the history of productivity measurement in the sector has at times been tough going, but that – given the future demands facing the sector, along with the tightening fiscal outlook – this work is only going to gain in importance. Further, rather than (perhaps unhelpfully) labelling sectors as 'laggards', the latest techniques in state sector productivity measurement could encourage a greater focus on questions like health sector innovation (especially the diffusion of new processes and technologies).

Exploiting the potential of these new measures, however, requires further work. Agencies need guidance on how to measure and understand their productivity and there is scope for greater sharing of lessons across government. This is an area where the health sector could make a valuable contribution, with some of the techniques and approaches being used in the sector (e.g., District Health Boards, 2017) already being at the New Zealand frontier (Productivity Commission, 2018). The Productivity Commission has also recently published guidance for analysts and will continue to support the development of an

informal network in this area through holding regular Productivity Hub and Government Economics Network (GEN) sessions.

But other agencies need to make an investment too. For example, given the potential benefits from the greater use of administrative data, agencies need to continue to work on sharing and using data across government in safe ways. Agencies also need to recognise that measuring productivity should be a regular part of assessing the performance of their organisation. This requires ongoing resourcing and an openness to using and developing productivity measures. The measurement of state sector productivity is a developing field and approaches will evolve as techniques and data improve. Yet this is no reason for not getting started. Productivity measures improve the more you use them.

- 1 This sector includes hospitals, medical and other healthcare services, and residential care services and social assistance. It also includes providers in both the state and private sectors, with the private sector accounting for 57% of industry GDP (production measure) in 2016.
- 2 Note that population ageing can also be reflected in the age of the health workforce. For a general discussion of workforce ageing issues see Koopman-Boyden et al., 2014.
- 3 Total health expenditure in each year of the FSM is assumed to reflect both the allocation for total health expenses and 36% of each year's allocation for operating allowances.
- 4 As well as on health, this will require a focus on education spending and New Zealand Superannuation. The health sector is the focus of this article, while a companion article in this issue of Policy Quarterly discusses the education sector (Gemmell, Nolan and Scobie, 2018). Issues relating to New Zealand Superannuation are not discussed in this article but have been well canvassed elsewhere (see, for example, Nolan, 2018).

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