Physician productivity in Australia: the 'flat of the curve' and beyond?

Anthony Scott

Melbourne Institute of Applied Economic and Social Research

The University of Melbourne

Paper for the 9th International Medical Workforce Collaborative Conference, Melbourne, November 2005.

Abstract

Physicians are one, albeit key, input into the production of better health and well being. There are two parts to the measurement of physician productivity: activities performed and the value of those activities to society, via their impact on health and welfare. The former is easiest to measure, whilst the latter is more difficult since prices are unlikely to reflect patients valuations of services provided. The total revenue from fees charged per FTE doctor has been increasing, whilst the quantity of services per doctor has been falling suggesting that the increase in revenue per doctor is due entirely to increases in real prices. This is against a context of a reduction in the supply of hours by GPs and specialists balanced against some evidence of an increase in the quality of GP services. Fewer services are being provided and costs are rising with unknown changes in quality. The net effect on population health depends on whether the forgone health gains of patients deterred from using health care due to price rises are lower than the potential increase in health from an increase in quality of care for those who do visit their GP. Further research should focus on the measurement and valuation of quality, in particular those aspects of physician activity that patients' value. As with many countries, there is little empirical evidence to determine the most cost-effective policies to improve physician productivity. Research on improving physician productivity should focus on the implementation of evidence-based practice, changes in skill mix, and the type of GP remuneration scheme. In Australia, it is also important to recognise the role of co-payments, and policies to re-distribute doctors across urban and remote areas, both of which can influence physician productivity.

Correspondence:
Anthony Scott, Professorial Fellow, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, Parkville, VIC 3010, Australia, a.scott@unimelb.edu.au;
www.melbourneinstitute.com/research/micro/health.html

Acknowledgements.

Thanks go to Jongsay Yong and Paul Gavel for helpful comments.

1 Introduction

Physician productivity is concerned with what physicians do and the effects of this on patients' well-being. To examine the productivity of physicians is to examine the productivity of the health care system as a whole since physicians, and the teams of health professionals under their direction, make the key clinical decisions that determine a patient's path through the health care system and to improved health. Physicians are one, albeit key, input into the production of good health. The fact that they are an input alongside other inputs, such as nurses, allied health professionals, managers and capital, suggests that changes in the combination of these inputs will influence productivity. Indeed, the health care system is but one of a number of inputs into the production of good health and well-being. Others include lifestyles and preventive behaviours, education, the environment and social capital. The relative impact of physicians and the health care system versus these other determinants of health is a key policy question that has yet to be addressed.

The role of physicians in the production of good health must therefore be seen in this broader context. This context also means that in order to link physicians' activities to better health, requires us to be able to attribute physicians' actions to better health, and to be sure that any changes in health are not the result of one of the other inputs to the production of health. Randomised trials are necessary to determine the question of attribution and causality, but it is well known that these usually cover only new technologies and much existing practice remains unevaluated. It is clearly impossible to conduct a randomized trial for every clinical decision made, but the growth of evidence-based medicine and systematic reviews of evidence, the incorporation of this evidence into clinical guidelines, and the use of these guidelines by physicians has an important role to play in improving their productivity. In particular, the issue of being able to change physicians' existing behaviour and practice patterns becomes central to the issue of improving productivity. The role of educational interventions, payment systems and the diffusion of technology in promoting behaviour change are relevant here.

The aim of this short paper is to examine the issues of physician productivity in the Australian context. The next section outlines in more depth how physician productivity might be defined. This is followed by an examination of some data relating to the productivity of physicians in Australia. The policy context in Australia is then outlined in terms of those policies that influence physician productivity. Finally, a research agenda is suggested that

2 Defining and measuring productivity: what do patients value?

There are two aspects to the measurement of productivity in economics that are relevant here: the activities performed by physicians and the value of these activities to patients and society. Measuring those activities that physicians perform on patients, such as diagnostic tests, consultations, prescribing, referrals, operations and procedures is the first part of measuring physician productivity. During an episode of illness a patient may be seen by a physician or by a number of different health care providers over a period of time who will each perform various activities. Patients may receive only one or many of these activities in a course of illness. Activities are combined through a 'production technology'. Patients with the same illness and who are similar in all respects may receive a different combination of activities, either through the probabilistic nature of illness and its treatment (what works for one patient does not work for others), or variations in the production technology across physicians (some physicians may have better knowledge than others about how to combine activities through adherence to clinical guidelines or experience). Changes in technology (new activities or a new combination of existing activities), and in the relative value (prices) of each activity, will alter the combination of activities provided. Changes in technology will also change the effectiveness of physicians' activities on patients' well-being and/or lower the cost of achieving current levels of outcome (AHWAC, 2005).

The second aspect of productivity is the value of physicians' activities to those who demand the activities: patients and society. In a perfectly competitive market, this

valuation is given by the equilibrium market price paid, the consumers willingness to pay, for those activities. A higher equilibrium price (a higher willingness to pay) reflects a higher valuation of services by consumers. In this context, productivity is therefore measured in monetary terms: the number of activities multiplied by the market price of each activity.

In health care patients do not directly demand the activities, but value the activities for the impact on their health and well-being. For a number of reasons concerned with market imperfections and market failure in the health sector, the prices paid by consumers (if they pay a price at all) are unlikely to reflect patients' valuations of physicians' activities. The existence of third party payment by the government or a private insurer means that patients do not face the full price of consuming health care. Market imperfections also mean that health care labour and product markets are not perfectly competitive. Even if such markets were competitive and patients did face a full price, this price would not reflect patients' valuations of physicians' activities because of asymmetry of information between physicians and patients: patients do not know what effect a physicians activities will have on their well-being. Patients cannot assign a value to services received at the point of consumption. Prices paid do not therefore reflect the patients valuation of services received. Since market imperfections and failures mean that prices cannot be used to measure the value of physician activities provided, other methods need to be developed to do this.

Physicians exist to serve the needs and demands of patients, and so it is patients and the community (as potential patients who pay taxes and private insurance premiums) who should ultimately determine how the productivity of physicians should be defined. The main question to be asked is 'what do patients value about the health care services they receive?' The most obvious is an improvement in their health status. There is a large literature on the measurement and valuation of health, with health usually defined in terms of additional life expectancy and utility-based measures of health-related quality of life based on patients preferences (Dolan, 2000). These have been combined to form Quality-Adjusted Life Years (QALYs), although are often measured separately. Health-

related quality of life is usually defined in terms of physical, social, and emotional functioning. The key to an economic approach to measuring health status is also the valuation of the different components of health status: physical functioning may be more important than social functioning for some individuals but not others. Utility-based measures of health-related quality of life explicitly incorporate patients preferences and trade-offs for length and quality of life, and for the different domains of health-related quality of life. What is useful about these measures, especially in their generic form, is that they can be used across different illness and diseases and they produce a single index number that is easy to summarise and analyse.[1] These measures have primarily been used to measure changes in health outcomes due to specific health care interventions in the context of randomized trials. Health outcomes are not routinely measured by hospitals or physicians in their everyday practice.

Patients and the community do not only value health outcomes. A number of other sources of value have been identified that exist even where there is no improvement in health outcomes. The first of these is generally referred to as the 'process' of care. There are a number of aspects about the way a health care service is delivered that are valued by patients. This includes factors such as waiting times, the invasiveness of a procedure, friendliness of staff, and involvement in decision making. Patients may therefore value the way in which physicians' activities are delivered. Although these may have an impact on health outcomes, they may also be valued for their own sake. The second 'source of value' is the provision of information. Screening and diagnostic tests, and verbal or written information provided by a physician may reveal information that may impact on future health outcomes, but may also reveal information that is valued for its own sake. A negative result of a test may not improve health status but provides information that reduces anxiety and provides re-assurance. A consultation with a GP that does not result in an improvement in health outcomes may still be of value to the patient. The measurement of some aspects of the process of care, such as waiting times and measures

[1] There are many disease-specific measures in existence, but by definition they cannot be compared across treatments and do not produce a single index number.

of patient satisfaction with various aspects of care, is clearly possible, but routine measurement in everyday practice does not usually capture these.

These three sources of value (health outcomes, process of care and information) will in some way be 'weighted' by patients before an overall assessment of their health care experience is made. In a world of limited resources, it will be useful to establish how patients and the community trade-off these three sources of value. They may be willing to accept a lower health outcome for a better process of care or more information. Discrete choice experiments are increasingly being used in health economics to examine such trade-offs and value the different characteristics of health care services, so it is possible to define and measure these weights and values (Ryan and Gerard, 2003). Discrete choice experiments can also be used to provide a monetary measure of the value of health outcomes, process of care and information. This provides information on 'willingness to pay'. This is particularly important for measuring the monetary value of physicians' activities.

In practice of course, it is those things that are most easily measured that are often used as measures of productivity for health care services. Further, there is also little attempt to 'value' these activities. This includes counting physician activities: episodes of treatment, numbers of services provided or re-imbursed, number of hospital separations. Other measures of 'quality' are clearly important here, such as re-admission rates, medical errors and iatrogenic illness, and patient complaints, but these are more related to health status and can be viewed as 'intermediate' measures of outcomes. Their relationship to health outcomes, process of care and information is not straightforward or obvious.

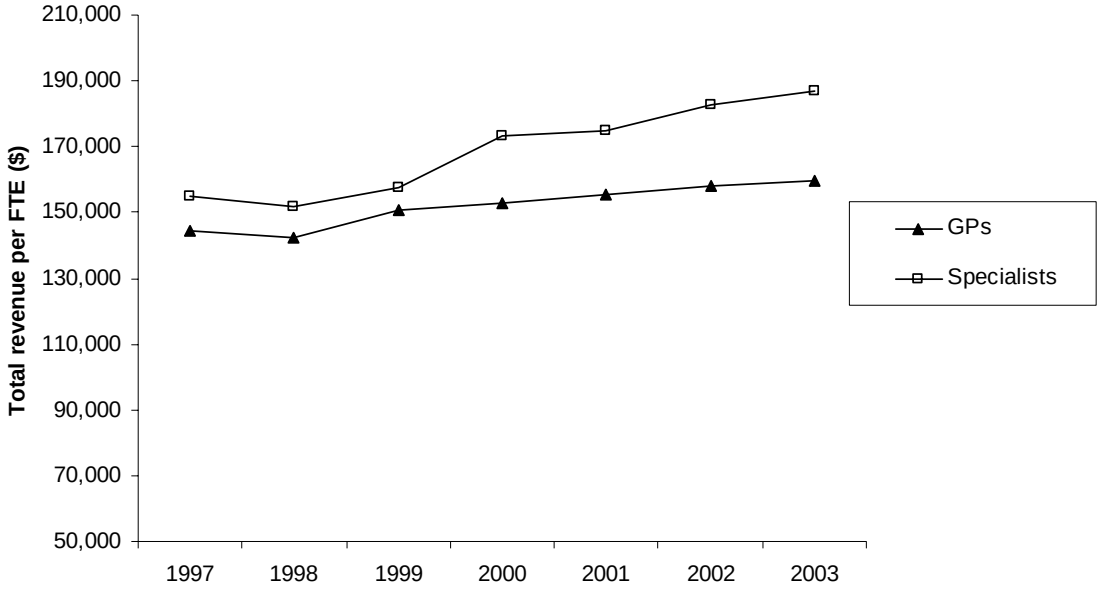
3 Summary of main trends in physician productivity in Australia

Given the above measurement issues, existing measures of physician productivity in Australia are difficult to find. The National Health Performance Committee of the Australian Institute of Health and Welfare (AIHW) produces broad, aggregate information on mortality, morbidity and health status (National Health Performance

Committee, 2004). However, for the reasons outlined above it is difficult to attribute changes in these indicators to changes in the productivity of physicians or indeed the health care system (Productivity Commission, 2005a). For example, the substantial decline in CHD mortality can be attributed to both physician productivity (new knowledge and technologies) and changes in lifestyles.

For GPs and specialists who practice outside of the hospital system and in small groups productivity can be more directly attributed to physicians. For the purposes of this paper, these groups will be focus of the analysis.[2] A usual starting point in the economic analysis of productivity is to use the total market value of physician activities per full time equivalent (FTE) physician as a measure of physician productivity. In section 2, this was defined as the number of activities multiplied by their market value. Given the nature of the fee-for-service payment system for physicians in Australia, this is given by the total value of fees charged (Medicare benefits paid plus the total value of patient co-payments) per FTE physician. This is shown in Figure 1 for GPs and specialists.

Figure 1. Total value of physician activity per FTE



[2] For recent trends in the 'output' of the acute hospital sector see Australian Health Workforce Advisory Committee et al. (2005).

Note: Includes Medicare payments and patient co-payments in constant 2002/3 prices using the AIHW medical services price index.
Source: Department of Health and Ageing (2005); AIHW Medical Labour Force Survey

Overall productivity seems to be increasing over the period, with this growth less pronounced for GPs. The first point to note is that, due to market imperfections and market failure, the total fee charged to patients will not reflect patients' valuation of the service provided. There are number of components of this growth that it is important to distinguish. Figure 2 shows the number of services provided per FTE doctor and the average price of those services (total value of fees charged per doctor in Figure 1 divided by the total number of services per doctor). [3] For GPs, the number of services per doctor has been falling since 1999 and the real price per service has been increasing (from $28.02 in 1997 to $32.63 in 2003). This is also confirmed by a decline in bulk-billing rates for GP services from 80.1% in 1995/6 to 68.2% in 2003/4.[4] Since volumes were falling, and the Medicare scheduled fee was increased each year at a rate below inflation (the CPI), it appears that the increase in the total value of GP activity in Figure 1 was due entirely to rises in real prices. Therefore health care costs were rising but fewer patients were being treated. One explanation for this from standard economic theory is that it is a reduction in supply that leads to a situation when prices rise and quantity demanded falls.[5]

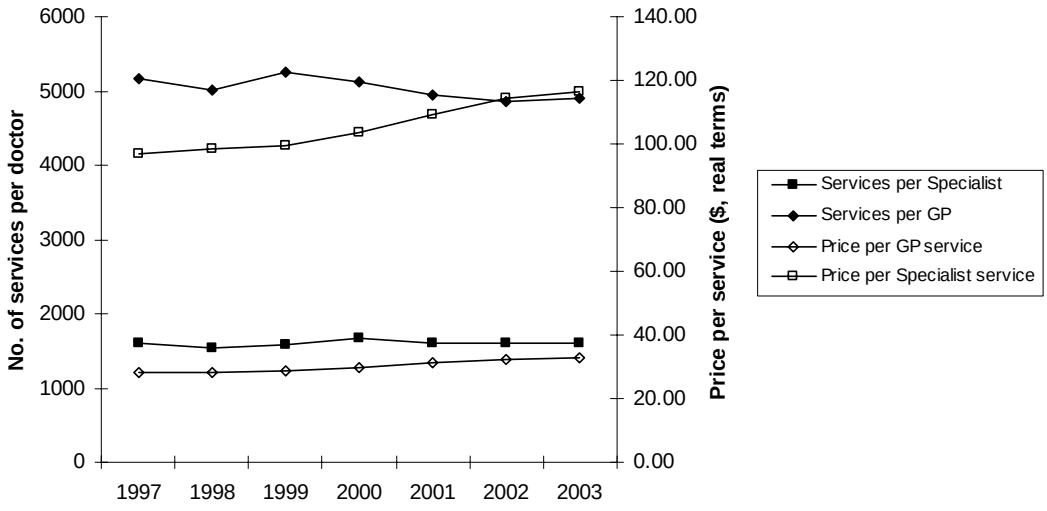
This seems to be the case. Figure 3 shows the numbers and FTEs of GPs and specialists in Australia. As in many other countries, although numbers might be rising, hours worked are falling amongst both males and females. Hours worked fell between 1998 and 1999 (45 to 42 hours per week), were stable in 2000 and 2001 (at 41.9 hours per week), and then fell slightly in 2002 and 2003 (41.1 and 40.9 hours per week respectively). This is more acute amongst GPs than specialists. The causes of this are numerous. It will partly be related to an increase in the proportion of women in medicine

[3] For GPs this is the number of unreferred attendances and for specialists the figures are for the number of specialist attendances, including obstetrics, anesthetics and operations.
[4] GPs who bulk-bill do not charge their patients a co-payment and accept 85% of the Medicare Scheduled Fee as full payment for the service provided.
[5] In contrast, if there was an increase in the demand, then prices would rise and quantity demanded would rise.

who are more likely to work part-time and take career breaks, and a more general trend of an emphasis on family life and more flexible working amongst both women and men. It may also be related to the inability of GP supply to adjust to changes in market conditions, such as increasing demand for health care. If supply cannot increase, then prices will rise. For a given number of hours worked and increased intensity of each hour worked, issues of low morale, stress and job dissatisfaction also reduce the productivity of the workforce and may influence reductions in hours worked and exits. This raises issues about the quality of each hour of labour supplied. However, there is little evidence on the time trends in job satisfaction for physicians in Australia.

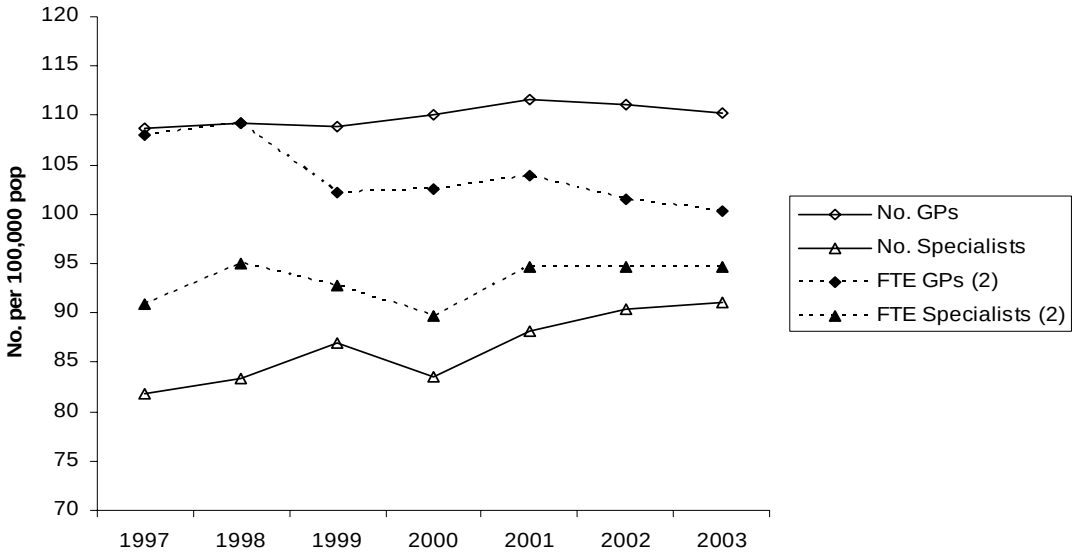
The fact that there was a significant reduction in hours (from 45 to 42 hours per week) in 1998/1999, and that this was accompanied and followed by rises in prices, provides some evidence that GPs reduced their hours first and then attempted to maintain their revenues by raising prices.

Figure 2. Number and prices of services provided.



Note: Constant 2002/3 prices using the AIHW medical services price index.
Source: Department of Health and Ageing (2005); AIHW Medical Labour Force Survey

Figure 3. Numbers and FTEs of GPs and Specialists in Australia



Source: AIHW Medical Labour Force Survey,

An alternative explanation of the decline in GP activity, and one that highlights the problems with using activity data as a measure of productivity, is that GPs may be having fewer but longer consultations and of a higher quality. We know there is evidence that longer consultations are associated with higher patient satisfaction, compliance and health outcomes (Beilby, 2003). The reduction in activity and higher prices may therefore reflect an increase in quality of care provided. Data from the BEACH survey of 100 consecutive consultations from 1000 GPs each year, shows that fee claims for longer and more complex consultations have been rising over time, although trends in data on actual consultation lengths have not yet been examined (Britt et al., 2004).[6] Other trends over time show changes in structural factors that are associated with increases in the quality of primary care. Charles et al (2004) show that the size of practices in terms of the number of GPs is increasing (26% were in solo practice in 1990-91 compared to 14% in 2002-03) and that more GPs now have Fellowship of the Royal Australian College of General Practitioners (17.8% in 1990-91 compared to 36.4% in 2002-03). The proportion of women GPs is also increasing (19% in 1990-91 and 35% in 2002-03) which

[6] Medicare fees for GPs are based on consultation length and complexity.

has also been associated with longer consultation lengths (Britt et al., 2005). The proportion of practices that are accredited is also increasing.

The net effect of these trends on the health of patients depends on whether the improvements in health from the potential increase in consultation lengths are greater than the reduction in health of those who no longer visit their GPs because of the price rises. Evidence on the effect of co-payments in health care suggest that those who are deterred from visiting are just as 'in need' of health care as those who visit their GP (Zweifel and Manning, 2000). It is therefore important to find out which patients are deterred from visiting their GP in addition to the extra health improvements (or process of care or information) for those having longer consultations.

For specialists, the total value of activity increased over the period (Figure 1). There was little change in the number of services provided per doctor, although real prices have increased more sharply than for GPs since 1999 (Figure 2), also evidenced by a decline in bulk-billing rates for specialists from 32.5% in 1995 to 26.7% in 2003. Hours worked have also fallen amongst specialists, suggesting a similar story as for GPs. As hours worked fell, specialists increased prices to maintain their incomes. The difference here is that the quantity of services did not fall, suggesting a more inelastic demand for specialist services. It is not possible to tell whether this represents an increase in quality of services provided. The apparent increase in productivity observed in Figure 1 is again due wholly to price rises. Health care costs are higher whilst the number of services being provided is stable and changes in quality are unknown.

Part of the explanation of these trends is that the demand for specialist services comes from GPs who refer their patients to specialists. One might expect longer GP consultations to reduce referrals to specialists, although specialists can also refer to each other and so the data are not very clear here and require a fuller understanding of GPs' and specialists' referral practices (Borland, 2002). Data suggests that specialist referrals from GPs have been increasing rather than falling, from 7.3 per 100 encounters in 1999/2000 to 7.9 per 100 encounters in 2003/2004 (Britt et al., 2004).

Some authors in Australia have attempted to directly examine the relationship between the number of doctors, medical expenditures and mortality rates, whilst attempting to control for other factors that influence mortality rates. These studies show conflicting findings. Richardson and Peacock (2003) provide some evidence of higher mortality rates when the number of doctors is high, whilst Connelly and Doessel (2003) show that higher expenditure on medical services are associated with lower mortality rates. Both studies, are however, cross sectional in nature thus are unable to examine the effect of actual changes in inputs or costs on mortality, and are unable to control for unobservable factors influencing mortality.

A key issue with these data is that in order to be able to interpret them as changes in productivity it is necessary to not only understand the link between the number of services provided and what patients value (health outcomes, process and information), but to understand the relationship between demand and supply side factors, including prices, and their impact on productivity.

3. The policy context: improving physician productivity in Australia

It is much easier to list those factors that might influence physician productivity than it is to measure it. Productivity improvements are concerned with getting the best from the existing stock of physicians and ensuring that additions to this stock increase the average level of productivity. It is also important to note that productivity can be increased by physicians altering the mix of their activities; doing less of what has been shown to be least effective (e.g. antibiotic prescribing) and doing more of what is most effective (e.g. prescribing statins). The implementation of evidence-based clinical guidelines is particularly important in this respect (Grimshaw et al., 2004).

There have been two recent reviews of the health workforce that are likely to lead to more emphasis on health workforce policy, and physician productivity, in Australia. The

first was the publication of a National Health Workforce Strategic Framework in Australia in 2004. The aim of this was to provide a framework for a more co-ordinated approach to workforce planning across Australia. It provides seven principles to act as a guide to stakeholders to develop health workforce policy. A number of these will influence physician productivity, including an equitable distribution of the workforce, a valued and supported workforce, a skilled and competent workforce, and re-alignment of skill mix and roles.

The Productivity Commission, an independent agency of the Australian Government, is currently undertaking a wide ranging review of the health care workforce, to report in December 2005 (Productivity Commission, 2005b). The issues paper published by the Commission in May 2005 focuses on the structural and regulatory issues surrounding the funding and delivery of undergraduate and post-graduate training, and the roles and responsibilities of state and federal governments, all of which are likely to influence productivity. Submissions to this review from many key stakeholders highlight a range of issues that concern physician productivity. It is apparent from these submissions that there are many good examples of good practice and policies being implemented that are aimed at improving workforce distribution, skills and competencies and skill mix. What is lacking from the 168 submissions to date are any formal evaluations of the relative costs and effectiveness of these policies on workforce productivity or on health outcomes. It seems that the Productivity Commission will have very little research evidence on which to base its findings.

There are a number of factors under the control of policy makers that can be used to increase productivity. This includes the use of new technologies by physicians, changes in skill mix and team working, the practice of evidence-based medicine, increasing morale and job satisfaction through work re-design, incentives in career structures, and policies to increase patient safety and reduce medical errors (including registration requirements for doctors from overseas). As with many countries, Australia is making varying degrees of progress in most of these areas. Rather than go through each of these

issues, which are common to most countries, the following focuses on three issues particularly relevant to Australia that are likely to influence physician productivity.

3.1 Co-payments.

In Australia, physicians are able to charge those fees that the market will bear with Medicare providing a fixed subsidy. Given the role of co-payments in managing demand, physician productivity will be influenced by which patients are being treated. There is a difference in the types of patients who visit the physician and those who do not because the price is too high. As was mentioned earlier, evidence suggests that because of asymmetry of information, those who are deterred from using health care because of higher co-payments are likely to be the least healthy and most in 'need' of health care: their capacity to benefit is higher than more affluent patients who continue to use health care (Zweifel and Manning, 2000). If this is the case, then the observed rises in prices may therefore reduce physician productivity if they are substituting more healthy patients for less healthy patients, i.e. population health will be lower.

3.2 Rurality.

In Australia, as in many other countries, the distribution of physicians across geographical areas is not considered to be 'appropriate'. It is important to recognise the trade off between efficiency and equity in this context. To maximize physician productivity may mean an inequitable distribution of physicians. Physicians may be less productive if it is necessary to locate physicians in rural and remote areas where populations are likely to be healthier than in urban areas (AIHW, 2005). This is likely to the case in rural areas with large non-indigenous populations. Most of the burden of disease and lower life expectancy in rural and remote areas occurs in indigenous populations. Depending on the trade-off between equity and efficiency, polices to alter the distribution of physicians should be targeted to areas with indigenous populations. Otherwise policies to re-distribute physicians to rural areas may reduce the productivity of physicians.

3.3 Physician Payment

A further influence on physician productivity in Australia is the payment system. Excepting hospital doctors, trained GPs and specialists are remunerated from the Medicare Benefits Schedule, in addition to patient co-payments where doctors charge above the Medicare fee rebate. The system of fee-for-service is well known to reward volume rather than quality of care. It can further impede productivity by inhibiting skill mix development, where fees are paid for medical services delivered by physicians only. GPs taking blood samples, monitoring chronic disease patients, providing vaccinations, immunizations and cervical screening, and some areas of prescribing are all areas where nurses can be more heavily involved.

The Practice Incentive Program (PIP) was introduced in 1999 and was the first step in Australia in the direction of a blended payment system for GPs, where practices can access additional payments from Medicare if they meet a number of criteria, including accreditation against recognised standards. Payments are made to practices for the achievement of quality standards, such as computerization, after hours care, student teaching and prescribing. Payments depend on the number of patients, rather than the number of consultations. They are therefore a form of capitation payment.[7] From 2001, those registered in the PIP scheme could also claim for Service Incentive Payments (SIPs). These include payments for cervical screening, diabetes, asthma and mental health (for 'cycles' of care), payments to those practices who employ practice nurses or allied health professionals, and payments to practices located in rural areas. For cervical screening and diabetes, there are also 'outcomes' payments if specified targets are met. The inclusion of mental illness, cervical screening, asthma and diabetes care represent a linkage between the payment system and evidence based medicine and is an important way in which the fee schedule can be altered to change physician behaviour. In 2003, income from the PIP scheme was estimated to be 9% of a GP's gross income (Select Committee on Medicare, 2003). A separate scheme is a number of items in the fee schedule (Enhanced Primary Care items) that can be claimed for the ongoing management of patients with chronic disease.

[7] Patients do not register with their GPs in Australia. The PIP payments are based on the number of patients seen by GPs estimated from claims data.

4. Further research

In one sense, it is difficult to measure physician productivity until agreement is reached on how it should be defined. It is important to distinguish between research about the measurement and valuation of productivity and research about its determinants. The latter is essential for the development of policies that increase productivity. In terms of measurement, it is clear that any activity-based measure must be weighted by the 'quality' of that activity. The ideal situation would be the routine measurement of health-related quality of life, the process of care (e.g. waiting times, patient satisfaction), and any confounding factors, before and after each contact (or a sample of contacts) with health services. Research would then be needed to choose, develop and test these measures in different contexts and settings. Such measures are currently being considered in the UK (Dawson et al., 2004). The trade-offs that patients make between improvements in health status, the process of care and other factors such as the provision of information is an important area of research that could be tackled empirically using discrete choice experiments incorporated into a population survey (Ryan and Gerard, 2003).

It is then important to be able to conduct research into factors that influence changes and variations in the measure of productivity. In addition to collecting data on patient-related factors, such as age, gender, co-morbidities, it would be necessary to collect data on the characteristics of the health care provider. This would include their demographics, the price charged to the patient, area of specialism, characteristics of their practice/place of work, and their level of income and type of remuneration scheme used to deliver that income.

Productivity and its determinants also need to be measured over time, so that the dynamic and temporal aspects productivity change can be evaluated. This is also fundamental in being able to identify the causal factors of observed changes in productivity, rather than just measuring associations as is the case when using cross-section data. Data linkage is a key issue here, particularly the linkage of administrative data on Medicate claims to

other administrative data sources (hospital admissions, pharmaceutical benefits scheme, mortality records) and to survey data, such as BEACH, the National Health Survey or the HILDA household survey. To date string privacy laws have prevented this occurring, although there are one or two notable exceptions. There is some way to go before these data will be useful measures of the productivity of health services and its determinants (Kelman et al., 2002; Young et al., 2001).

4 References

Australian Institute of Health and Welfare (2005). Rural, regional and remote health: indicators of health. Rural Health Series No.5. Australian Institute of Health and Welfare: Canberra.

Australian Health Workforce Advisory Committee, Australian Medical Workforce Advisory Committee and Australian Health Workforce Officials' Committee (2005). Technology and Health Workforce Planning, Health Workforce Issues Paper 2, Sydney.

Australian Health Workforce Advisory Committee, Australian Medical Workforce Advisory Committee and Australian Health Workforce Officials' Committee (2005). Demand For Health Services and the Health Workforce - Information Paper, Health Workforce Issues Information Paper 3, Sydney.

Beilby J (2003). Attendance item restructure working group. Final Report. Royal Australian College of General Practitioners.

Borland J. (2002) The markets for medical specialists in Australia. In: Productivity Commission. Health Policy Roundtable. Conference Proceedings.

Britt H, Miller GC, Knox S, Charles J, Valenti L, Pan Y, Henderson J, O'Halloran J, Ng A. (2004). General practice activity in Australia 2003-4. General Practice Series No.16. Australian Institute of Health and Welfare: Canberra.

Britt H., Valentini L., Miller G. (2005) Determinants of consultation length in Australian General Practice. The Medical Journal of Australia, 183(2);68-71.

Charles J., Britt H., Valentini L. (2004) The evolution of the general practice workforce in Australia, 1991-2003. The Medical Journal of Australia, 181(2):85-90.

Connelly L., Doessel D. (2003) Medical expenditures and health status in Australia: a story of increasing or decreasing returns. Paper presented to the 4th World Congress of the International Health Economics Association, June.

Dawson D., Gravelle H., Kind P., O'Mahoney M., Street A., Weale M. (2004). Developing new approaches to measuring NHS outputs and productivity. Second Interim

report: data for productivity estimates. CHE Technical Paper Series No.34. Centre for Health Economics, University of York.

Department of Health and Ageing. (2005). http://www.health.gov.au/internet/wcms/publishing.nsf/Content/medstat-dec04-tables-c/$file/tablec3.xls

Dolan P. (2000) The measurement of health-related quality of life. In: Culyer AJ., Newhouse J. Handbook of Health Economics Volume 1B. Elsevier Science: Amsterdam.

Grimshaw J., Thomas RE., McLennan GS. et al. (2004). Effectiveness and efficiency of guideline implementation strategies. Health Technology Assessment, 8;1-84.

Kelman CW, Bass J, Holman CDJ. (2002) Research use of linked health data - a 'best practice' protocol. Australian and New Zealand Journal of Public Health, 26: 251-255.

National Health Performance Committee (2004). National report on health sector performance indicators 2003. A report to the Australian Health Ministers' Conference. Canberra; Australian Institute of Health and Welfare.

Productivity Commission (2005a). Impacts of medical technology in Australia. Productivity Commission Progress Report. Canberra: Commonwealth of Australia.

Productivity Commission (2005b). The Health Workforce. Productivity Commission Issues Paper, May 2005. Australian Government: Canberra.

Richardson R., Peacock S. (2003) Will more doctors increase or decrease death rates? An econometric analysis of Australian mortality statistics. Working Paper No. 137, Centre for Health Program Evaluation. West Heidelberg.

Ryan M, Gerard K. (2003) Using discrete choice experiments in health economics: moving forward. In: Scott A, Maynard A, Elliott R. Advances in health economics. Wiley: Chichester.

Select Committee on Medicare (2003). Medicare: healthcare or welfare? The Senate. Commonwealth of Australia: Canberra.

Young AF., Dobson AJ., Byles JE. (2001). Health services research using linked records: who consents and what is the gain? Australian and New Zealand Journal of Public Health, 25:417-420.

Zweifel P., Manning W.G. Moral Hazard and consumer incentives in health care. In: Culyer AJ., Newhouse J. Handbook of Health Economics. Volume 1A. Amsterdam: North-Holland Elsevier, 2000.