Productivity, Migration and Skills

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At a national level, the question is: what is the link between education and growth?

That is a question the Productivity Commission is grappling with in the context of our 5-year Productivity Review. It's not simple and to show why I want to start two claims: one bland and one more controversial.

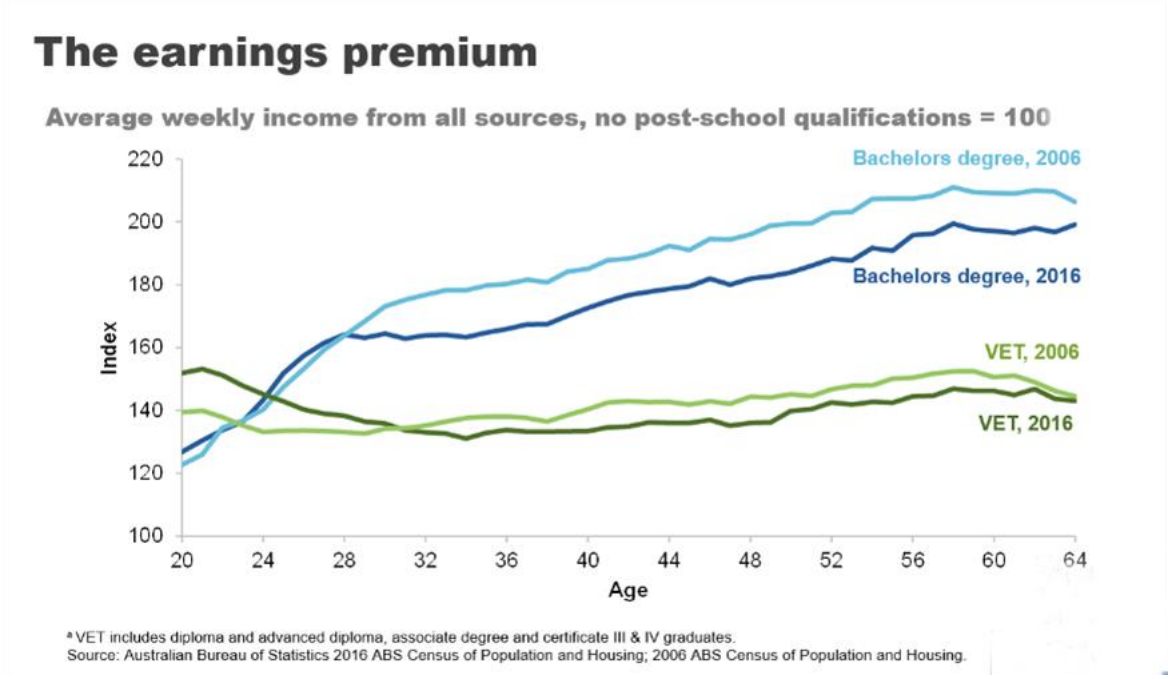
The bland one is that education is fundamental to equipping people for the high skill jobs of a modern economy. (Among its many other benefits.) The controversial one centres on our prospects for future growth and it is this: it is not clear that high levels of education are making us any more innovative. Because the glaring paradox of our age is that we have never been more highly educated and we have the lowest productivity growth in 50 years.

How can this be, and what should we do about it? I think the challenge that it poses is that education and research, like most good things, have a tendency towards diminishing returns. The policy question is how we might break out of that tendency.

First, there is considerable literature on the benefits of education for individuals. Those benefits are on many dimensions – broader than the economic – but the economic gains are clear enough. This is reflected in earnings premia that graduates earn over a lifetime relative to those with only a high school education.

This chart shows the excess over and above the earnings of a high school graduate. Note 4 things:

- the premium for university graduates is substantial
- it is higher than for VET graduates
- it peaks late in one's working life, whereas the premium for a VET graduate peaks early
- it has declined somewhat over time.

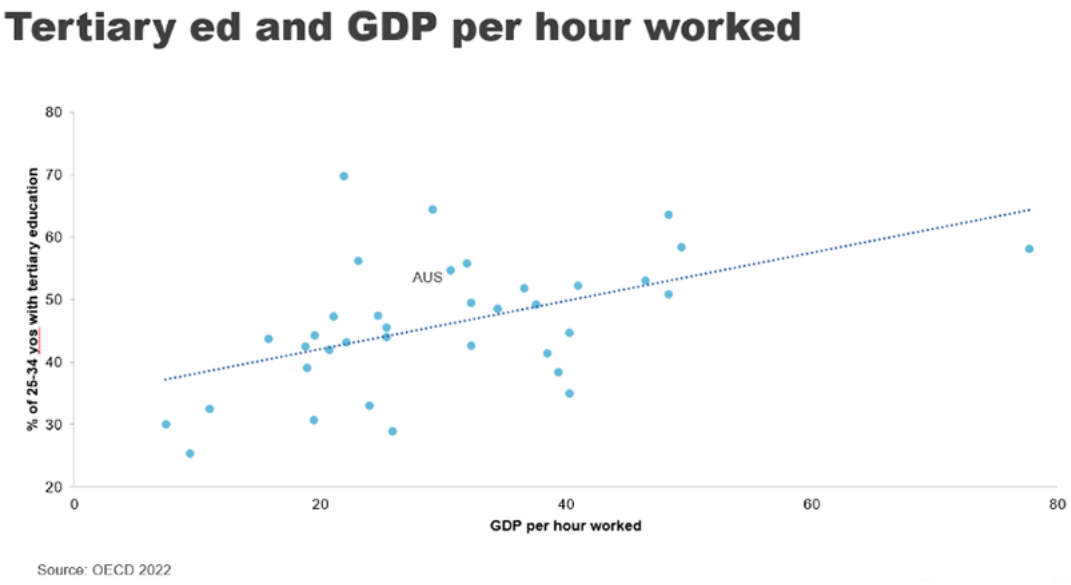


But its hard to extrapolate from those individual earnings premia to a broader claim that a more educated workforce would lead to higher incomes and growth. The earnings premium reflects both the effect of a university education and the cohort that goes to university.

And there is a school of thought – beginning with Nobel Laureate Michael Spence and more recently associated with Brian Caplan – that higher education is largely about signalling an individual's intelligence rather than adding much to human capital. (It really is that stark: his book is called The Case Against Education: Why the Education System is a Waste of Time and Money.)

While labour market signalling definitely occurs, it's fair to say that Caplan's view isn't the majority or mainstream view of economists. [But even if Caplan is right, that doesn't defeat the case for making sure that universities are operating efficiently and are themselves innovating in the way they deliver key services. Indeed, it reinforces the case for a dynamic agile and efficient university sector.]

Those who have tried to model and explain the process of economic growth have long regarded human capital formation as fundamental to growth, along with physical capital and educational attainment as a key to forming human capital. And there is an observed positive correlation between high educational attainment and GDP per capita.



You can see here the upward sloping line of best fit on this chart. Australia sits above the line, implying we are smarter than we are rich (or that we should be getting more from our investment in higher degrees – you choose).

But of course, correlation is not causation, and the causation can run in either direction: richer countries can invest more in education, and young people can spend longer in the formal education system. Alternatively, high incomes and high educational attainment can be correlated with a third thing.

One such third thing is the changing composition of economies as they become richer: all developed economies have experienced a similar pattern: agriculture and manufacturing reflecting a declining relative share of GDP and services making up an increasing share.

Many of those rising industries – whether in business services like finance, legal or engineering; or personal services like health or education – require higher qualifications across the workforce than was the case for agriculture and manufacturing.

The National Skills Commission has projected 9 in 10 of the new jobs that will be created in the next 5 years require post-school qualifications, many of them a bachelor's degree. Since 2000, the NSC has noted a large shift in the skill composition of the workforce in favour of people with a Bachelor degree (up from 26 per cent to 32 per cent of the workforce) and a decline in those with high school or certificate I (down from 20 per cent to 16 per cent).

So far, so good: by world standards Australia has high levels of formal education (declining PISA results notwithstanding), is a rich country; and relative to our own history, has never been richer.

This is all consistent with the bland assertion I made at the outset. But how do we explain the more controversial one: despite having the arguably best educated workforce in Australian history, our rates of productivity growth are the lowest in over 50 years.

We are not alone in this – it is a trend observed across all developed economies. But it underscores an uncomfortable possibility – for all our education, across the developed world, on the one macro indicator that counts, we are just not as innovative or dynamic as we once were.

American economist Robert Solow once quipped (in 1987) that you could see computers everywhere but in the productivity statistics.

- Can we say the same for high levels of formal education?
- What lies behind this apparent paradox?
- Is it that the system is encouraging conformity as much as it does creativity?
- Or is it something more basic: a tendency towards diminishing marginal returns?
- For example, in research, is it that the ideas themselves are getting harder to find?

This is a point illustrated by Nicholas Bloom, Charles Jones, John van Reenen and Michael Webb. They point out that rates of productivity growth in the US economy – measuring the annual addition to the stock of new, economically useful ideas have slowed – while the number of researchers across the US economy has grown by a factor of 23 since the 1930s. They calculate that the aggregate productivity of research has had a growth rate of *minus* 5.1 per cent per year on average since the 1930s

Take the famous case of Moore's Law: the tendency for the number of transistors fitted onto an integrated circuit to double every two years – on the face of it a remarkable testament to our capacity for ongoing innovation and rapid exponential growth. But the number of researchers required to bring about this result has grown to be 18 times higher than it was in 1971. So in fact they estimate that the *research* productivity in the semi-conductor industry is actually *falling* by up to 6.8 per cent a year.

They show a similar story on agricultural crop yields: yields are improving at a relatively constant or slightly declining rate, but the number of agricultural researchers required to achieve this has doubled. They tell a similar story on the rise in life expectancy through medical research – the gains are achieved at the cost of more and more research effort.

Diminishing returns could also be observed in the gains we make from additional years of education. For example, it is possible that we have largely exhausted the gains that come from extra years of education.

That is a view recently articulated by Dietrich Vollrath in another aptly titled book: Fully Grown – Why a Stagnant Economy is a Sign of Success. He cites the work of Claudia Goldin and Laurence Katz showing that in the US, the high school graduation rate in 1910 was around 9 per cent. By 1940 it was around 50 per cent and by the 1970s it was around 80 per cent. By 2010 it was only a little more than that, at 84 per cent. In other words, the transformation in the education levels of the US workforce in the 20th century had largely run its course by the end of that century.

Australia's increase in years of schooling lagged the US slightly but the basic pattern is the same. And with the high levels of university and VET participation among young people, we will ultimately observe the same pattern: it will get harder and harder to generate further increases.

Interestingly, in compiling its estimates of productivity growth in the Australian economy, the ABS has to measure both the labour and capital inputs used to produce annual GDP. And they make an adjustment to account for any change in the quality of labour, based on the change in the composition of hours worked in the economy by workers of different ages and educational qualifications.

To date, that annual adjustment still shows increases in the 'quality' of labour, and by a reasonably steady amount of around 0.5 per cent improvement per annum. But it seems logical that ultimately that will plateau, and it has shown signs of diminishing returns in relation to some high skill industries such as professional services. It just gets harder to eke out those gains.

Our own work on the effect of the expansion associated with the demand driven system bears this out. We used statistical techniques to identify the additional students who went to uni *as a result of* the demand driven system – as against those who would have gone anyway. And we found that it was a different looking cohort of students. 73 per cent of the additional students had an ATAR less than 70 (compared with the comparator cohort, in which only 28 per cent had an ATAR below 70). Looking back at their PISA results when they were age 15, they had a lower score on literacy and numeracy – around 500 which is (now) close to the average for Australia. Compared with other students, these 'additional students' were more likely to drop out, but of those who graduated, they were just as likely to be in full time work and their graduate salaries were roughly similar.

Overall, it was a mixed report card: the expansion of access created opportunities for a different-looking cohort of students, and many of them had the transformative experience that university can provide. But they were clearly a group with different qualities and needs, and one clear conclusion was that universities need to take their responsibilities that group of students seriously – not to assume that the student experience is generic and have a one-size fits all, volume based attitude to enrolment. Any expansion of the system has to focus on the qualities of marginal student rather than the average student.

Overall these observations suggest that, as important as higher education is and will be to our future economy, there is a challenge. The gains from quantity are becoming exhausted and increasingly it will be quality that matters. And this isn't just about high levels of quality, but about ongoing improvements in quality year on year. A culture of innovation, technological adoption and a degree of disruption to our models of delivery.

Rather than thinking about the contribution of extra education to economy-wide productivity, we have to think harder about productivity within the education sector itself.

How do we get higher quality – better student – outcomes for the investment we make, which in turn can lead to community wide gains? It might imply a greater focus on quality teaching. Perhaps a focus on the distinctive cohorts of students and how to support them individually. How to empower them to make early informed choices about whether university (and which course) is for them, so as to avoid significant and inefficient debt for limited personal return. And grappling with the question as to how well we are encouraging creativity and innovation.

In doing so we may need to think more about what innovation looks like in a service dominated economy. The above examples: semiconductors, crop yields and pharmaceuticals and other medical technology reflect the path of much historical innovation: the application of science and new technology to develop new products and processes. We need that to continue – not least to find ways to decarbonise the economy at an acceptable cost. Just as we needed it to develop mRNA vaccines.

But in a service dominated economy, there is also something specific about service innovation: the ability to find new and different ways to satisfy human wants. Sometime service industries progress by adopting new technology, like better aircraft or more advanced medical diagnostic tools. In other instances, even those involving the adoption of technology, services innovate by changing the whole business model and consumer interface, such as with ride sharing.

Health is an interesting example. At one level it is a highly innovative sector – but most of the innovation occurs at what you might think of as the manufacturing end: new pharmaceuticals, new equipment, new diagnostic techniques. The service models in health are much slower to change.

The Productivity Commission looked at this in our case studies on innovative approaches to managing chronic health conditions. That report told the story of many local innovators on the ground. They were not necessarily doing anything hi-tech. They were often making use of fairly simple technology, like text messages, basic computer software or phone calls. But they were innovating to develop more pro-active, patient centred and integrated models of care. And they were swimming massively against the tide.

The capabilities that these innovators showed were not necessarily what we would think of as technical skills. They were a suite of very human traits like EQ, vision, persuasion, resilience, adaptability, etc. Often they were the rule breakers.

Interestingly, there is some academic literature that links entrepreneurship to personality traits including a higher likelihood of having engaged in illicit activities as a teenager. At the very least, those innately human and hard-to-automate qualities like empathy, judgment and synthesis appear to be increasingly important.

US economist David Deming has illustrated the growing importance of social skills, noting that high paying jobs increasingly require social skills and that these are an important complement to cognitive ability. He also finds that the returns to maths skills are significantly increased if maths is combined with social skills. He notes that this is partly because in service interactions, there is a sense of joint production between the worker and the customer: the service is bespoke, individualised. It's quality depends critically on the ability of the worker to 'read' the customer and respond. Much of this is based on tacit knowledge, which is not necessarily easy to teach. The point is that there is an important stream of innovation that occurs away from the lab.

Opinion is divided on the extent to which, for example, entrepreneurial skills can be taught. There is more support for the idea that these skills are best developed where there is exposure to others with an entrepreneurial mindset. This could have implications for models of collaboration between researchers and day to day problem solvers in the economy.

Finally, given the session's focus on migration as well as skills, a few quick thoughts on skills shortages.

Our policy debate is rapidly catching up with the reality that we are in a near full employment economy. In that environment, the scarcity of real resources – labour and capital – becomes the true constraint on decision making.

The key question is less about whether a particular action 'creates jobs' and more about who is going to do those jobs and which other firm or sector will free up that labour. Is it the best (highest value) use of what is truly a scarce resource.

For government, the familiar questions about fiscal affordability are increasingly supplemented with questions about whether the labour to deliver on policy priorities exists, where it might come from and at what cost in terms of foregone economic activity elsewhere in the economy.

There is a cyclical element to labour shortages, heightened by the legacy of closed borders.

But there is a structural question too: several of our fastest growing service sectors are labour intensive, and it has proven challenging in the past to automate and substitute for labour in areas like health, education, aged care, disability, child care – sometimes due to technological limitations and sometimes because business models have been slow to take full advantage of what technological opportunities *are* available.

It's hard to find an industry that isn't talking (ever more loudly) about skill shortages and workforce issues. A key question is: Can they all be accommodated? Or are we, to some extent arguing over a finite pie?

It's not completely fixed: there are policies that could help increase labour force participation, though they come at a cost. There are policies to train and retrain segments of the working age population who are currently out of the labour force. And there is scope to use skilled migration to help alleviate labour shortages.

This is one of Australia's critical advantages as a high income country, an attractive place to migrate and a track record of absorbing population growth well in excess of the developed world average. But it too has its costs: it is not an infinite tap. More like a scarce resource that we need to ration wisely and efficiently, and ensure that other policy settings like infrastructure provision adjust appropriately. That is the big policy issue.

The Commission's recent work, particularly on the review of the *National Agreement on Skills and Workforce Development* has highlighted some of the inherent challenges in compiling and maintaining priority skills lists. But they are one form of rationing. There could be others.

The point is: government policy cannot and will not fix every perceived labour shortage, through migration, differential training subsidies or promotional campaigns. Some labour shortages will be fixed through relative wages; through technology and automation and new models of service delivery, not to mention the digital trade in services which could be a significant new opportunity.

Embracing all these things is part and parcel of being an innovative economy.