The Case for Measured Optimism

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Michael Brennan, Chair, Productivity Commission

In 2011 venture capitalist Peter Thiel summed up a common lament: “We wanted flying cars, instead we got 140 characters.”

That crisp line conveys disappointment, but also reveals a stylised fact about growth: it has a way of confounding our predictions.

I have previously told the story of Arthur Summerfield, the US postmaster general who in 1959 predicted that we would soon deliver mail by rocket. He is quoted as saying:

> “before man reaches the moon, mail will be delivered within hours from New York to California, to Britain, to India or Australia by guided missiles. We stand on the threshold of rocket mail."

We didn’t get rocket mail either. But that’s hardly a lament: we got something much better — the ability to send mail from New York to California, Britain, India and Australia in seconds without the carbon emissions of a rocket.

Prediction is hard. Not just because the future is uncertain, but because we tend to make one systematic error: that is, to extrapolate on a linear trend, typically holding all else constant. Growth isn’t linear in that sense (Thomas Philippon notwithstanding).

Innovations often come in waves: a breakthrough occurs, it takes time before it is well understood — before the implications and applications are fully appreciated; this is usually followed by rapid take up and then a plateau. That is the familiar S-shaped curve of technological adoption, and it was certainly the case with transport in the 19th and 20th century.

The motor car took about 30 years (until 1945) before it accounted for 25 per cent of the land transport task. But by 1975 it was nearly 90 per cent. It is no higher today. (though cars are much better and the road toll has been dramatically reduced in the last 50 years)

Any of us in 1959 might have made the same extrapolation as Mr Summerfield: mail delivery had moved from the horse and coach to the train and steamship to the truck and aeroplane … so why not the rocket?

The idea that innovation would take an orthogonal turn — that communications technology would take over from transport technology as the vanguard of innovation, was essentially unforeseeable. 140 characters rather than flying cars.

This example tells us something important: future productivity growth will not necessarily look like it has in the past. It also illustrates why we can be both systematically over-optimistic and over-pessimistic about future growth:

- Over-optimistic when we are in the steep upward sloping portion of the S-curve, (wrongly) extrapolating a linear trend;
- Too pessimistic when we see a past source of growth coming to a plateau, and we can't quite imagine what the next wave might be.
- For most of human history, growth has not been the natural state.
- Some farm-level data suggests that output per farm worker was no higher in 1790 than in the early 1300s. That is to say, farming techniques did not improve much over 5 centuries.
- And real wages in farming in 1800 were lower than in 1500.

Then suddenly from the 1800s (or some time a bit before) there was lift off of growth in Britain, followed by western Europe, followed by the US and Australia and East Asia.

The rise in global incomes since then has meant that the proportion of the world's population living below today's definition of extreme poverty has fallen from 90 per cent in 1820 to 10 per cent today. And that, despite a global population that is 7 times as large.

My own view is that the economics profession has been remarkably incurious about what caused this explosion of growth — surely among the most extraordinary developments in human history.

For convenience, let's put it down to a sort of meta-invention: a society with sufficient scientific knowledge, a set of incentives to innovate, attitudes that favoured growth and some institutions that kept rent-seeking in check to a tolerable degree.

- What then do we make of the slow-down in productivity growth across the developed world over the last two decades?
- Is this the S-curve writ large?
- Is our meta-invention reaching the plateau — running out of puff — just as individual waves of innovation have often done in the past?
- Were we too optimistic to think that solid rates of exponential growth would just keep going?
- Or are we just suffering from a lack of imagination?

At the Productivity Commission, in undertaking the 5-year Productivity Inquiry, I would describe our outlook as measured optimism. That is, a confidence that future productivity growth is achievable and can be helped along by policy settings, but a realism about the challenge: starting with a strong understanding of the pessimists' case.

That was the central message of the first interim report released two weeks ago: a scene-setter on our recent productivity performance, the headwinds we face and the policy areas where we are focusing attention.

The first thing we did was go back to basics. Productivity is poorly understood in the community; and it is not clear that we economists have de-mystified it much with our talk of labour productivity, capital deepening and MFP. To make it more concrete, we noted that productivity growth manifests in 3 main ways:

- Goods and services that get cheaper over time; whose real cost (measured in labour hours) falls. We demonstrated the reduction in cost of a bed, a bicycle or a loaf of bread since 1901, in terms of the hours of work required at the average wage to obtain these things.
  - This effect is meaningful (the cost of the bicycle fell from 473 hours in 1901 to six hours today); and it is measurable — it flows through to real wages growth, generally through the denominator (the price deflator). William Nordhaus once estimated that at least 95 per cent of productivity growth is ultimately passed on to consumers in lower prices.

- Then there are the goods and services which improve in quality. This too is meaningful but harder to measure.
  - We used the contrast between a 1908 Model T Ford and a modern day Tesla. The former had a 20 horse power engine and a crank shaft; a top speed of 70 kms per hour, sprung leather seats and, of course, a paper map to go with it. The Tesla might as well be a flying car for the contrast with a Model T.
- Finally there are the new things: the dramatic innovations that bring discontinuities of cost and quality. Plumbing, air conditioning, air travel, the internet.

When we talk of labour productivity or MFP growth, it is really just our best (but imperfect) attempt to roll up all these different types of improvement into a single metric. But we felt it important to emphasise that productivity growth is ultimately the sum of all the individual improvements on these three dimensions — the 'micro lens' as we call it. We felt this was helpful for a number of reasons:

- It reminds us that productivity growth can manifest in different ways in different parts of the economy. Some sectors at some times will see dramatic reductions in the real cost of a product or service (like computing, PV solar or genome sequencing) while in others the improvement might be more weighted to quality.
- It reminds us that the point of productivity growth is not merely to have more 'stuff'. It's the new discoveries and the improved quality that provide much of the rise in living standards.
- Equally, it reminds us that not all innovation comes in the form of eye-catching new inventions and discoveries. Much comes in the form of incremental gains — doing things slightly better — to chip away at the real cost of a good or service or improve it at the margin.
- Finally, it reminds us that we do not have to confine ourselves to that which is included in measured aggregates like GDP per hour worked. Productivity as a concept can be applied to getting better outcomes on many dimensions, as long as we are doing it efficiently: getting more or better from the same or fewer inputs.

With that in mind, and to understand the productivity challenge, it pays to do justice to the case put forward by growth pessimists. I will mention two strands of pessimism: that associated with American economist Robert Gordon, and the problem of 'cost disease' first discussed in detail by William Baumol in the 1960s.

Gordon's central thesis is that productivity growth has slowed since the 1970s because the rate and importance of new invention in the preceding century simply couldn't be repeated. He points to the massive transformation of lives in the century from 1870 onwards due to electricity, the motor car, running water, central heating, refrigeration, as well as the innovations that facilitated higher life expectancy and additional years of schooling.

He points out that a child born in the early 19th century was effectively born into a world that was (as he puts it) almost medieval — a world lit dimly by candlelight, where health treatment consisted of folk remedies, where the speed of travel was limited to that of a horse or sailing ship.

That changed dramatically from the late 19th century onwards in ways that make our more recent of innovations — in areas like information technology and communications — look modest and narrow by comparison. He says:

> "Economic growth is not a steady process that creates economic advance at a regular pace, century after century. Instead, progress occurs much more rapidly in some times than others. There was virtually no economic growth for millennia until 1770 … remarkably rapid growth in the century ending 1970 and slower growth since then.

> Our central thesis is that some inventions are more important than others and that the revolutionary century after the Civil War was made possible by a unique clustering, in the late 19th century of what we call the 'Great Inventions'."

Gordon invites this thought experiment: look at all the major labour-saving innovations in the household (I am thinking mainly of the laundry and the kitchen). The big ones are: running water, electric light at the flick of a switch, gas/electric cooking, refrigeration and a freezer, a dishwasher, washing machine, a dryer. He points out that all of these inventions pre-date the 1970s. The only item to have come along in the last 50 years to have had anything like that impact is the microwave oven, and its pretty marginal compared with the rest.

But returning to my earlier triumvirate of cost, quality and new invention, that doesn't mean there has been no productivity improvement in the kitchen and laundry for 50 years. The slow, steady application and spread of new ideas, including the rise of trade (itself a productivity-enhancing innovation) has seen the real cost of the food in the pantry or the fridge (again measured in labour hours) fall by 36 per cent. The quality and variety of that food has also improved.

The cost of rent has gone down by 30 per cent, and clothing — a beneficiary of increased trade — has fallen by 73 per cent. These cost reductions have been a gradual, imperceptible process in the background, but very meaningful in the longer term.

This does not negate Gordon's point — the pace of these productivity improvements might be less than that achieved in the past, at least in percentage terms. But even slower percentage growth — when applied to already high incomes — can translate into large absolute gains in living standards.

For some purposes, the absolute gain might be a better measure of well-being improvement than the percentage change. And there is a broader point which is relevant to policy: there may not be much we can do about the rate of large-scale new inventions, particularly as a relatively small economy.

There might be more we can do to ensure new inventions and innovations are adopted and spread across the Australian economy, and that we have the right incentives for the sort of widespread but smaller scale everyday innovation that adds up to big effects over time.

This is a key issue that we will explore in an upcoming interim paper on innovation.

The second strand of the case for pessimism is William Baumol's cost disease. In short, it provides an explanation as to why productivity growth — which is never evenly spread across the economy — could sow the seeds of a future slowdown.

Many of you are familiar with the logic, but it goes like this:

If part of the economy experiences rapid productivity growth, producing output with less capital and labour, while other sectors experience very limited productivity growth, and if demand for both types of output follow a fairly conventional pattern — with a degree of price inelasticity — then (ironically) the effect is for more resources to flow into the sector with slower productivity growth.

The parts of the economy with the slowest prod growth actually expand as a share of the economy while those with rapid productivity growth shrink. Baumol noted that there had been rapid productivity growth in traditional goods sectors — agriculture, manufacturing and mining — but the same productivity growth was hard to achieve in services because the labour content of many services is fixed (or hard to replace). Baumol's example was a string quartet which always needs 4 players.

To an extent, this fits the experience of developed economies over the last 50 years. We have seen a shift towards services, and (on average) slower productivity growth in services than the

dramatic improvements in areas like agriculture, mining and (globally) manufacturing. Which in turn makes it harder to achieve future productivity growth. Some say ‘cost disease’ is the wrong term, given this effect is a sign of past success.

The economist Charles Jones put it like this: “Economic growth is determined not by what we are good at, but rather what is essential but hard to improve.”

In general, services do look a bit different. They often have a high labour input which is hard to automate; they are often bespoke and hard to mass produce. And, as we showed in our interim report, when you line up virtually any good in the CPI against the most closely related service (such as medical products vs. medical devices; books vs. education; cars vs. car repairs) you find that the good has fallen in price relative to the service.

But we also made the point that so-called cost disease is not destiny. It is a starting point for the policy discussion — a reminder of my opening point that productivity growth will have to look slightly different in the future relative to the past, at least in some ways. It means we need a focus on the services economy — on the areas where productivity growth has been harder to achieve, and an openness to how productivity growth could look different.

It is interesting, and strangely reassuring, that Baumol arguably picked the wrong example — the string quartet — which actually *has* been transformed by technology, just not in expected ways. It remains true that it is hard to automate, if automation means replacing the cellist with a robot. But streaming has meant high quality recordings are available to virtually everyone in a weightless form irrespective of distance. That is productivity, but via an unexpected route.

A key question concerns innovation: what do the innovation ‘systems’ look like in service sectors? Are they different to those operating in (say) manufacturing, with its heavy emphasis on formal R&D?

A further question goes back to the earlier triumvirate: what if more of the future productivity gains in services (say in health or education or the caring sector) come in the form of quality improvements rather than reductions in real cost?

One implication is that we would need very robust quality measures to be able to track productivity improvements, and for these to factor into a quality-adjusted price index (used to calculate real wages growth).

Another implication is that the fiscal dividend from productivity growth in government services might be indirect: higher quality services might help reduce service volumes (if healthier people used the hospital system less for example). Rather than providing a direct cost reduction through making the service itself cheaper. But in principle, a degree of cost reduction in services should be possible, as has proven to be the case in sectors like finance, warehousing and wholesale trade.

Our next interim report will deal with the role of digital technologies and the use of data. These technologies, including machine learning and AI, have great potential to augment labour input, replace labour for individual tasks, and thereby reduce cost and improve quality across a range of services.

Our work on mental health showed the role that clinically supported online services could play — improving quality through an integrated offering (available at convenient times with anonymity) and reducing cost by allowing clinicians to support many more patients through a more efficient allocation of time.

So we should be realistic about the challenges, but optimistic about what is possible. We cannot acquiesce to pessimism.

Productivity growth might feel less intuitive in some growing sectors of the economy, and it is hard to accurately measure. But this should not lead to an 'anything goes' mindset. The principle of productivity growth — the idea of getting better outcomes for less resources — is the path of progress.

The fact that some productivity growth might come in the form of quality improvements in the future does not imply that every quality improvement is therefore productivity enhancing. For example, it is possible to spend profligately to achieve modest quality improvements. Equally it is possible to regulate quality standards that are costly or inefficient, or which rigidly lock-in defined inputs and cut off future paths for innovation and productivity. Maintaining rigour is important.

In the PC's work on mental health, we tried to make assessments about different policy interventions based on their cost per Quality Adjusted Life Year — the value that the intervention could achieve in terms of better outcomes. That's not an easy calculation, but it does allow some comparison of alternative policy choices when dollars are scarce.

It is the same logic that is applied when listing drugs on the PBS. The Regulation Impact Analysis process is a similar attempt at rigour in assessing options and deciding whether regulatory interventions are 'worth it'. In this way, productivity growth is highly compatible with attempts to capture broader measures of well being.

Our interim report showed that, in general, higher per capita incomes are correlated with important elements of well being, like life expectancy, reported life satisfaction and the equality of the income distribution.

Where there are specific trade-offs between growth and other societal values — like the impact on the environment — the best approach is to rigorously include those broader costs in policy or private choices, not to argue against the pursuit of productivity growth itself.

So, we are the measured optimists on productivity growth.

The structure of the modern economy no doubt changes the precise path that productivity growth will take. And that future path will surely offer some surprises. But a clear understanding of the challenges helps us focus our policy effort. We have to look for policy enablers which can support productivity in parts of the economy where that has previously proven hard.

A quote from economist Benjamin Jones sums this up:

> "To the extent that technological opportunities vary, observers may be tempted to focus on fields and industries where progress has been profound. Looking back through time, sectors where productivity has advanced rapidly have driven economic growth, sectoral dynamics and social change …
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> Yet this backward looking perspective is incomplete … Looking forward, the harder things take on increasing importance. That is, GDP and future progress depend less and less on the sectors we have found relatively easy to advance (like agriculture, manufacturing or now digital technologies) and increasingly on the sectors that continue to be hard, which make up a growing share of the economy … the difficult problems — in energy, transportation, construction, health services, education and government services — only come to matter more."

Our first interim report was a step in laying out that challenge. Without that clarity, we risk doing the equivalent of hanging out for rocket mail — relying on the next iteration of what worked in the past, instead of realising that our biggest opportunities might lie on a different path.