

The Holy Grail of Trend Growth

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'Anyone who believes that exponential growth can go on forever in a finite world is either a madman or an economist.'

Kenneth Boulding (in evidence to a hearing of the US Congress in 1973)

We are told (relentlessly) that the election is about jobs and growth and who can argue with those objectives! We are so inured to the policy emphasis on growth that we never stop to think about it realistically. Economic growth is portrayed as something that is so fundamental to prosperity it cannot and must not be questioned. But even a facile analysis of the facts shows that we have to start to be realistic about the nature of growth itself and the potential trajectories of the global and national economies in the 21st century.

Using GDP as a metric that everyone quotes, let's examine growth in the world over the last 50 years or so. GDP measures the value of domestic production of goods and services in a year and the income derived from this production. Tracking this is, therefore, a broad (albeit imperfect) measure of both the 'speed' of the economy (in \$ per year) and contributions to wealth.

Figure 1 shows global GDP since the mid 1960s. Using the Excel trendline function it is simple to demonstrate that this curve shows exponential growth over that period of about 3% per annum. In other words, on average the world economy has grown by 3% year on year over that period.

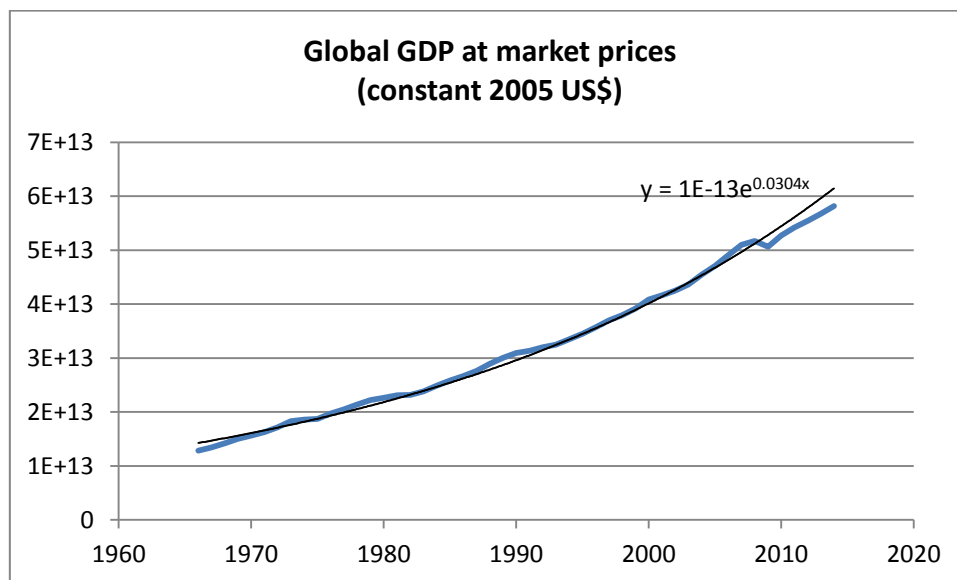


Figure 1 Global GDP

Source: World DataBank (<http://databank.worldbank.org>)

Exponential growth in any system occurs because of reinforcing feedback. It's easiest to understand this through global population which (until now) has grown exponentially throughout human history.

This is because more people lead to more children which leads to more people. Exponential growth is also what you hope happens to your bank account (compound interest), how disease outbreaks grow (and dissipate) so quickly and indeed how economies grow as wealth grows (more income leads to more expenditure leads to more production). However, there is another feature of exponential growth that we know applies to all systems but cannot seem to countenance in our thinking about the economy. That is of course that it cannot continue indefinitely. Nothing can grow forever; at some stage the system approaches a limit to ongoing growth. The most obvious one for the global economy is population. Over the period in Figure 1 the world population has grown at an average annual rate of 1.6%. However, the UN's 'medium variant' estimate is for the growth rate to continue the decline that commenced in the mid 1970s (Figure 2). If correct, this will take the global population to around 11.2 bn by century end. (For the moment we will leave aside whether this is even possible given the resource and environmental impacts of such an increase.)

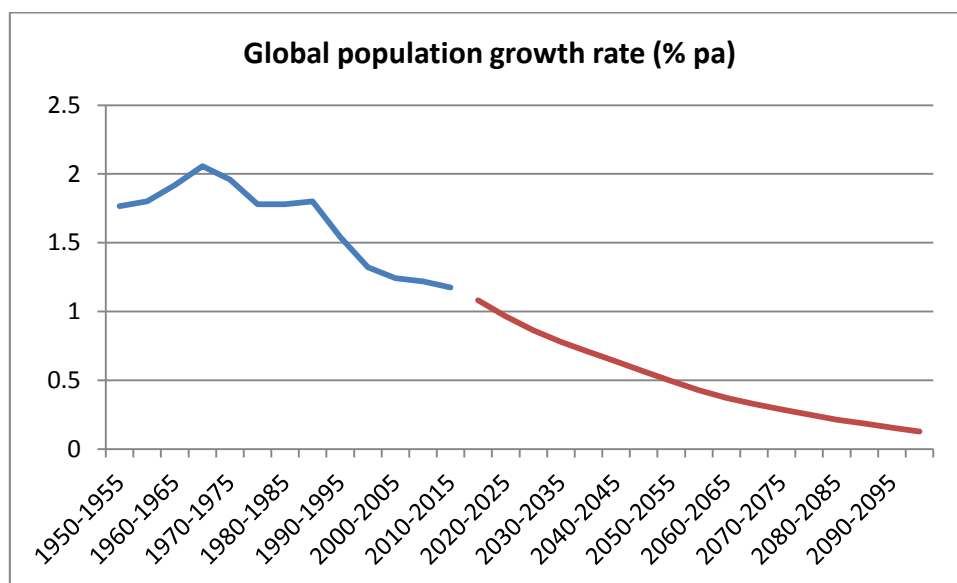


Figure 2 Global population growth rate

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

Since the mid 1960s, growth in GDP on a per capita basis (GDP/c) has averaged about 1.4% pa, i.e. the 3.0% set out in Figure 1 minus the average population growth rate of 1.6%. Global GDP per person is presently about \$8,100 (in constant 2005 US\$). So what might global GDP look like by the end of the 21st century? The following thought experiment gives us a clue.

Presently GDP per capita in Australia is about \$40,000 (again in constant 2005 US\$) which is about 5 times the global average and in the top ten countries in the world. Let's be very optimistic and say that global average GDP/c rises during the century to approach that figure, at the same time as the population changes play out as indicated in Figure 2. In other words, the whole world becomes as wealthy as Australia over the century. Global GDP and its growth rate for this scenario are shown in Figure 3.

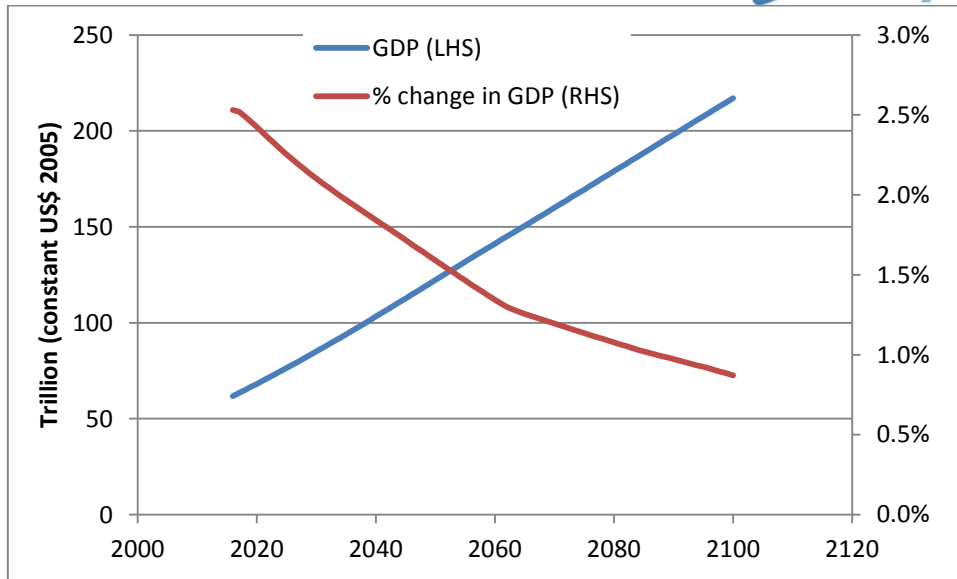


Figure 3 Global GDP projections
Source: Author's calculations

Even under this unrealistically optimistic scenario, growth rates fall continuously over the century even though GDP increases by a factor of 3.5. Even if the UN's highest population estimates are used instead, the picture is not much different (growth rates drop from present levels to 1.5%). If this was going to happen, you may argue, we would see signs of it already. We do! Figure 4 shows the trajectory of GDP growth in the world's high income countries, including Australia.

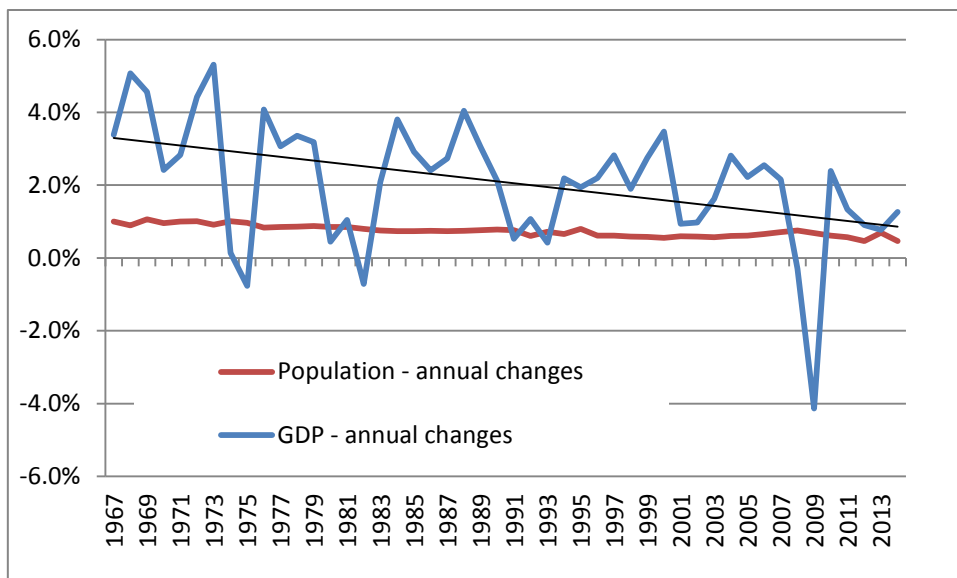


Figure 4 Population and GDP in high income countries (based on constant 2005 US\$)
Source: World DataBank

Figure 5 shows that the picture in Australia is in fact very similar (this data from the ABS is in chain volume terms).

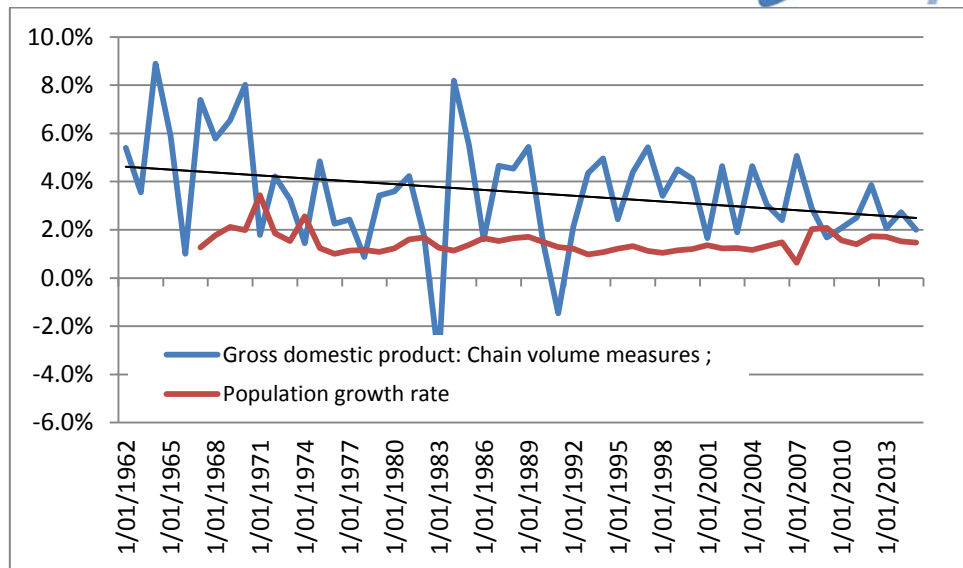


Figure 5 Annual population and GDP growth rates in Australia
 Source: ABS Cat 5206.0 Australian National Accounts: National Income, Expenditure and Product

So when you hear that that Australia’s growth is “below trend” you may now ask yourself what exactly that means. While it is certainly true that growth of 3% on average occurred between 1971 and 2012, predicting a systematic upward trend from now on is somewhat heroic given what has been happening here and in other high income countries. So declining population growth will contribute to lower than recent historical GDP growth rates, and this is associated with lower fertility rates as the population becomes wealthier: the so-called demographic transition. As you would expect, this process is most evident in higher income countries as clearly identified in Figure 4.

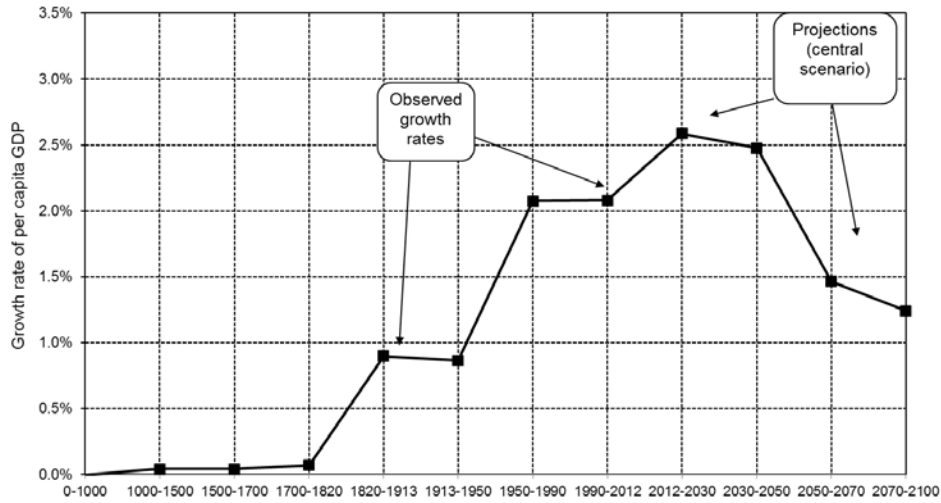
So what about per capita GDP? For an assessment of that, let’s turn to Thomas Piketty:

... it is important to recall that past growth, as spectacular as it was, almost always occurred at relatively slow annual rates, generally no more than 1– 1.5 percent per year. The only historical examples of noticeably more rapid growth— 3– 4 percent or more— occurred in countries that were experiencing accelerated catch-up with other countries. This is a process that by definition ends when catch-up is achieved and therefore can only be transitional and time limited. Clearly, moreover, such a catch-up process cannot take place globally.

Source: Piketty, Thomas. Capital in the Twenty-First Century (p. 93). Harvard University Press.

With suitable caveats Piketty offers the projections shown in Figure 6 (his Figure 2.4) which shows global real GDP/c growth diminishing by half from its peak level (about 2.5% pa) by century end.

Figure 2.4. The growth rate of world per capita output
since Antiquity until 2100



The growth rate of per capita output surpassed 2% from 1950 to 2012. If the convergence process goes on, it will surpass 2,5% from 2012 to 2050, and then will drop below 1,5%.
Sources and series : see piketty.pse.ens.fr/capital21c.

Figure 6 World per capita growth rate projections – Piketty

Source: Piketty, Thomas. *Capital in the Twenty-First Century* (p. 100). Harvard University Press.

Piketty assumes that the richest countries “will grow at a rate of 1.2 percent from 2012 to 2100 .., while poor and emerging countries will continue the convergence process” and, therefore, have higher GDP/c growth rates.

In fact, Australia’s GDP/c growth rate has been (on average) about 2% pa (measured in chain volume terms) since the early 1970’s and has recently been about 1.5% (Figure 7).

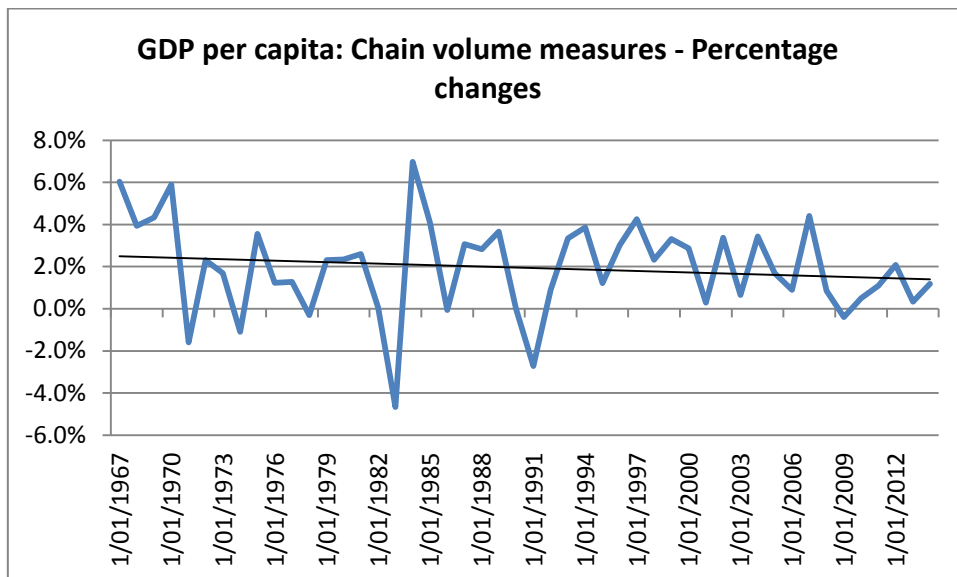


Figure 7 GDP per capita in Australia

Source: ABS Cat 5206.0 Australian National Accounts: National Income, Expenditure and Product

So if we add GDP/c of (say) 1.5% to Australia’s population growth rate of around 1.5% we get 3.0%. The government’s recent budget announcement says:

The economy is forecast to grow by 2½ per cent in both 2015-16 and 2016-17 and to pick up to 3 per cent in 2017-18.

While the Treasury estimate may turn out to be reasonable over the next few years, retaining this level of growth consistently beyond the short term appears highly unlikely. Australia is an export economy and has obviously been heavily reliant on China’s massive economic expansion which started in the early 1990s, coinciding with the beginning of Australia’s oft trumpeted long run of economic growth. China’s import growth since that time has been historically unprecedented and will almost certainly remain so. Figure 7 compares China’s import growth with Australia’s export growth.

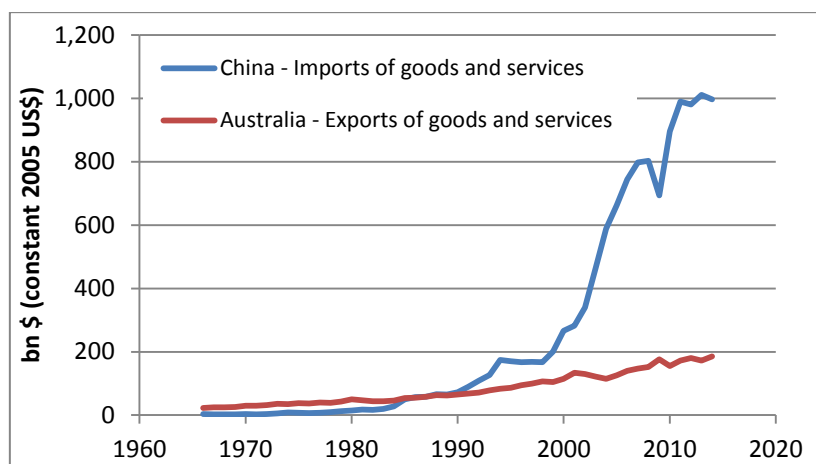


Figure 7 Chinese imports and Australian exports
Source: World DataBank

China purchases one third of all Australian exports, and the recent reduction in its GDP growth rate to around 7% (which, by the way, does **not** mean the economy is *slowing* – it means that it is *growing more slowly*) is often cited as the basis of Australia’s present economic malaise - which is how a GDP growth rate of 2.5% is commonly portrayed. So what contribution do we think ongoing Chinese economic growth will play in Australia’s future economic fortunes? Again we can deploy our thought experiment to consider the possibilities.

The role of declining population growth in GDP growth is explained above. It is often neglected that the UN (and the Chinese government) expect China’s population to commence a decline by around 2030 (Figure 8), reducing its population by 30% by the end of the century.

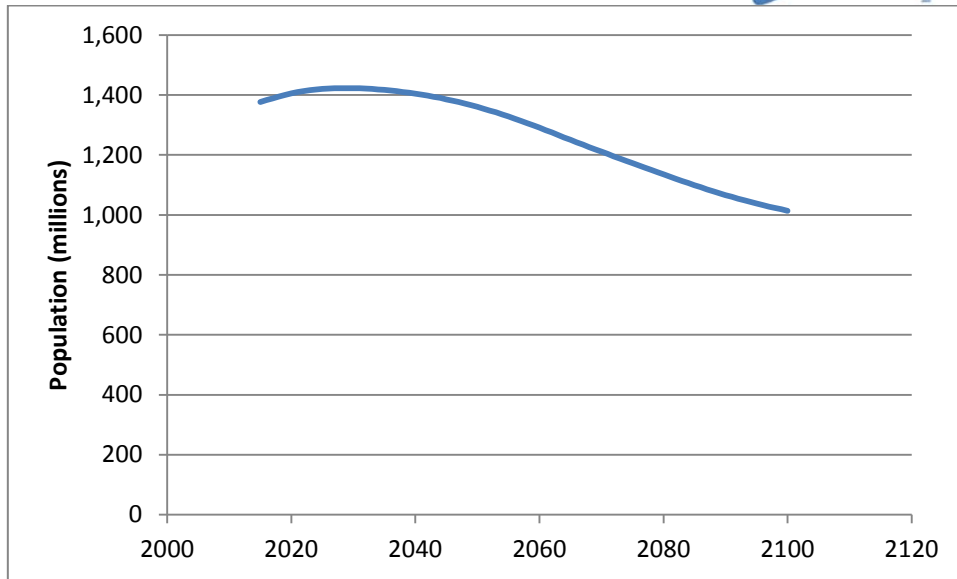


Figure 8 China population

Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision, DVD Edition.

If the UN population estimates for China are modelled in the same way as for the world, and we again optimistically assume that GDP/c in China also trends upwards towards the present Australian figure of \$40,000, the result is as shown in Figure 9.

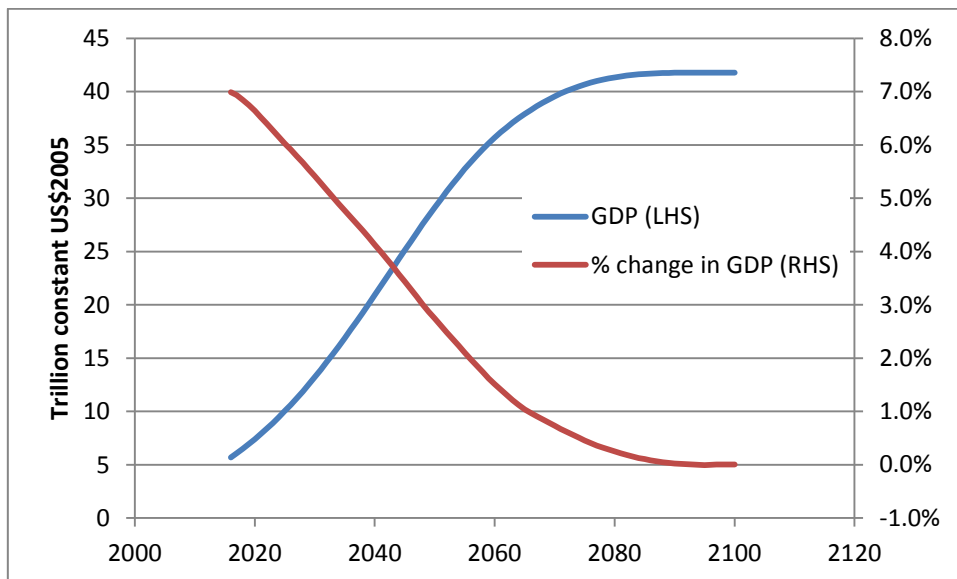


Figure 9 China GDP projections

Source: Author's calculations

Even with continuing improvements in GDP/c it will not be possible for China's GDP as a whole to maintain its previous rate of growth in the face of declining and then negative population growth. So if we think Australia is struggling with 7% China GDP growth, then we should start to re-adjust now.

Economic theory tells us that as poorer countries become richer, GDP/c will converge. In the thought experiments above, I have assumed that it will converge to \$40,000. There are many reasons why resource and ecological limits to growth means that this is neither feasible nor desirable, but that is another story (told [here](#), [here](#), and [here](#)). If GDP/c convergences to a lower figure the GDP growth rates cited above will be lower.

If population growth rates continue to fall, and GDP/c continues to converge across the globe, then global GDP growth rates must also continue to steadily fall over the long term. This is not economics - it is algebra and Australia cannot avoid this ultimate reality.

It is time to drop the growth mantra and devise economic policies that deliver us a future with quality jobs and reasonable living standards in a world in which low growth converts to a steady-state, eco-efficient, low carbon economy as global population stabilises. This is what former World Bank economist [Herman Daly](#), and UK academic [Tim Jackson](#), and many others have long advocated.

Australia already has one of the highest levels of GDP/c in the world. Improving how it is distributed is a more important and achievable objective than hoping and praying it goes up forever.

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