

Australia's Changing Growth Potential

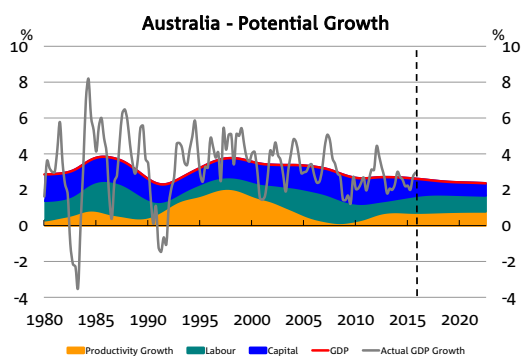
by NAB Group Economics

26 May 2016



National Australia Bank

- This note attempts to lay out the challenge that now faces the Australian economy by providing estimates of Australia's potential growth rate post the GFC. This serves to remind us how important it is for Australia to embrace innovation and find new sources of growth.
- Potential growth in Australia is now estimated at approximately 2½% (previously thought to be around 3¼%), below recent estimates from the Treasury and the RBA (≈ 2¾%), but closer to IMF estimates.
- Productivity growth has slowed noticeably in Australia since the 1990s. However, the negative impact on potential growth and national income has been postponed by the (temporary) offsetting effects of the mining boom. With those offsets now unwinding, if nothing else fills the gap, Australia may experience its worst decade of national income growth (and potentially a deterioration in living standards) in nearly half a century.
- Expected trends in population growth and investment suggest a resurgence in productivity growth will be the only answer. **Mining productivity gains will only provide temporary support, raising potential growth above 2½% in the near term, but declining thereafter as structural productivity declines resume.** This may partly reflect the shift towards services-based drivers of growth, which have lower (measured) labour productivity.
- To return to previous average rates of growth, productivity growth would need to pick up to 1½% from ¾% currently. Unfortunately, productivity has slowed globally (pointing to complex structural factors) and without an unexpected technological advancement or significant progress on the reform front, raising productivity growth will be challenging.
- Previous reforms have addressed the 'low hanging fruit' for productivity gains (competition policies etc), meaning further progress may prove more difficult. However, firms continue to highlight painpoints such as industrial relations and taxation where more progress can be made. In addition, product market reforms would also assist allocative efficiency – IMF analysis shows there are still some industries in Australia that could benefit significantly from efficiency gains.
- We also note that NAB's research on innovation provides encouraging signs that business – particularly small business is working hard to lift productivity and efficiency. The production function approach used to estimate potential growth in this note does not and cannot consider the impact of this or current innovation policy, which suggests some upside risk to these estimates.
- The implications of lower potential for monetary policy are mixed. It implies that the output gap is smaller than previously thought, suggesting a need for tighter monetary policy at this point in the cycle should inflation pressures develop more quickly (not a concern at present given the global disinflationary backdrop). However, lower potential growth also has a negative impact on the 'neutral rate' of interest – potentially lowering it (all else equal) more than ½ a ppt below historical levels, to around 3½%. If so, the lower neutral rate more than offsets the smaller output gap in a simple monetary policy framework (Taylor's rule), justifying the current modest easing bias.
- Lower growth potential can also have an impact on fiscal policy. Previous modelling work undertaken by Federal Treasury suggested that a 25bp fall in potential growth would subtract around \$9 billion from the underlying cash balance over four years.
- This paper is broken down into sections. For summary results and implications, please see pages 2 and 3. For more detailed discussion, including why productivity growth has slowed, the divergent productivity trends across industries, the impact of other sectoral shifts on productivity, and possible upside surprises to productivity, please see pages 4 - 9. For sensitivity of our results to assumptions, please see Appendix A on page 10.



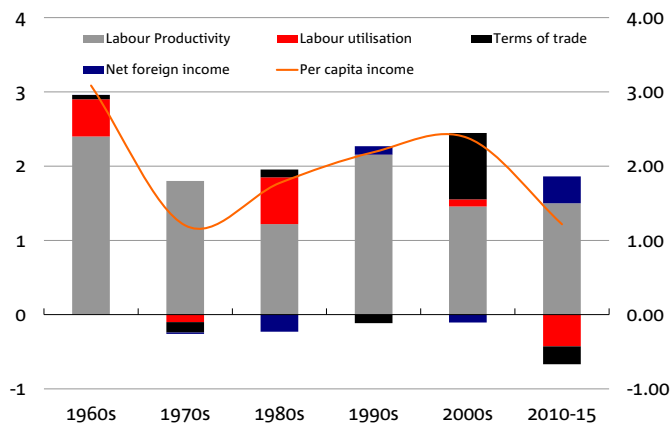
Sources: ABS; NAB Economics

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Laying out the challenge

Now that the closing stage of Australia's 'once in a generation' mining boom is well underway, attention has shifted to how the economy is positioned to handle the difficult transition it needs to undertake. In order to maintain the high living standards many Australians have become accustomed to, the economy must remain vibrant to support stronger income growth. But can the economy (particularly non-mining sectors) fill the void left behind by mining investment and falling commodity prices?

Chart 2: Contribution to annual per capita income growth

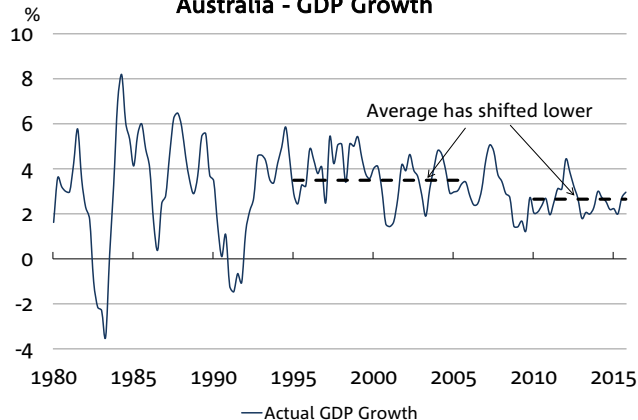


Sources: NAB Economics; Productivity Commission; ABS

This will be a momentous task. Breaking per capita income growth down into its various components reveals just how significant the booming terms of trade was to incomes during the 2000's (Chart 2). In the 12 years to 2011/12, the terms of trade contributed more than \$160b to real national income (\$7,700 in per capita terms). Importantly, the terms of trade helped to more than offset the post-1990s slowdown in labour productivity growth, postponing a hit to national income and living standards. Admittedly part (but not all) of the productivity slowdown was driven by the mining industry itself – average growth in non-mining labour productivity since 2005 was less than half the pace of that during most of the 1990s.

The contribution has now turned negative, and with commodity prices not expected to rise to previous levels any time soon, there is a real risk that average living standards could deteriorate without some kind of an offset, namely from stronger (productivity-driven) GDP growth.

Chart 3: Potential growth appears to be gradually slowing
Australia - GDP Growth



The problem is that GDP growth in Australia appears to be slowing rather than picking up, increasing just 2½% in 2015. That is consistent with the average rate of growth experienced since 2010, but is well below the 3¾% once thought to be the potential rate of growth.

But does this signal a structural decline in Australia's growth potential, or are we simply seeing some cyclical fluctuation? Unfortunately, our estimates suggest structural factors have played a large role, despite some influence of cyclical factors at particular points in time.

Estimates of potential growth

Consistent with an apparent fall in average growth, our estimates suggest that potential growth has probably fallen at least ½ a percentage point from pre-GFC levels, to around 2¼% - 2¾% presently – although a temporary boost is expected to come from the mining industry (see below for details on how potential growth is estimated using a production function approach, and the Appendix for sensitivity to the assumptions used).

To better understand what is driving the structural components of the slowdown, thinking about potential growth in terms of the simple 3P's framework is helpful; that is, as a function of **population & participation** (both key determinants of labour supply) and labour **productivity**. For instance, an increase in either the supply of labour, or the amount of output produced per unit of labour, will (in turn) increase the productive capacity of the economy. With that in mind, key themes affecting the 3P's currently and into the future include:

- At a fundamental level, slower **population growth** post the mining boom and the ageing of the population (lowering labour participation rates over time), means that the contribution to growth from labour supply is and will likely be limited compared to recent history. Higher instances of part-time work also lower average hours worked (see p4 for details).
- **Productivity** will remain disappointing, especially in comparison to the 1990's, which saw the benefits of structural reforms and significant technological progress in information & communication technology (ICT) (see p4 for details).
- Other potential drivers of lower productivity will include **significant sectoral shifts underway in the economy**, the most apparent being in the mining sector – mining productivity has been negatively affected by long investment lags and increased mining of marginal deposits (see p7 for more detail). While this will improve near-term as production in mining picks up and investment trails off, this will only provide a temporary boost to productivity.
- **The other significant shift will continue to be the growing economic significance of highly labour intensive industries** (primarily in the services sector), where productivity gains can be more difficult to obtain (and measure) (see p7 for details).

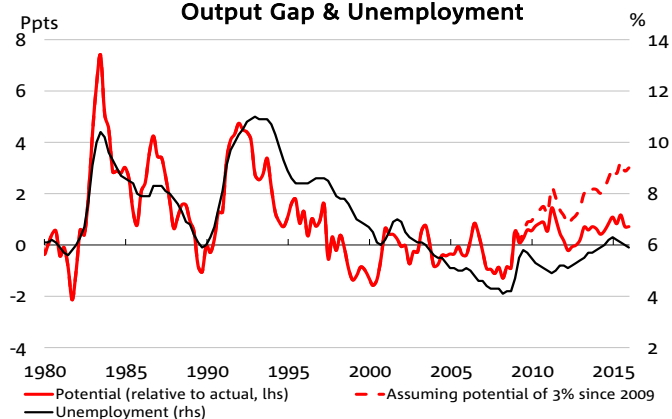
Implications for the economy and policy

It is generally accepted that potential growth has slowed in recent years. Both the RBA and Treasury have made statements to this effect, with the Federal Treasury officially revising their estimate of potential growth to 2¾% (from 3%) – the RBA have indicated a similar view. Our estimations, however, suggest an even larger decline, down to 2½%, which (if nothing is done) has notable implications for the economy and policy – negative implications for living standards, government revenues, the neutral rate of interest and so on.

The risks facing living standards highlight the need to drive better productivity outcomes. This will be a difficult task given that much of the ‘low hanging fruit’ on the reform front has already been harvested. However, a number of commentators – including respondents to the NAB Business Survey – have said more progress can be made, especially in the realms of product market and taxation reforms, as well as labour reform (to an extent). Innovation also needs to be encouraged even further, as recognised by the current Government, to drive technological advancement.

In addition, **lower growth potential implies a smaller output gap than previously envisaged** – evidenced by the current flat-to-falling unemployment rate (Chart 4), and rising capacity utilisation rates. This could mean that domestic economic conditions are less disinflationary than previously thought, signifying that monetary policy is currently too accommodative (although this ignores the role of the presently deflationary global environment). **However, lower potential growth would tend to have implications for the neutral rate of interest as well.**

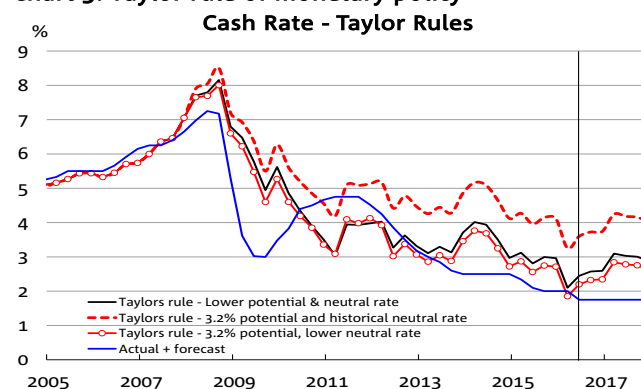
Chart 4: Slowing potential suggests smaller output gap
Output Gap & Unemployment



While the relationship between the neutral rate and potential growth is complex, we have applied techniques previously used by the Bank of Canada, which draw a simple link between the two – suggesting an almost one-for-one relationship.¹ This then means that a more than ½ ppt fall in potential growth will lead to a similar decline in the neutral rate. Inserting these changes into a simple ‘Taylor Rule’ of monetary policy setting actually denotes a need for lower interest rates than would previously have

been the case given current GDP growth and inflation (Chart 5).

Chart 5: Taylor rule of monetary policy



Indeed our working assumption **for the neutral cash rate in Australia is currently approximately 3½%** (compared to around 4¼% to 5¼% in the pre-GFC period), based on lower potential growth and higher private sector leverage.

The Taylor Rule also implies that the current cash rate of 1.75% is too low, however these rules can deviate significantly from the actual cash rate as they do not incorporate a number of factors affecting RBA decisions such as extraordinarily accommodative monetary policy globally (including negative interest rates and quantitative easing). The RBA also takes into consideration a number of other inputs, including global and local (dis)inflationary pressures (e.g. commodity prices), wage pressures, asset prices and so on.

Finally, lower growth potential has implications for fiscal policy that are arguably a little more straight-forward. The Federal Treasury addressed this issue in some detail in its Mid-Year Economic & Fiscal Outlook (MYEFO) late last year, where they revised down their estimate of potential growth to 2¾% (from 3% previously). If Budget GDP forecasts are correct, our estimate of 2½% for potential growth suggests that the Budget deficit could close sooner than currently projected (due to a smaller output gap). However, lower potential likely means slower GDP growth than forecast, which will have a negative impact on revenues – the main mechanism bringing the budget back to balance.

The [Federal Treasury](#) previously estimated that a 25bp reduction in the potential growth rate would subtract from the underlying cash balance in the order of \$9 billion over 4 years. Our estimate of potential growth is an additional 25bps lower than Treasury’s. Assuming a similar impact, this implies that there is significant risk to the Government achieving its planned underlying cash surplus by 2020-21.

For further detailed discussion, please read on.

¹ This analysis from BoC uses an overlapping generations (OLG) model.

Detailed analysis

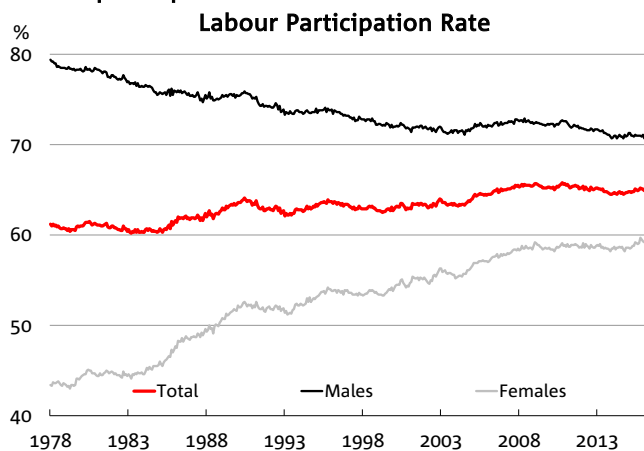
In the sections below, we examine labour supply and productivity in more detail.

Is there potential for labour supply/utilisation to contribute to faster growth?

- Both workforce participation and hours worked per employee are expected to broadly stabilise in the near-term before recommencing their downward trends in the medium-to longer term.
- Therefore, increases in the labour supply are expected to contribute around ¾% to our estimate of potential growth.

One way to obtain higher per capita income and GDP growth is through greater labour utilisation (working more). In previous decades, gains in labour utilisation have been obtained through various means, such as labour market reforms and increased participation of women in the workforce. Many of these drivers (including the windfall from greater female participation) are one offs, where the peak benefits have likely come and gone and may suggest a limit to future gains. Indeed, the chart above (Chart 1) shows that labour utilisation has not made a meaningful contribution to per capita income growth since the 1980s, and has actually been a major source of contraction since the GFC.

Labour participation trends are less favourable

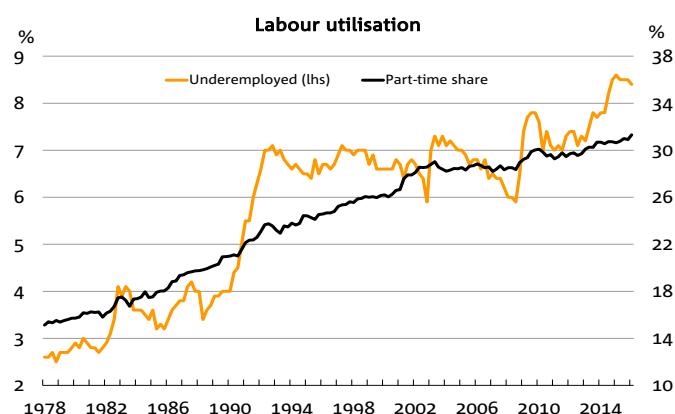


This largely reflects a reversal, or at least a stalling of, the trend rise in participation rates over the preceding 3-4 decades. While it is possible that increased female participation will remain supportive in the future, this is expected to be more than offset by slowing participation rates due to the ageing of the population. According to the 2015 Intergenerational Report released by the Government, workforce participation rates in Australia are expected to drop to around 62½% by 2054-55 (from near 65% presently).

There are, however, a number of other factors that underlie trends in labour utilisation besides the participation rate. For example, the growing role of part-time workers has significant implications for potential growth. Consistent with this, the number of hours worked per employee has been in long-term trend decline, which if continued, will pose a constraint on potential growth. To a large extent, the decline in average hours worked appears to be

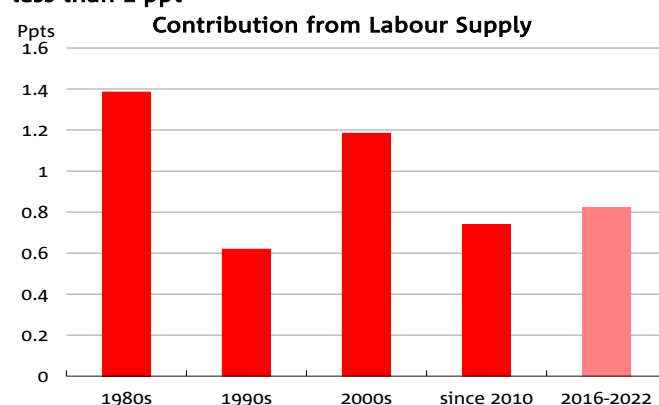
structural. Both increased participation of women and the ageing population have contributed to the trend given preferences for shorter working hours, but demand factors are also at play – demand for a more flexible labour market leading to the casualization of the workforce. Part-time employment growth has been strong in key labour intensive industries such as health, retail and hospitality, suggesting compositional effect as well. This trend therefore is only likely to continue in the medium to longer term. In the near-term, however, ABS data on labour ‘underemployment’ suggests there is at least moderate scope to increase labour utilisation (hours per worker), as long as the demand for labour supports it.

Underemployment at record highs – suggests labour utilisation could be increased



Given these offsetting factors, both workforce participation and hours worked per employee are expected to broadly stabilise in the near-term before recommencing their downward trends in the medium-to longer term. Consequently, using a standard production function framework suggests increases in the labour supply are expected to contribute around ¾% to potential growth between 2016 and 2022 (see Chart below).

Contribution from labour supply to potential growth less than 1 ppt



Productivity growth in Australia has slowed

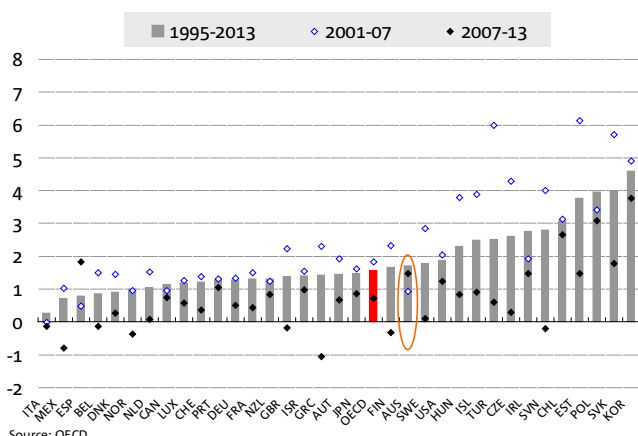
- Developed economies have been experiencing what appears to be a structural decline in productivity growth - a trend for which Australia is no exception.
- Sectoral shifts have impacted on Australian productivity outcomes - particularly divergent trends between mining and non-mining sectors.

- Looking forward, there should be a ‘second wind’ of labour productivity growth over the coming 12 to 18 months stemming from the mining sector, but this will be temporary.

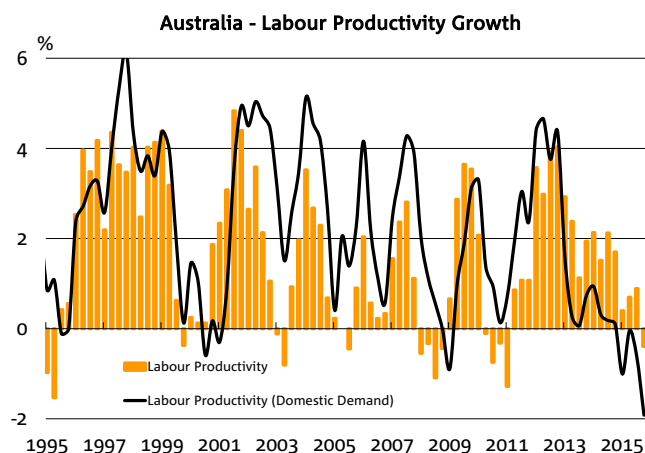
Aside from labour utilisation, working more efficiently (that is, increasing **labour productivity**) is arguably the best way to achieve a sustainable increase in both GDP growth and incomes. The concept of productivity is one that is often difficult to grasp, even for economists. Put simply, it is the ability to produce more goods and services for any given level of inputs. It is often presented statistically as the amount of output per hour of labour used, although this representation reflects both *capital deepening* (changes in the amount of capital available to labour), and productivity gains not associated with changes in inputs (known as multi-factor productivity, or *MFP*). MFP can be increased either through technological progress, or gains in human capital (education, training etc).

The problem, however, is that developed economies have been experiencing what appears to be a structural decline in productivity growth – a trend where Australia is no exception. As we can see from the chart below, Australia’s labour productivity growth has been around middle of the pack relative to OECD economies since the mid-1990s. It is interesting to note, however, that Australia was one of only two OECD countries to see average productivity growth increase in the post GFC period, relative to 2001-07 (largely due to capital deepening related to the mining investment boom). But despite the improvement, as like all other OECD economies (other than Spain), post-GFC productivity growth has remained below the long run average. More timely data are even less promising, showing labour productivity growth slowing notably over 2013, and was very weak in the first half of 2015 (Chart below).

Labour productivity growth – slowdown is a global phenomenon



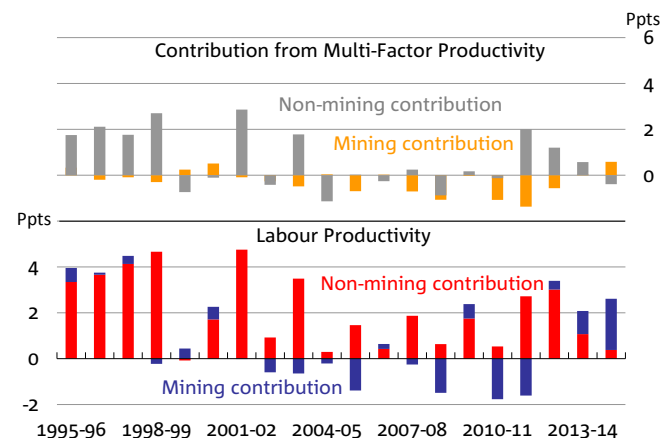
Certainly, despite experiencing relatively solid employment growth for much of this year, economic growth continues to be relatively tepid in Australia – implying a notable deterioration in labour productivity. As mentioned above, the slowdown is likely a reflection of the mining investment cycle, significant sectoral shifts in the economy, and the waning impact of reforms and an ICT boom in the mid-1990s/early 2000s.



Divergent productivity trends between mining and non-mining sectors

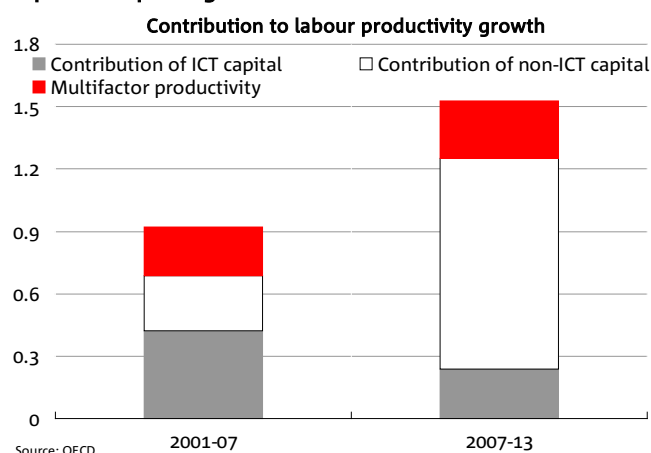
Sectoral shifts have also impacted on Australian productivity outcomes. In particular, we note the divergent trends in productivity observed between mining and non-mining sectors of the economy. In the period between 2007 and 2013, labour productivity in the mining sector generally fell and tended to offset productivity gains elsewhere (Chart).

Contributions to labour productivity – mining vs non-mining sectors

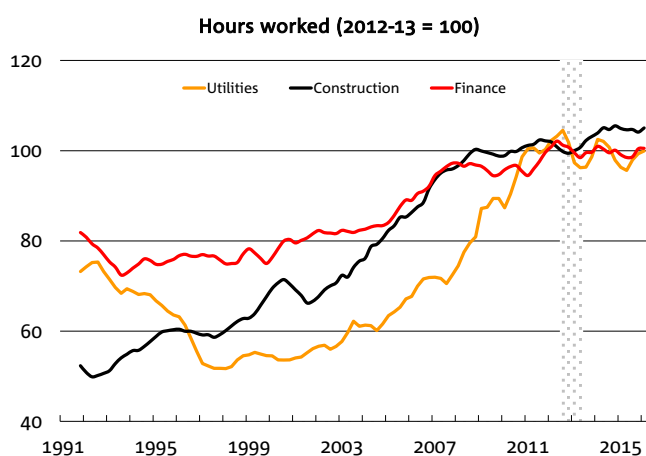


The decline was largely a reflection of long lead times for major mining investment projects, as large amounts of capital and labour were committed to projects that would not yield any production for many years in some cases. However, there may also be some structural headwinds at play, such as the long-running rise in mineral extraction costs – as higher prices pushed producers to more marginal deposits. The drag on productivity from mining began to reverse around 2012/13 as mining projects became operational, increasing output. Falls in mining sector MFP then lessened and capital deepening finally contributed to labour productivity.

Labour productivity growth in Australia largely from capital deepening

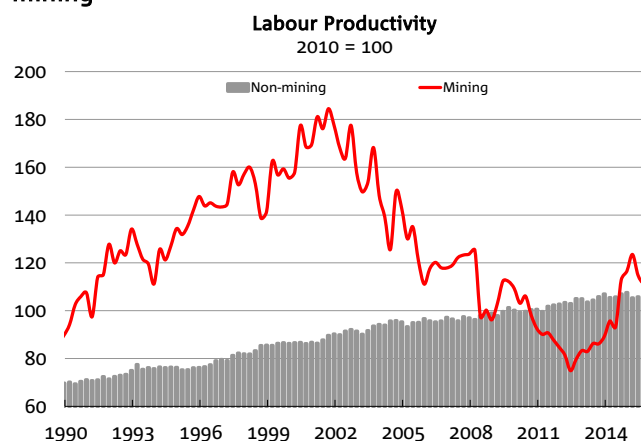


In the non-mining sector on the other hand, labour productivity has increased over the past decade, but at a much slower pace than was seen previously. There was, however, a promising improvement in non-mining productivity from around 2011-12, driven by both MFP growth and capital deepening, although this proved to be short lived. Taking a closer look at the rise in capital deepening also reveals that in the industries where gains were most apparent (including finance & insurance, utilities and construction) capital deepening was achieved largely through a reduction in labour input, as hours worked in these industries generally declined in that year (Chart).



With changes in mining and non-mining productivity growth continuing to largely offset one another (although the roles have reversed from prior years), **it would seem as though the long hoped for spike in Australian productivity (that many had expected) post mining investment boom has somewhat disappointed (at least it has thus far)**. As raised earlier, recent National Accounts results suggest the situation has deteriorated even further in 2015 and seems to point to a loss in momentum – including growth in mining labour productivity (Chart).

Quarterly Labour productivity index – mining vs non-mining

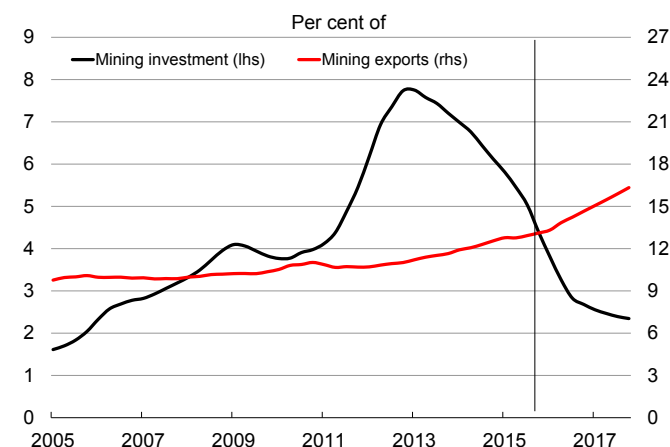


Looking forward, there should be a ‘second wind’ of labour productivity growth over the coming 12 to 18 months.

In particular, mining employment has not yet fallen as much as would be expected given declines in mining capital expenditure. However, it is only a matter of time before construction of more major mining projects is completed and the less labour intensive production phase commences – bolstering output per unit of labour.

Based on long-running ‘rules of thumb’ and available data on the mining investment pipeline, we can get a rough idea of the industry’s labour and capital inputs and production outputs, at least for the next few years (Chart). This implies that, **should mining employment and capital expenditure fall as expected, with output going up simultaneously, growth in the industry’s labour productivity can be expected to remain very strong, at least in the near-term**. However, our projections would also suggest that the peak change in the contribution from mining to national labour productivity growth may have already occurred (although there are significant risks attached to these projections). Additionally, the resulting fall in mining’s share of labour hours means the contribution from mining to national productivity growth will be partially offset (see blue line in chart below).

Australia’s mining sector – expected contribution



Regardless of the magnitude and timing of future productivity gains in the mining industry, it appears as though the windfall is likely to be temporary. The pipeline of mining investment is expected to be significantly

depleted by 2018, and lower commodity prices will continue to discourage capital investment in mining for quite some time. As mentioned earlier, studies also tend to show that multi-factor productivity in the mining industry (excluding the temporary impacts from long investment lead times) could remain soft, largely reflecting growing difficulty with resource extraction. According to a 2008 report from the Productivity Commission, depletion of Australia’s natural resources almost completely offset annual underlying MFP growth between 1974-75 and 2006-07 (underlying MFP was estimated at around 2.5%).

Mining labour productivity growth to remain strong, but peak change in growth/contribution already behind us



NAB estimates the peak contribution of mining to total labour productivity at around ½ ppt in mid-2017. These results are not significantly different to those produced by the IMF, which suggests that the peak contribution from mining is likely to occur in 2016, contributing well below 1 ppt and depleting to near zero before 2020.

Considering the effect of other sectoral shifts on productivity

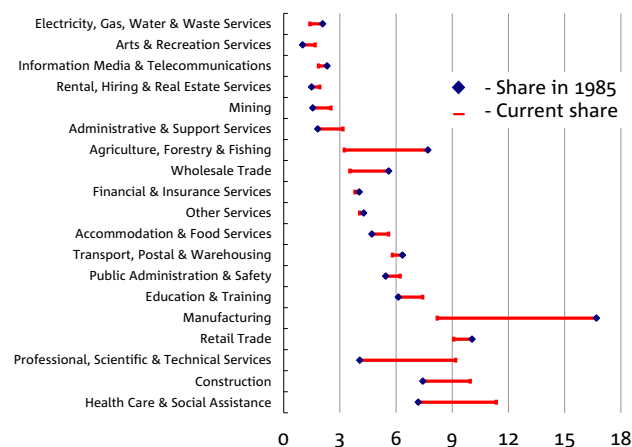
- Structural factors are playing a role in slowing productivity growth
- Factors of production are shifting into labour intensive service sectors where productivity gains appear harder to obtain.

So why is national labour productivity so weak, even as the drag from mining is unwound? While it is extremely difficult to pinpoint the causes, **part of the poor productivity performance is probably explained by other underlying sectoral shifts – something that appears to be playing out across a number of developed economies.** A recent IMF report² explored these issues in great detail, and while the report does not focus on Australia specifically, the findings suggested that (at least prior to the GFC) a slowing of trend growth (and productivity) across advanced economies was in part a reflection of ‘not only the reallocation of resources to sectors where productivity growth was slower, but also declining productivity growth within those sectors which increasingly account for the bulk of employment and economic activity’.

² The New Normal: A Sector-Level Perspective on Growth and Productivity Trends in Advanced Economies

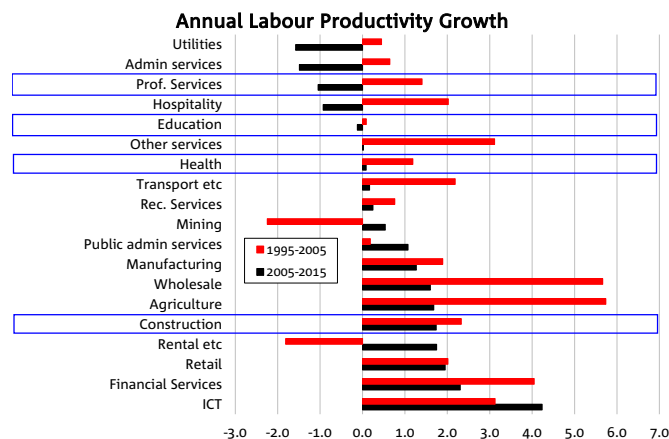
Australia has similarly undergone a significant shift in the industries that command the bulk of the labour hours over the past couple of decades. In particular, manufacturing and agriculture have been overtaken by areas such as health, construction and professional, scientific & technical services. Similarly, the bulk of Australian production (GVA) is now generated by the service sectors as well. But can the growing importance of these (largely service based) industries help to explain the more subdued rate of productivity growth in Australia?

Industry share of hours worked (%) – 1985 to current



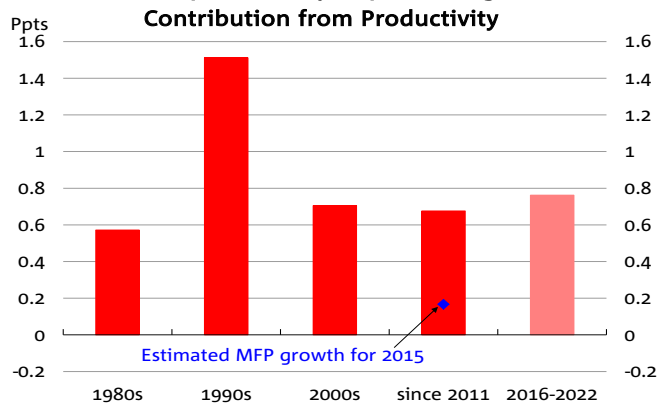
At face value, it would seem as though the shift to a services based economy has a number of, potentially negative, implications for productivity growth. This is because highly labour intensive industries (as the service sector tends to be) will generally find it more difficult to obtain high levels of productivity growth given the requirement for highly personalised products (eg. legal advice or medical care). This limits the ability to achieve higher productivity via massive economies of scale (mass production). Additionally, many service sectors have limited scope for capital deepening, creating a constraint on labour productivity. Frustratingly from an analytical perspective, however, is that output (and by extension productivity) of the services sector is especially difficult to measure (particularly when trying to account for the quality of non-physical products). Nevertheless, the following chart demonstrates how labour productivity compared across industries between 1995-2005 and 2005-2014.

Long-run labour productivity growth by industry



The main stand-out is that labour productivity looks to have deteriorated across most industries, and significantly so in many. This is particularly true of many of the industries that have seen the greatest increase in labour hours, such as health, professional services and education. This has also been true to some extent in construction, although this could potentially reflect spill over's from the mining sector. These trends are largely reflected in the ABS's experimental calculations of industry MFP, although this only covers market sectors (therefore excluding many important industries such as health and education). Perhaps the most notable exception is the ITC sector, which built upon the already impressive productivity gains since the mid-1990s. The ICT boom also had positive spill over effects to other industries. Naturally, it is difficult to predict when (or if) another ICT (or similar) boom is likely to occur.

Contribution of productivity to potential growth



Upside surprises to productivity are possible

- Our central expectation for productivity growth is relatively modest, but there is scope for improvement
- There may be scope for further 'catch-up' with other developed economies given the prevailing productivity gap.
- Important industries like personal services and distribution remain below the technology frontier, suggesting scope for efficiency gains
- The NAB Innovation Survey suggests that firms in industries close to the productivity frontier tend to be both high performing and highly innovative, which could lead to an advancement of the technology frontier for these industries
- This note does not address policy responses to the productivity issue, but the Government's announced innovation policy signals an intention to head in the right direction.

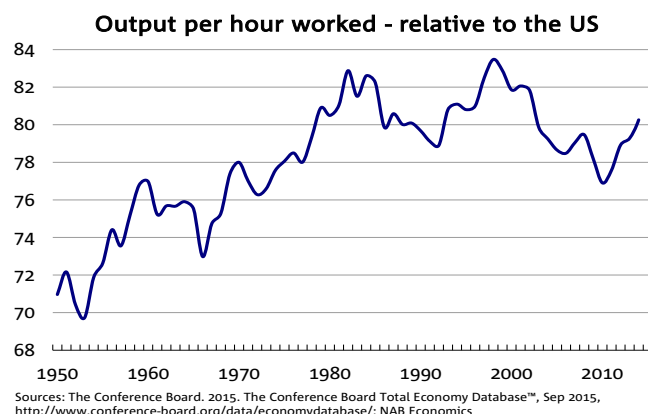
Given the various crosswinds, our central projection assumes the productivity growth remains broadly around the average estimated rates of recent years (around ¾%), although very weak productivity growth in recent quarters suggests some downside risks. Again, these are broadly consistent with recent IMF estimates. The [IMF estimates](#) that Australia will need to almost double the anticipated rates of productivity growth in order to sustain growth at the rates of the past. Similarly, NAB estimates suggest productivity growth needs to be 0.5-0.75

ppts higher than the central projection to maintain the previously assumed rate of potential growth for Australia (3½%). Although possible, obtaining such an outcome for productivity will likely require significant reforms, technological advancements and improved allocative efficiency.

Despite this, there are a variety of upside risks to productivity which have not and cannot be considered in the above production function framework.

One reason to be hopeful is the fact that Australia's productivity gap to the US (considered on, or near, the technology frontier) remains wide, suggesting there is significant scope to improve efficiency – according to the IMF, bridging half the gap over 10-15 years would see Australia achieve a GDP growth rate of close to 3¼%. In fact, other recent IMF research shows that advanced economies could boost MFP levels by 7-9% on average over 10 years via better cross-sector allocation of inputs alone.

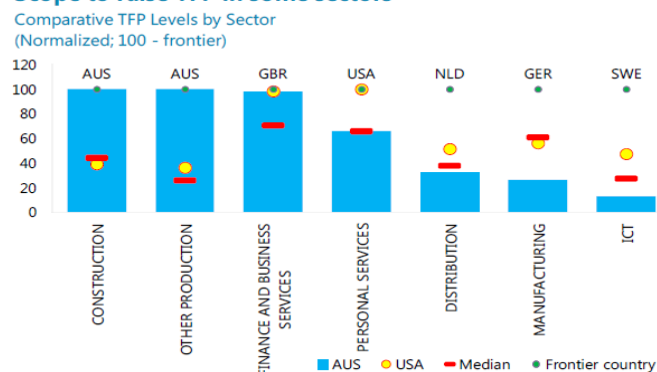
Australia's productivity gap is still wide



There may, however, be some impediments to bridging this gap. Aside from the obvious differences in things like industry compositions between the two economies, factors such as geography and population size can have a limiting effect on productivity gains – although ICT advancements etc help to reduce these constraints. The relatively persistent gap since the 1980s would tend to support the concept of natural impediments, while a 2006 [paper](#) out of the Federal Treasury found that Australia's geography might explain as much as half of the productivity gap with the United States. Nevertheless, a sectoral break-down of MFP frontiers suggest potential for efficiency gains in Australia are mixed.

Mixed possibilities for efficiency gains across industries

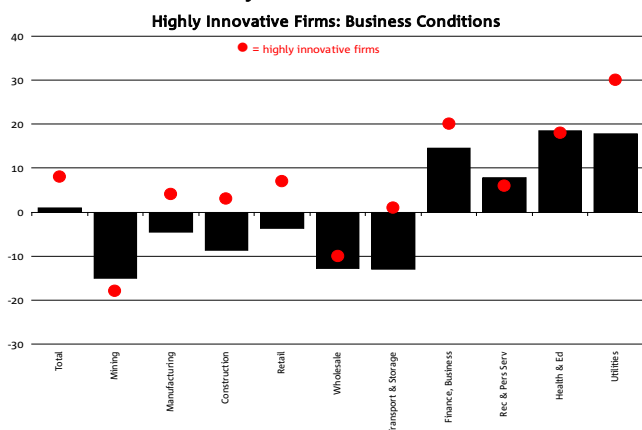
Scope to raise TFP in some sectors



The chart above shows that major Australian industries such as finance & business services and construction (which are only expected to grow in significance), are already operating close to the technology frontier, suggesting limited scope for rapid efficiency gains. In contrast, the manufacturing industry (with a declining share of the economy) has very large scope for improvement.

Nevertheless, important industries like personal services and distribution also have significant scope for efficiency gains, while ICT has the most ground to gain. As we saw in the late 1990s/early 2000s, productivity gains in ICT can have significant spill over's to other industries as well.

NAB Innovation survey

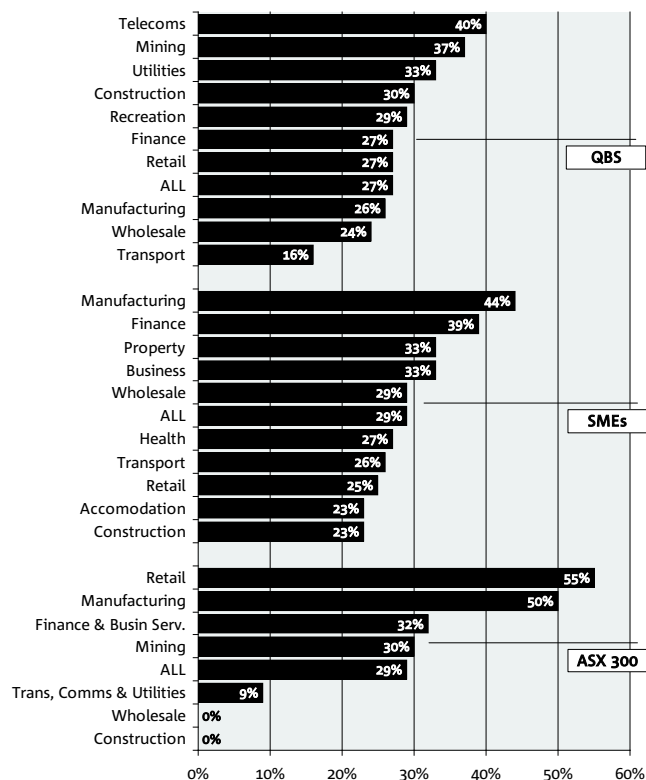


On an additional positive note, a recent survey of business innovation undertaken by NAB suggests that, firms in industries such as financial and personal services (which are close to the productivity frontier, which can limit efficiency gains) tend to be both high performing and highly innovative, which could lead to an advancement of the technology frontier for these industries. Moreover, when breaking innovation down by firm size, industries subject to a great deal of international competition such as manufacturing was the most innovative in the SME space and for larger businesses (ASX 300) – an industry for which Australia is currently well below the productivity frontier. Large retail firms also consider themselves highly innovative.

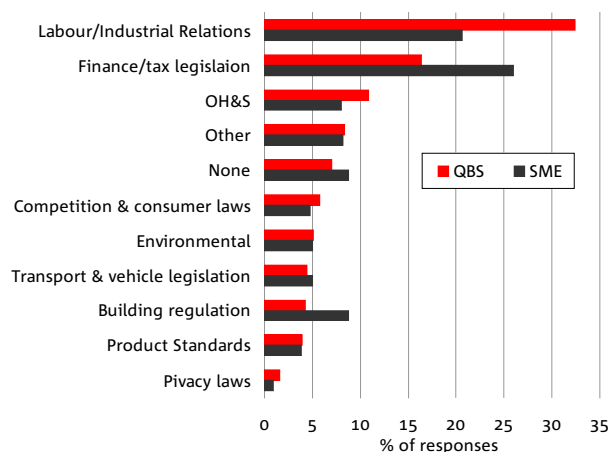
Finally, there are a number of potential reforms that could be used to help stimulate productivity growth in Australia. Examination of these reforms is beyond the scope of this report, but broadly includes (although not limited to) more efficient and simple taxes, as well as labour and product market reforms to increase competition – a detailed discussion of competition reforms can be found in the [Government's Competition Policy Review](#) released in 2015 (with the Government supporting 39 of the Review's 56 recommendations). Additionally, when asked in the NAB Business Survey about which regulatory barriers are the biggest constraints to productivity, firms pointed to industrial relations and taxation as areas where more progress can be made (see [Australian Industry Report](#) from the Department of Industry & Science, p100, for more details).³ The framework for this note also does not

consider the impact of recent changes to the Government's innovation policy, which the Government claims will deliver for Australia the next age of economic prosperity. Investment in infrastructure would also remove bottlenecks, helping many industries realise potential efficiency gains.

Culture of Innovation: Your Organisation (by size & industry)



NAB Business Survey – major regulatory constraints



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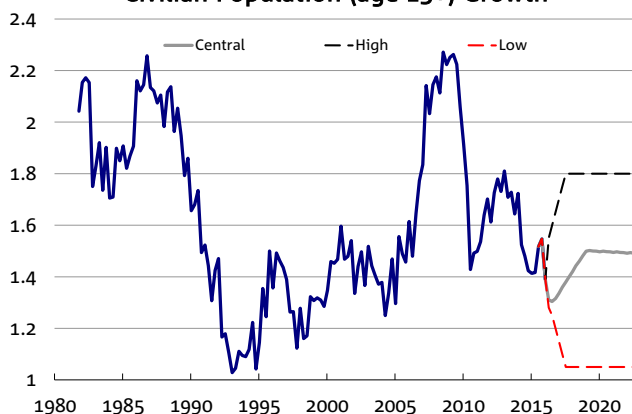
Box A: Sensitivity of statistical analysis to growth potential assumptions

As mentioned above, using a simple production function framework NAB estimates that Australia’s rate of potential growth has likely slowed gradually to around 2½% per annum, from a presumed 3¼% previously. While a near-term boost to productivity will come from the mining sector, this is likely to be temporary and partially offset by subdued productivity gains in the non-mining sector. Concurrently, our central projection for workforce participation to post a cyclical pick-up in the near-term as the labour market improves, will help to offset a slowdown in working age population growth. All these factors tend to be broadly offsetting, helping to keep potential growth around the 2½% region over coming years.

These estimates are sensitive however to the assumptions that are made regarding both demographics and productivity.

Demographic assumption for labour supply

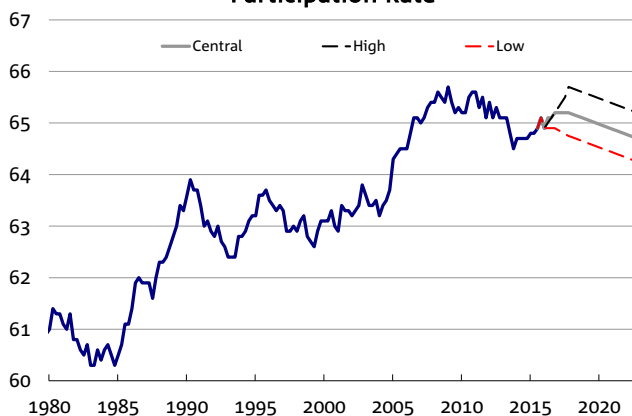
Civilian Population (age 15+) Growth



Working age population growth:

- Central projection – population growth slows to 1.3% in the near-term before improving to 1.5%
- Lower bound – working age population growth slows to 90s recession lows and stays there
- Upper bound – working age population growth rises, but remains well below mining boom peaks

Participation Rate

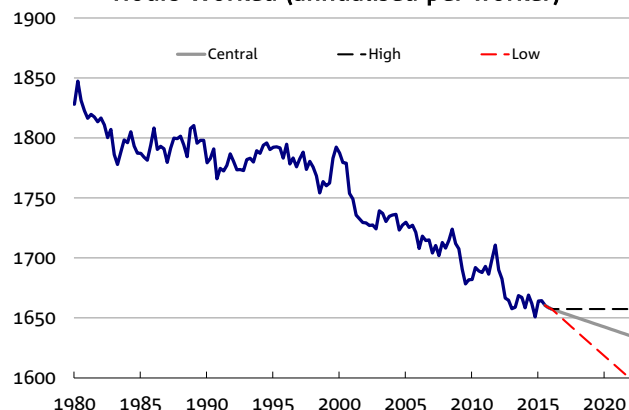


Participation rate

- Central projection – participation rate stabilises around current level

- Lower bound – participation rate continues recent downward trend
- Upper bound – participation returns to recent peak

Hours Worked (annualised per worker)



Hours worked per employee

- Central projection – hours worked per worker stops falling
- Lower bound – long running decline continues
- Upper bound – decline in ‘underemployment’ sees hours worked return to around pre-GFC levels.

Assumption for productivity growth

- Central projection – cross-winds from mining and non-mining keep productivity growth broadly similar to post-GFC average (around ¾%)
- Lower bound – productivity growth remains close to recent lows (0.5%). Would require either long delays (or lower than expected yields) in mining projects, or zero to negative productivity growth in non-mining
- Upper bound – Pre-GFC rates of multi-factor productivity growth (1½%). This implies GDP growth potential similar to old assumptions (although only under our high projection of labour supply (1¼%)).

From the table below, the range of potential growth estimates vary from below 1½% to 3¼% depending on the assumptions used. Naturally, the highest probability is assigned to the central projections (giving a potential growth rate of 2½%), although given what we consider to be a difficult challenge of boosting productivity growth to 1½%, the upper bound estimates of potential growth to 3¼% seem highly unlikely. Also, given that some of the lower bound demographic estimates for labour supply simply assume a continuation of existing trends, this could suggest some additional downside risk to the true rate of potential growth.

Table: Scenario sensitivity of potential growth estimates

		Labour		
		Low	Central	High
Productivity	Low	1.6	2.1	2.4
	Central	1.9	2.3	2.7
	High	2.5	2.9	3.3

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