STATEMENT 8: FORECASTING PERFORMANCE AND SCENARIO ANALYSIS

The economic and fiscal forecasts presented in the 2017-18 Budget incorporate assumptions and judgments based on information available at the time of preparation. These forecasts are subject to considerable but normal uncertainty.

This Statement provides details of the historical performance of Budget forecasts for the key macroeconomic aggregates of real and nominal GDP as well as for estimates of government receipts. The Statement also presents a number of scenarios seeking to illustrate the sensitivity of budget aggregates to changes in economic forecasts and projections, and some underlying assumptions.

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OVERVIEW

The macroeconomic and fiscal forecasts presented in the 2017-18 Budget incorporate assumptions and judgments based on information available at the time of preparation.

Macroeconomic and fiscal forecasts are important for Government policy and decision making. The budget estimates provide a fiscal baseline against which policy decisions are taken by the Government. Better forecasting and a better understanding of the uncertainties around the forecasts contribute to better policy and decision making.

This Statement presents an assessment of the historical performance of Budget forecasts and estimates of uncertainty around these forecasts. This assessment is consistent with the practice of many other international fiscal agencies to improve forecasting performance and, more importantly, to raise awareness of the uncertainties inherent in forecasting.

This Statement also presents an analysis of the sensitivity of 2017-18 Budget estimates to changes in key assumptions as required under the *Charter of Budget Honesty Act 1998*. An analysis of how alternative assumptions over the medium term can affect the economic and fiscal projections is also included.

FORECASTING PERFORMANCE

Macroeconomic forecasting performance

The Government's macroeconomic forecasts are prepared using a range of modelling techniques including macroeconometric models, spreadsheet analysis and accounting frameworks. These are supplemented by survey data, business liaison, professional opinion and judgment.

Forecasts are subject to inherent uncertainties. Generally, these uncertainties tend to increase as the forecast horizon lengthens. Forecast errors (the difference between forecasts and outcomes) can arise for a range of reasons — for example, differences between the assumed path of key variables and outcomes, as well as changes in the relationships between different parts of the economy.

Confidence intervals seek to illustrate that there is a range of plausible outcomes around any forecast. Confidence intervals are based on observed historical patterns of forecast errors. They are a guide to the degree of uncertainty around a forecast and, typically, span a wide range of outcomes.

Real GDP forecasts

Real GDP forecasts in the Budget are based on a number of key assumptions including exchange rates, interest rates and commodity prices. The forecasts also incorporate judgments about how developments in one part of the Australian economy affect other parts and how the domestic economy is affected by events in the international economy. The accuracy of the forecasts depends on the extent to which the assumptions and judgments underpinning them prove to be correct — and also the reliability of the economic relationships embodied in the macroeconomic models used to produce them.

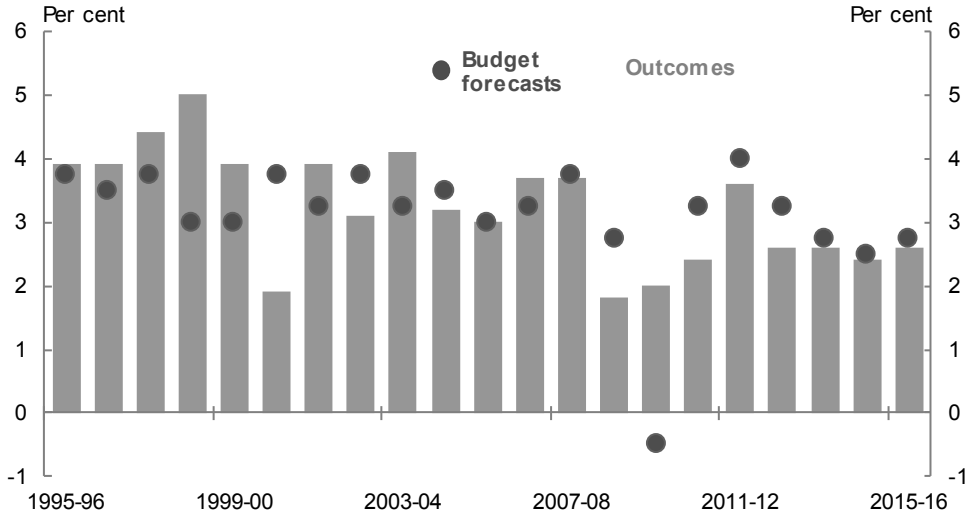
For example, a lower exchange rate than assumed would be expected to result in higher than forecast growth in Australia's export volumes, including in tourism, higher education and manufacturing. At the same time, import prices would be higher, resulting in lower growth in import volumes. Overall, this would lead to a larger contribution from net exports to economic growth, although there would be some mitigating effect on real GDP from the impact of higher import prices on real household income.

Forecast errors for real GDP can also result from unexpected shifts in the pace or nature of economic activity during the forecast period. A faster than forecast pick-up in Australia's economic growth in 2017-18 could be driven by stronger consumer spending, underpinned by faster than forecast growth in employment and wages. Faster economic growth could also be driven by stronger than expected major trading partner growth, which could boost exports and, in turn, stimulate incomes and demand throughout the economy.

Over the past 20 years, Treasury's forecasts of real GDP growth have exhibited little evidence of bias and accuracy has generally remained within a range of ½ to 1 percentage point (Chart 1). While forecasts of real GDP growth were less accurate in the years during and immediately after the global financial crisis (GFC), forecast errors seem to have returned to the usual range.

National Accounts data are not yet available for the whole of 2016-17. Information to date suggests that real GDP growth will be lower than last year's Budget forecast. Within those forecasts, there are also changes at the component level. Stronger growth in dwelling investment is more than offset by softer than expected household consumption. Other components of GDP, including net exports, have so far evolved broadly as forecast in the 2016-17 Budget.

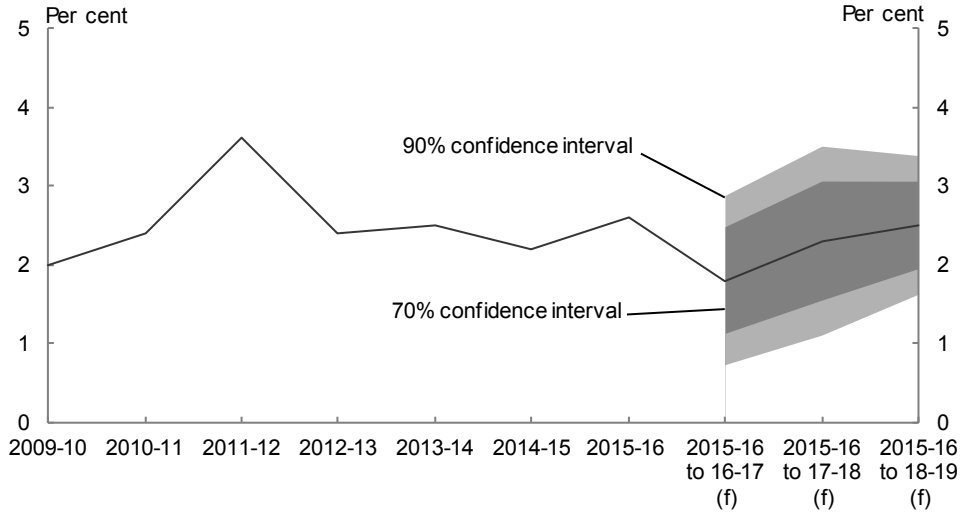
Chart 1: Budget forecasts of real GDP growth



Note: Outcome is as published in the December quarter 2016 National Accounts. Forecast is that published in the Budget for that year.
Source: ABS cat. no. 5206.0 and Treasury.

Chart 2 shows that the average annualised growth rate in real GDP in the two years to 2017-18 is expected to be around 2¼ per cent, with the 70 per cent confidence interval ranging from 1½ to 3 per cent. In other words, if forecast errors are similar to those made over recent years, there is a 70 per cent probability that the growth rate will lie in this range.

Chart 2: Confidence intervals around real GDP growth rate forecasts



Note: The central line shows the outcomes and the 2017-18 Budget forecasts. Annual growth rates are reported for the outcomes. Average annualised growth rates from 2015-16 are reported for 2016-17 onwards. (f) are forecasts. Confidence intervals are based on the root mean squared errors (RMSEs) of Budget forecasts from 1998-99 onwards, with outcomes based on December quarter 2016 National Accounts data.
Source: ABS cat. no. 5206.0, Budget papers and Treasury.

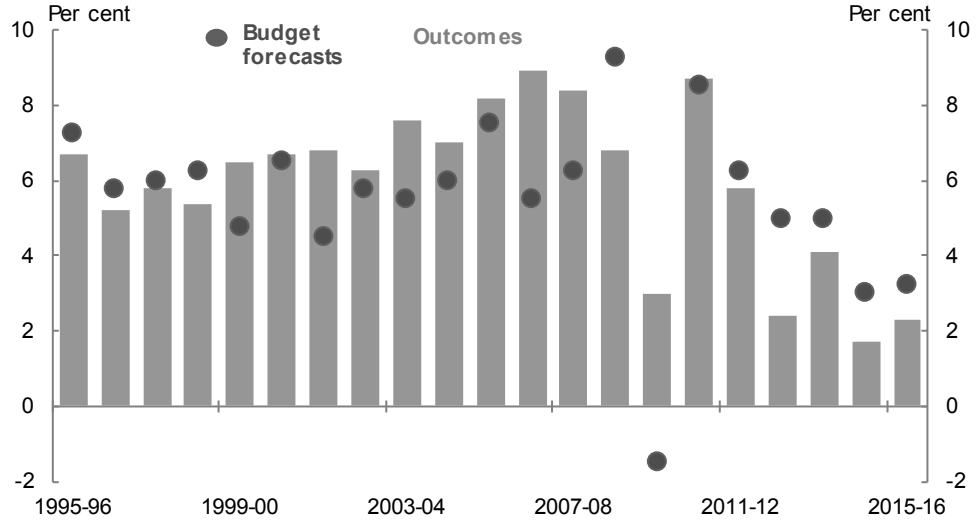
Nominal GDP forecasts

Compared with real GDP forecasts, nominal GDP forecasts are subject to additional sources of uncertainty from the evolution of domestic prices and wages, and world prices for commodities.

Over the past decade, nominal GDP forecast errors have reflected the greater difficulties in predicting movements in global commodity prices (Chart 3). Larger than expected or assumed falls in the prices of key commodities in recent years — particularly for iron ore — have meant that nominal GDP was overestimated.

In 2016-17, the outcome for nominal GDP growth is expected to be higher than forecast in last year's Budget. This primarily reflects stronger than expected commodity prices which remained at elevated levels for much of the past year.

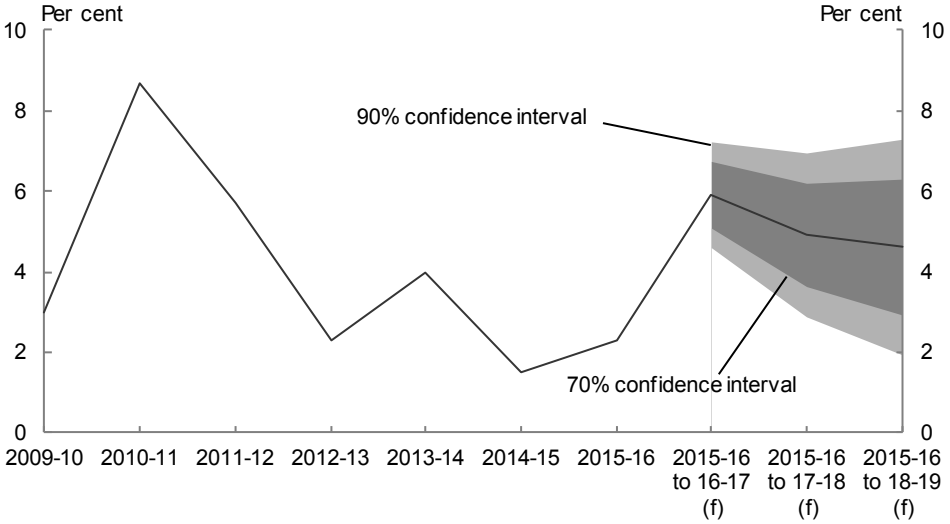
Chart 3: Budget forecasts of nominal GDP growth



Note: Outcome is as published in the December quarter 2016 National Accounts. Forecast is that published in the Budget for that year.
Source: ABS cat. no. 5206.0 and Treasury.

The confidence intervals around nominal GDP forecasts are wider than those around the real GDP forecasts, reflecting both the uncertainty over the outlook for real GDP and the added uncertainty about the outlook for domestic prices and commodity prices. Average annualised growth in nominal GDP in the two years to 2017-18 is expected to be around 5 per cent, with the 70 per cent confidence interval ranging from 3¾ to 6¼ per cent (Chart 4).

Chart 4: Confidence intervals around nominal GDP growth rate forecasts



Note: See note to Chart 2.
Source: ABS cat. no. 5206.0, Budget papers and Treasury.

Fiscal forecasting performance

The fiscal estimates contained in the Budget are based on economic and demographic forecasts and projections as well as estimates of the impact of Government spending and revenue measures. Changes to the economic or demographic forecasts and projections underlying the estimates will affect forecasts for receipts and payments. As such, this will have a direct impact on the profile of the underlying cash balance and government debt. Even small movements in economic forecasts and projections or outcomes that differ from the forecasts and projections can result in large changes to the budget aggregates, for example, decreasing payments or increasing receipts with flow-on effects to the underlying cash balance.

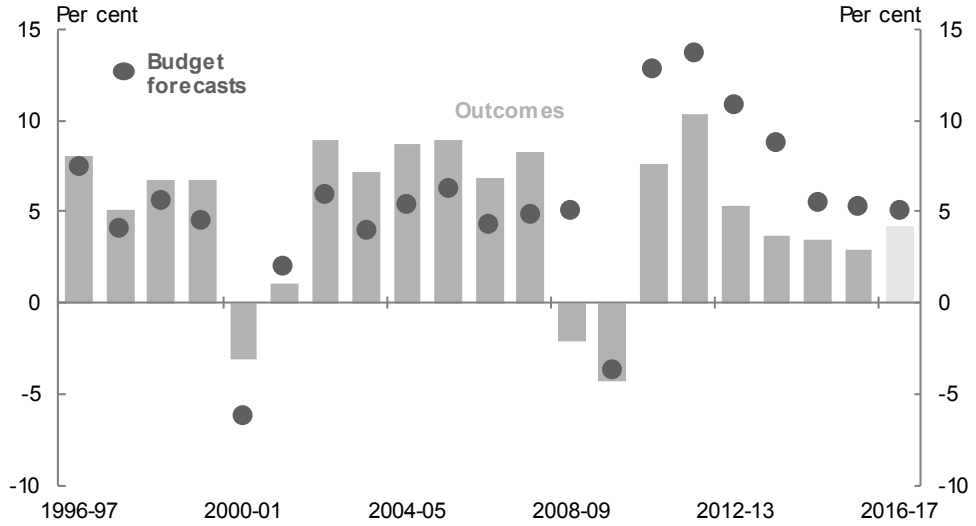
Receipts

The Government's tax receipts estimates are generally prepared using a 'base plus growth' methodology. The last known outcome (2015-16 for the 2017-18 Budget) is used as the base to which estimated growth rates are applied, resulting in tax receipts estimates for the current and future years. Estimates for the current year also incorporate recent trends in tax collections.

Most of the indirect heads of revenue, such as GST and fuel excise, are forecast by mapping the growth rate of an appropriate economic parameter directly to the tax growth rate in the relevant head of revenue. A number of income taxes also involve determining whether this tax will be paid in the year the income is earned, such as for pay-as-you-go withholding tax, or in future years, such as for individuals' refunds.

Over the past two decades, receipts forecasts have both under- and over-predicted outcomes (Chart 5).

Chart 5: Budget forecasts of tax receipts growth



Note: Forecast error for 2016-17 is an estimate.
Source: ABS cat. no. 5206.0, Budget papers and Treasury.

Generally, there is a strong correlation between the accuracy of the forecasts of nominal GDP and its components and the forecasts for tax receipts. On average, economic forecast errors will be magnified in receipts forecast errors, owing to the progressive nature of personal income tax. Chart 6 plots the forecast errors for nominal non-farm GDP against the errors for tax receipts excluding capital gains tax (CGT). It shows that where there has been an underestimate of nominal non-farm GDP growth, tax receipts tend to be underestimated and *vice versa*.

Looking at the medium term and beyond, tax receipts projections are driven by long-term economic trends and tax policy settings. External structural pressures and systemic design factors in Australia's tax system could result in tax receipts from many sources as a proportion of GDP declining over this extended time period.

One driver of this decline could be a continuation of consumer preferences away from highly taxed items such as fuel, alcohol and tobacco. GST revenue growth could also weaken as consumption favours non-GST items. Company tax may also come under pressure from international trends to reduce company tax rates, particularly as capital is increasingly mobile. The Government's Ten Year Enterprise Tax Plan is designed to enable Australia to continue to attract investors within this international context.

A further source of uncertainty in the medium term is the composition of national income, as discussed in Box 1 of Budget Statement 5. If recent trends in the wage share persist then this will put downward pressure on total tax receipts, even in the event of nominal GDP being in line with the projections.

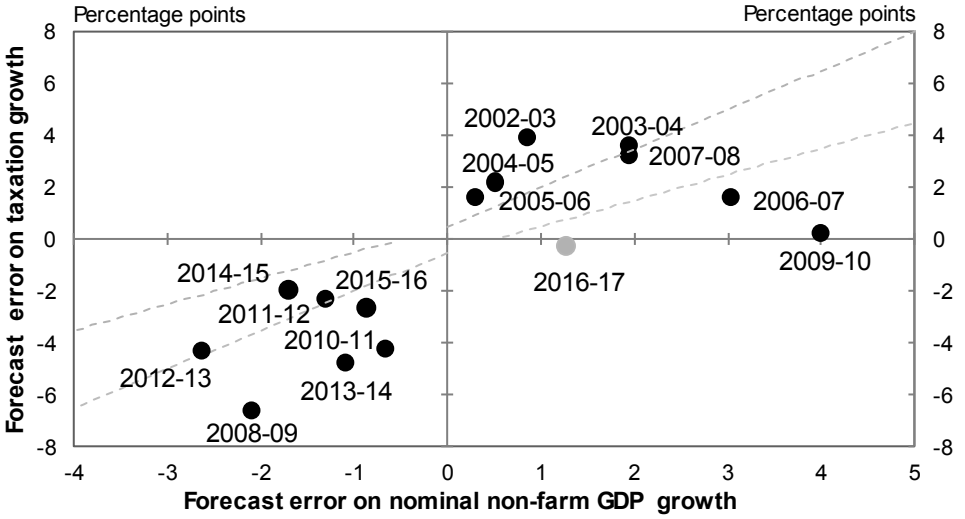
The extent to which the tax system is resilient to these and other factors is highly uncertain and not independent of tax rate differentials, both domestically and internationally.

The forecast for 2016-17 tax receipts (excluding CGT) in the 2016-17 Budget is expected to have been an over-estimate of around 0.3 percentage points, compared with an under-estimate of around 1.3 percentage points for nominal non-farm GDP growth. The shortfall in revenue largely reflects compositional changes in nominal non-farm GDP growth compared to that forecast in the 2016-17 Budget, and the impact of these changes on different heads of revenue. The error is also impacted by the timing of tax receipts. These factors are discussed further in Boxes 1 and 2 in Budget Statement 5.

The largest contributors to the expected forecast error for 2016-17 are gross income tax withholding which is estimated to be $3.4 billion (1.9 per cent) below the forecast of the 2016-17 Budget; GST, which is estimated to be $1.5 billion (2.4 per cent) below the forecast of the 2016-17 Budget; and company tax, which is estimated to be $1.2 billion (1.7 per cent) lower than expected in the 2016-17 Budget. These and other variations are discussed further in Budget Statement 5.

Discussions of earlier years' forecast performance can be found in previous budgets.

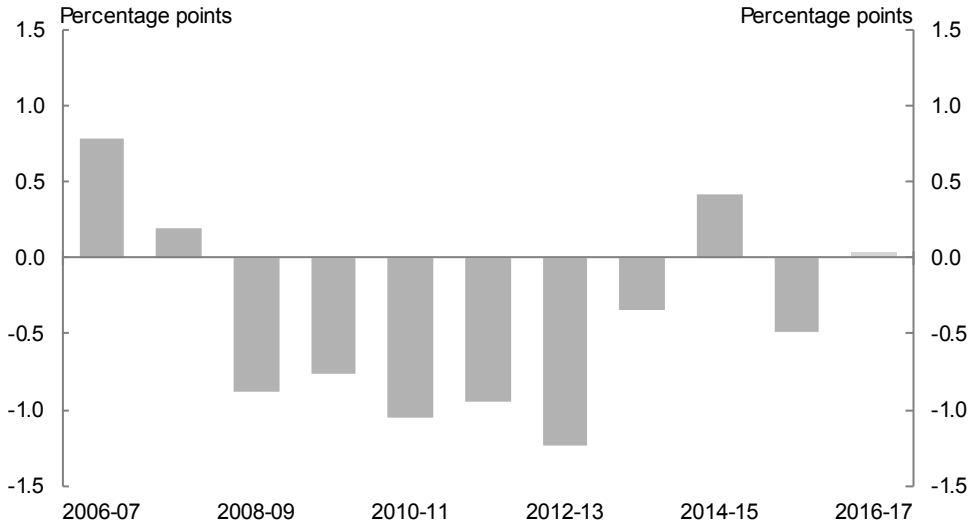
Chart 6: Budget forecast errors on nominal non-farm GDP growth and taxation receipts growth (excluding CGT)



Note: The lower and upper lines indicate the expected forecast error in tax receipts given the associated forecast error in nominal non-farm GDP growth. Forecast errors outside this range could be a result of factors such as timing of tax receipts. The lines are based on aggregate elasticities (of receipts with respect to nominal non-farm GDP) of 1.0 and 1.5 respectively, assuming an error of plus or minus 0.5 per cent if there is zero error on the economic forecasts. Forecast error for 2016-17 is an estimate.
Source: ABS cat. no. 5206.0, Budget papers and Treasury.

From 2008-09, forecast errors in tax receipts have been affected significantly by the economic downturn following the GFC and, in particular, the impact on CGT (Chart 7).

Chart 7: Forecast error on capital gains tax (contribution to tax receipts growth)



Note: Forecast error for 2016-17 is an estimate.
Source: Treasury.

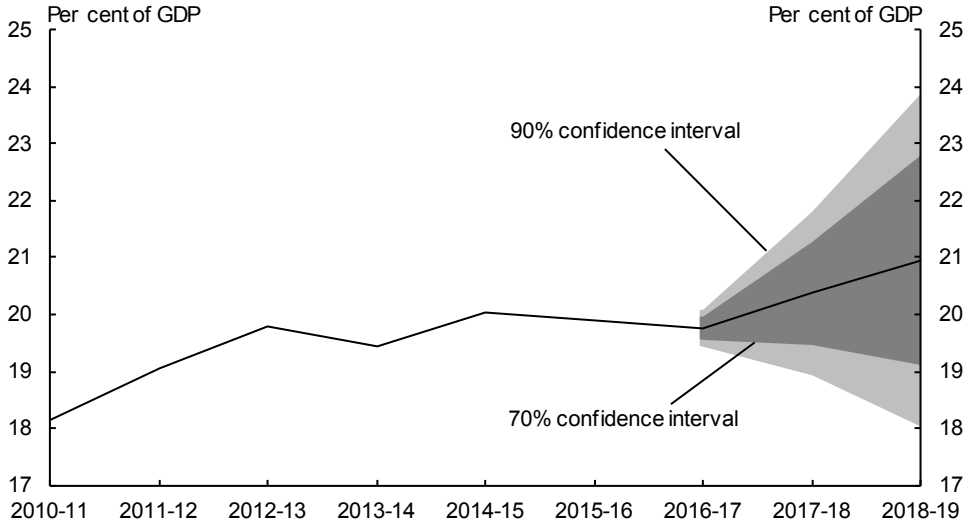
Forecasting CGT is very difficult. Asset price movements above or below the assumption may cause CGT to differ significantly from the forecast. Further, CGT only applies to realised gains, so even if the asset prices are consistent with the assumptions, there may be more or less gains realised than was assumed.

Following the GFC, a large stock of capital losses were carried forward (see Box 2 of Statement 5 of the 2011-12 Budget), and the utilisation of these losses continues to generate large uncertainties in both the timing and magnitude of the forecasts.

Chart 8 shows confidence intervals around the forecasts for receipts (excluding GST[1] and including Future Fund earnings). Confidence intervals constructed around the receipts forecasts exclude historical variations caused by subsequent policy decisions. These intervals take into account errors caused by parameter and other variations in isolation.

1 GST was not reported as a Commonwealth tax in budget documents prior to the 2008-09 Budget. As a result, GST data have been removed from historical receipts and payments data to abstract from any error associated with this change in accounting treatment.

Chart 8: Confidence intervals around receipts forecasts



Note: The central line shows the outcomes and the 2017-18 Budget point estimate forecasts. Confidence intervals use RMSEs for Budget forecasts from the 1998-99 Budget onwards.
Source: Treasury.

The chart shows that there is always considerable uncertainty around receipts forecasts and that this uncertainty increases as the forecast horizon lengthens. It suggests that in 2017-18, the width of the 70 per cent confidence interval for the 2017-18 Budget receipts forecast is approximately 1.8 per cent of GDP ($35 billion) and the 90 per cent confidence interval is approximately 2.9 per cent of GDP ($50 billion).

Payments

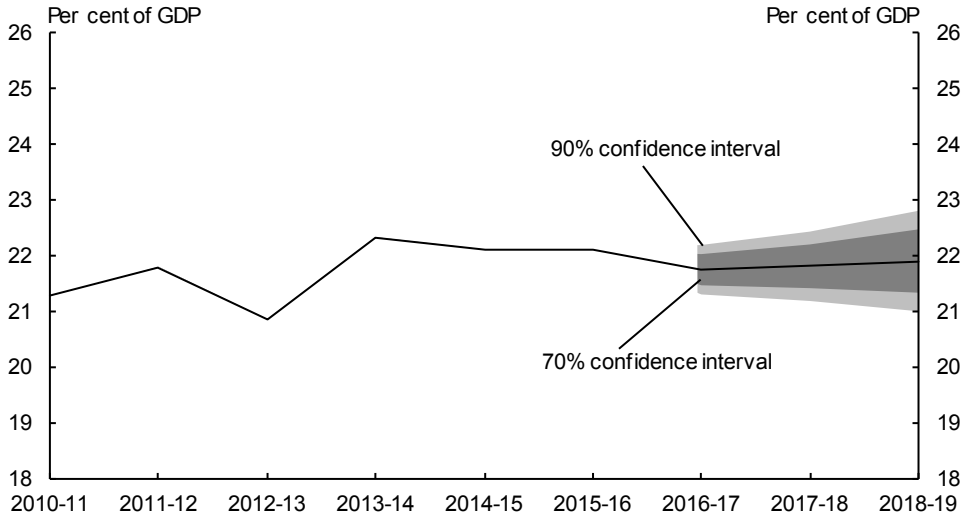
The Government's payments estimates are predominantly prepared by agencies that comprise the Australian Government general government sector. An assessment of payments forecasting performance is not included in this Statement. However, historical errors have been incorporated in estimated confidence intervals.

Chart 9 shows confidence intervals around payments forecasts (excluding GST). As with receipts estimates, historical policy decisions are excluded,[2] and future policy decisions are out of scope. Payments estimates include the public debt interest impact of policy decisions.[3]

2 The allowance for historical policy includes only new policy decisions made at each update. No allowance is made for other decisions, such as assistance for the impact of natural disasters or changes to the timing of projects announced in previous updates. These decisions will contribute to historical forecast errors and therefore increase the size of the confidence intervals around payments.

3 The impacts of past policy decisions on historical public debt interest through time cannot be readily identified or estimated. For this reason, no adjustment has been made to exclude these impacts from the analysis.

Chart 9: Confidence intervals around payments forecasts



Note: See note to Chart 8.
Source: Treasury.

The chart shows that there is moderate uncertainty around payments forecasts. In 2017-18, the width of the 70 per cent confidence interval for the 2017-18 Budget payments forecast is approximately 0.8 per cent of GDP ($15 billion) and the 90 per cent confidence interval is approximately 1.2 per cent of GDP ($25 billion).

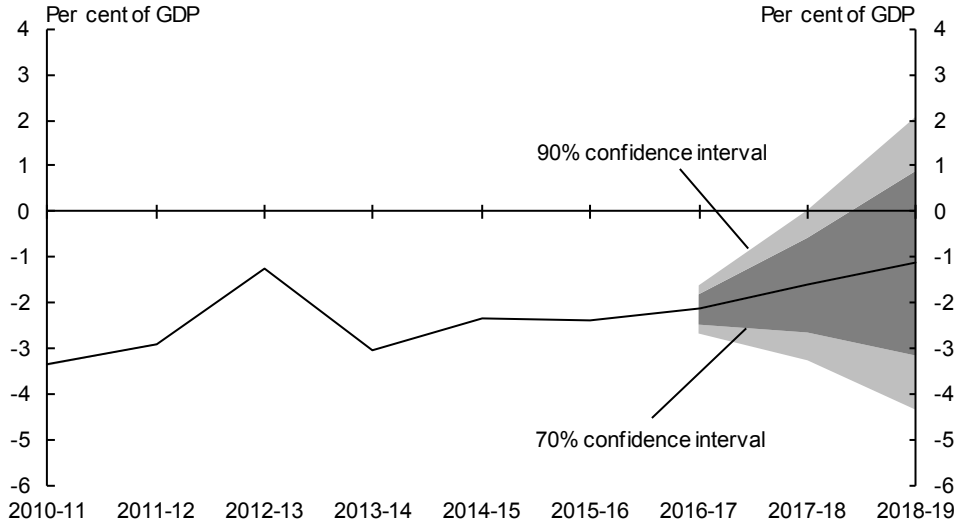
Payments outcomes can differ from forecasts for a number of reasons. Demand-driven programs, such as payments to individuals and some social services, form the bulk of government expenditure. Forecasts of payments associated with a number of these government programs depend on forecasts of economic conditions. For example, higher than forecast unemployment levels will mean that expenditure on related services, including allowances, will be higher than forecast.

Underlying cash balance

The underlying cash balance estimates are sensitive to the same forecast errors that affect estimates of receipts and payments. Confidence interval analysis shows that there is considerable uncertainty around the underlying cash balance forecasts (Chart 10).

In 2017-18, the width of the 70 per cent confidence interval for the 2017-18 Budget underlying cash balance forecast is approximately 2.1 per cent of GDP ($40 billion) and the 90 per cent confidence interval is approximately 3.3 per cent of GDP ($60 billion). In line with receipts forecasts, uncertainty increases over the estimates period.

Chart 10: Confidence intervals around the underlying cash balance forecasts



Note: See note to Chart 8.
Source: Treasury.

SENSITIVITY AND SCENARIO ANALYSIS

Small movements in economic forecasts or projections can improve or worsen the underlying cash balance, depending on their impacts on payments and receipts. This in turn can drive changes in gross and net debt. Consideration of particular scenarios and sensitivity analysis demonstrates the potential impact of these changes. This analysis highlights the uncertainties that governments face should risks eventuate — for example, in meeting budget forecasts or fiscal targets.

The analysis presented in the 2017-18 Budget considers the impact of changes to the economic outlook over both the forecast years and medium-term fiscal projections.

Scenarios 1 and 2 explore the sensitivity of fiscal aggregates to an alternative path for the terms of trade and a delayed recovery in non-mining business investment. These risks are outlined in Statement 2.

Scenarios 3 to 6 illustrate the sensitivity of fiscal aggregates to changes in key assumptions underpinning the medium-term economic projections.

Sensitivity analysis over the forecast period

The following two scenarios provide an indication of the sensitivity of receipts, payments and the underlying cash balance to changes in the economic outlook over the forecast period.

For further information on the sensitivity of the underlying cash balance to changes in inflation, please refer to *Statement 2: Economic Outlook of the 2017 -18 Budget.*

Scenario 1: Alternative path for the terms of trade

This scenario considers the consequences of a permanent 10 per cent movement in world prices of non-rural commodity exports through 2017-18 relative to Budget forecast levels. Such a price rise (fall) is consistent with a rise (fall) in the terms of trade of 4¾ per cent and an increase (decrease) in nominal GDP of 1 per cent by 2018-19. The sensitivity analysis shows the flow-on effects to GDP, the labour market and prices. The impacts in Table 1 are stylised and refer to percentage deviations from the Budget forecast levels due to a permanent rise in non-rural commodity prices. The impacts on the economy of a permanent fall in these prices of the same magnitude would be broadly symmetric.

Table 1: Illustrative impact of a permanent 10 per cent rise in non-rural commodity prices (per cent deviation from the Budget level)[4]

	Impact after 1 year (2017-18) per cent	Impact after 2 years (2018-19) per cent
Real GDP	0	1/4
GDP deflator	1/2	3/4
Nominal GDP	1/2	1
Employment	0	1/4
Wages	1/4	1/2
CPI	0	1/4
Company profits	1 3/4	3 1/4
Nominal household consumption	0	1/2

Assuming no change in exchange rates or interest rates, the increase in export prices leads directly to higher overall output prices (as measured by the GDP deflator) and higher domestic incomes compared with Budget levels. Higher domestic incomes cause both consumption and investment to rise, resulting in higher real GDP and employment and an increase in wages. The rise in aggregate demand puts upward pressure on domestic prices.

On the receipts side, an increase in nominal GDP increases tax collections. The largest impact is on company tax receipts as the increase in export income increases company profits. The impact on company tax is larger in 2018-19, partly owing to lags in tax collections and a larger impact on company profits in the second year of the scenario period. Higher company profits are assumed to flow through to higher Australian equity prices, therefore increasing capital gains tax from individuals, companies and superannuation funds.

On the payments side, a significant proportion of government expenditure is partially indexed to movements in costs (as reflected in various price and wage indicators). Some forms of expenditure, in particular income support payments, are also driven by the number of beneficiaries.

4 These results represent a partial economic analysis only and do not attempt to capture all the economic feedback and other policy responses related to changed economic conditions, and assume no change in the exchange rate, interest rates or policy over the forecast period.

The overall estimated expenditure on income support payments (including pensions, unemployment benefits and other allowances) decreases in both years, reflecting a lower number of unemployment benefit recipients. The fall in spending on unemployment benefits in 2018-19 is partially offset by increased expenditure on pensions and allowances reflecting stronger growth in benefit rates resulting from slightly higher inflation. At the same time other payments linked to inflation also rise in line with the stronger growth in prices.

Given these assumptions, the overall impact of the increase in the terms of trade is an improvement in the underlying cash balance of around $2.0 billion in 2017-18 and around $5.9 billion in 2018-19 (see Table 2). The opposite impacts would be broadly expected for a fall in the terms of trade of the same magnitude.

Table 2: Illustrative sensitivity of the budget balance to a permanent 10 per cent rise in non-rural commodity prices

	2017-18 $b	2018-19 $b
Receipts		
Individuals and other withholding taxes	0.5	1.8
Superannuation fund taxes	0.1	0.2
Company tax	1.2	3.0
Goods and services tax	0.0	0.3
Excise and customs duty	0.0	0.2
Other taxes	0.1	0.3
Total receipts	**1.9**	**5.8**
Payments		
Income support	0.1	0.3
Other payments	0.0	0.0
Goods and services tax	0.0	-0.3
Total payments	**0.1**	**0.0**
Public debt interest	0.0	0.1
Underlying cash balance impact(a)	**2.0**	**5.9**

(a) Estimated impacts fall within the 70 per cent confidence intervals for years 2017-18 and 2018-19, as shown in Charts 8 to 10.

This scenario assumes no change in exchange rates. Under a floating exchange rate, however, an increase in the terms of trade would be expected to lead to an appreciation of the exchange rate. This would likely soften the effects on real GDP, meaning the impact on the fiscal position could be smaller.

The impacts of a US$10 per tonne FOB movement in iron ore prices alone are contained in Box 1.

Box 1: Sensitivity analysis of iron ore price movements

The impacts of a **US$10 per tonne FOB movement in iron ore prices** over the course of a year, based on the sensitivity analysis presented in Scenario 1, is set out in Table A. A US$10 per tonne FOB movement in the iron ore price results in a movement in nominal GDP of around $6.5 billion in 2017-18 and just over $14 billion in 2018-19.

Table A: Sensitivity analysis of a US$10 per tonne movement in iron ore prices

	US$10/tonne FOB[(a)] fall		US$10/tonne FOB increase	
	2017-18	2018-19	2017-18	2018-19
Nominal GDP ($billion)	-6.5	-14.1	6.5	14.1
Tax receipts ($billion)	-1.3	-4.2	1.3	4.2

(a) Prices are presented in free-on-board (FOB) terms which exclude the cost of freight.
Source: Treasury.

Scenario 2: Delayed recovery in non-mining business investment

This scenario considers the consequences of a weaker outlook for business investment than forecast in the Budget. The scenario involves a 3 and 6 per cent reduction in new business investment in 2017-18 and 2018-19 respectively, compared with Budget levels, as a result of a delayed recovery in non-mining business investment. Under this scenario, the level of non-mining business investment would be broadly flat over this two-year period.

Once again, the sensitivity analysis evaluates the flow-on effects to GDP, the labour market and prices. The impacts in Table 3 are stylised and refer to percentage deviations from the Budget forecast levels.

Table 3: Illustrative impact of a delayed recovery in non-mining business investment (per cent deviation from the Budget level)[5]

	Impact after 1 year (2017-18) per cent	Impact after 2 years (2018-19) per cent
Real GDP	- 1/4	- 1/2
GDP deflator	0	- 1/4
Nominal GDP	- 1/4	- 3/4
Employment	- 1/4	- 1/2
Wages	0	- 1/4
CPI	0	- 1/4
Company profits	-1	-1 3/4
Nominal household consumption	0	- 1/2

Assuming no change in exchange rates or interest rates, the delayed recovery in non-mining business investment leads directly to lower real GDP compared with Budget levels and also lower imports. This fall in output depresses employment and,

5 These results represent a partial economic analysis only and do not attempt to capture all the economic feedback and other policy responses related to changed economic conditions, and assume no change in the exchange rate, interest rates or policy over the forecast period.

in turn, wages. This results in lower levels of consumption. The fall in aggregate demand puts downward pressure on domestic prices.

On the receipts side, lower nominal GDP results in lower tax collections. The initial impact is largest on corporate profits and company tax. In the second year, the larger impact on wages and consumption is expected to result in a larger reduction to tax receipts from individuals and the goods and services tax.

On the payments side, overall estimated expenditure on income support payments increases in both years due to a higher number of unemployment benefit recipients. The increase in spending on unemployment benefits in 2018-19 is partially offset by reduced expenditure on pensions and allowances reflecting slightly lower inflation. In addition, other payments linked to inflation fall in line with the reduced growth in prices.

The overall impact of the delayed recovery in non-mining business investment is a decrease in the underlying cash balance of around $1.6 billion in 2017-18 and around $4.3 billion in 2018-19 (see Table 4).

Table 4: Illustrative sensitivity of the budget balance to a delayed recovery in non-mining business investment

	2017-18	2018-19
	$b	$b
Receipts		
Individuals and other withholding taxes	-0.5	-1.8
Superannuation fund taxes	-0.1	-0.1
Company tax	-0.8	-1.7
Goods and services tax	-0.1	-0.3
Excise and customs duty	-0.1	-0.2
Other taxes	0.0	0.0
Total receipts	**-1.6**	**-4.1**
Payments		
Income support	-0.1	-0.4
Other payments	0.0	0.0
Goods and services tax	0.1	0.3
Total payments	**0.0**	**-0.1**
Public debt interest	0.0	-0.1
Underlying cash balance impact(a)	**-1.6**	**-4.3**

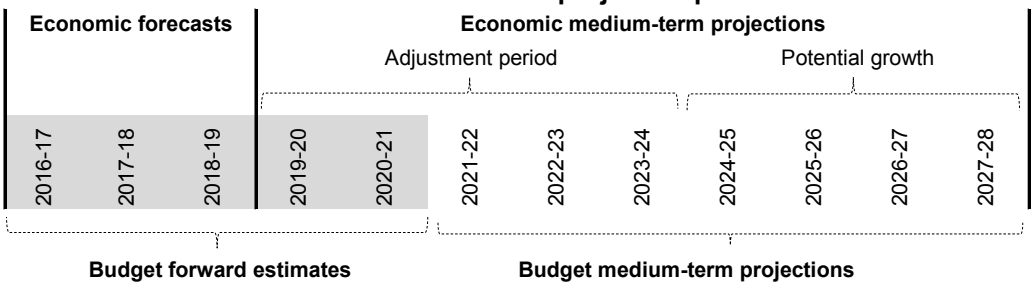
(a) Estimated impacts fall within the 70 per cent confidence intervals for years 2017-18 and 2018-19, as shown in Charts 8 to 10.

Sensitivity analysis over the medium term

The economic estimates underlying the fiscal projections divide the forecast horizon into a near-term forecast period and a medium-term projection period. The forecast period covers the two years following the current financial year. The medium-term projection period covers the remaining nine years (Chart 11). For the fiscal projections,

the medium-term projection period is the seven years after the Budget forward estimates.

Chart 11: Medium-term projection period



Source: Treasury.

The economic and fiscal projections are not equivalent to the economic and fiscal forecasts. The forecasts are based on a range of short-run forecasting methodologies informed by professional opinion and information from business liaison. By contrast, the projections are based on a medium-term methodology. It is crucial to note that they are not estimates or judgments about how conditions will unfold over the medium term. An important assumption is that Government policy does not change.

Economic projections framework

Treasury's medium-term economic projection methodology assumes that any spare capacity remaining in the economy at the end of the forecast period will be absorbed over the following five years (the adjustment period). Over this period, labour force variables including employment and the participation rate are assumed to converge to their long-run trend levels as real GDP returns to potential — the maximum output the economy can produce when there is full employment. This assumption is crucial to the methodology. Importantly, the assumed five-year timeframe may not be validated and this would affect the projections. Treasury continues to review and refine the methodology.

Potential GDP is estimated based on analysis of underlying trends for population, productivity and participation. The Budget forecasts imply that real GDP will be lower than potential GDP at the end of the forecast period — that is, there will be a negative output gap. To close the estimated output gap and absorb forecast spare capacity in the economy, real GDP is projected to grow faster than potential over the adjustment period (over the five years from 2019-20). By the end of the adjustment period, the output gap is assumed to have closed completely and real GDP grows at its potential rate thereafter.

Fiscal projections framework

Treasury's medium-term fiscal projections use the Budget forward estimates as a base. They are therefore subject to similar risks and uncertainties that affect the fiscal aggregates discussed earlier in this Statement, but the longer timeframes mean these risks and uncertainties can be amplified.

Beyond the forward estimates, a range of simplifying assumptions are used to project government receipts and payments. The main drivers are movements in economic growth, the size and structure of the population and prices. The medium-term economic projections are a critical driver of the fiscal projections. For payments, a key parameter is expected per person costs (in each age bracket) of major government programs based on current Government policy. The projections assume current Government policy does not change.

Changes to the assumptions underpinning Treasury's estimate of Australia's potential GDP — as well as the pace of adjustment back to potential — can have large impacts on the fiscal projections. The following section illustrates the sensitivity of fiscal aggregates to these assumptions over the medium-term projection period.

Output gap scenarios

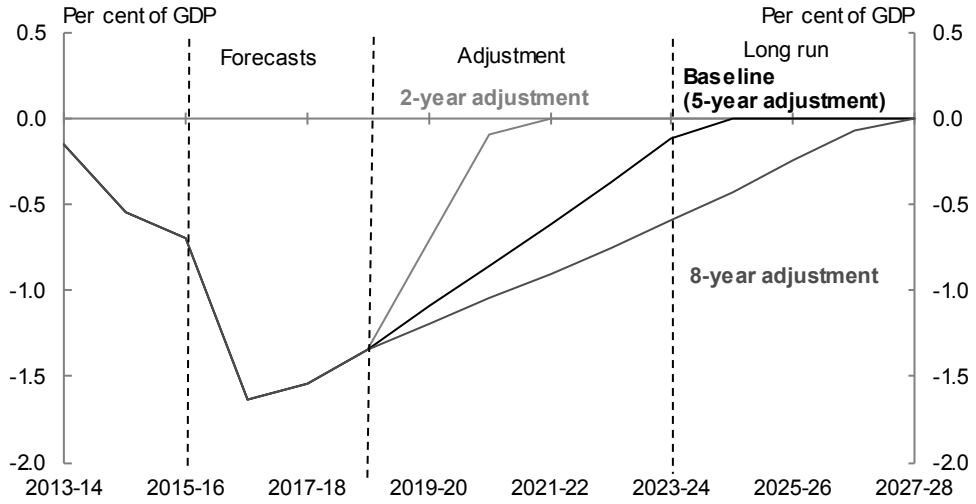
Scenarios 3 and 4: Alternative output gap adjustment period assumptions

As noted above, the assumption that the adjustment takes five years is crucial and is subject to considerable conjecture as to whether it is appropriate. Scenarios 3 and 4 examine the consequences of shorter (2 years) and longer (8 years) adjustment periods, respectively.

Over the five year adjustment period, real GDP is projected to grow at 3 per cent a year — faster than the estimated potential growth rate of the economy of 2¾ per cent — to close an estimated output gap of around 1½ per cent of GDP.

In Scenario 3, a shorter adjustment period requires faster real GDP growth over the adjustment period (Chart 12). In the two-year adjustment period, annual real GDP growth is 0.4 percentage points higher than in the baseline projections to return the economy to its potential level over two years rather than five years.

Chart 12: Output gap — Illustrative impact of closing the output gap over two or eight years



Source: Treasury.

Under this scenario employment grows more quickly than in the Budget projections, leading to lower unemployment over the first five projection years. This in turn generates faster growth in wages and domestic prices. While the long-run level of real GDP is unchanged from Budget, the price level is permanently higher. As a result, closing the output gap over two years increases the level of nominal GDP in 2027-28 by around 1 per cent compared with Budget.

The higher level of nominal GDP also means higher projected tax receipts over the 10-year period to 2027-28. Payments are projected to be lower, driven largely by lower projected unemployment which reduces unemployment benefit recipient numbers.

Overall, the faster adjustment in Scenario 3 has a positive impact on the underlying cash balance (Chart 13). In this scenario, the underlying cash balance peaks at 0.9 per cent of GDP in 2021-22, before falling gradually over the medium-term to 0.7 per cent of GDP in 2027-28. This is compared to baseline projections which peak at 0.5 per cent of GDP in 2024-25, before falling to 0.4 per cent of GDP by 2027-28.

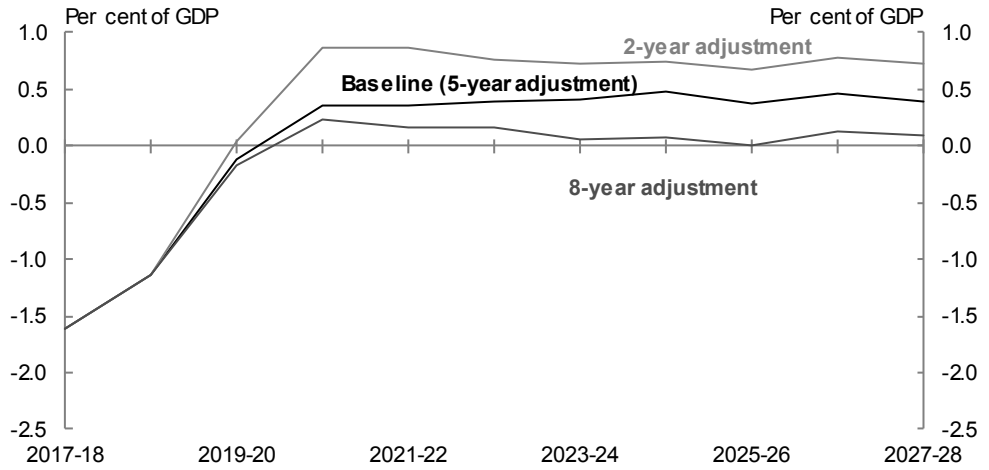
The variation in the underlying cash balance would have implications for the level of government debt. Under Scenario 3, gross debt would be lower, reflecting lower Government borrowing associated with the stronger Budget position. Public debt interest payments would also be lower, further contributing to the improvement in the underlying cash balance.

In Scenario 4, a longer adjustment period requires slower real GDP growth over the adjustment period to return the economy to its potential level over eight years rather than five. This leads to higher unemployment over the eight years of the adjustment

period and slower growth in wages and domestic prices compared with the Budget projections.

A slower adjustment in Scenario 4 has a negative impact on the underlying cash balance. Receipts are lower across the period and payments higher overall. In this scenario, the underlying cash balance peaks at 0.2 per cent of GDP in 2020-21, deteriorating to broad balance over the medium term. Gross debt and public debt interest payments would be higher than in the baseline scenario.

Chart 13: Underlying cash balance — Illustrative impact of closing the output gap over two or eight years



Source: Treasury projections.

Productivity scenarios

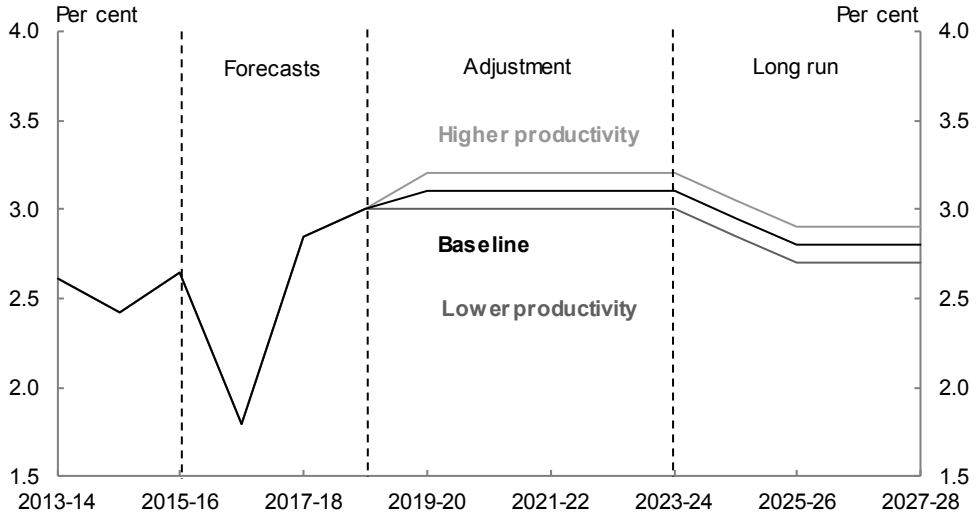
Scenarios 5 and 6: Alternative trend labour productivity growth assumptions

Labour productivity growth is an important determinant of Australia's potential GDP growth. The Budget projections assume that labour productivity grows at a trend rate of 1.6 per cent a year, in line with its 30-year average annual growth rate.

Scenario 5 examines the consequences of a trend rate of labour productivity growth of 1.5 per cent a year, which is 0.1 percentage points lower than the Budget projections. This reduces the economy's potential growth rate over the projection period (Chart 14). As a result, real GDP grows more slowly over the adjustment period compared with the baseline projections to close the output gap and absorb spare capacity in the economy.

By the end of the projection period in 2027-28, real GDP is around 1 per cent lower compared with the Budget projections. Lower labour productivity growth also flows through to lower wages. Nominal GDP falls in line with real GDP as there is only a small effect on wages per unit of output (nominal unit labour costs) and, in turn, prices.

Chart 14: Real GDP growth rate — Illustrative impact of higher and lower trend productivity growth



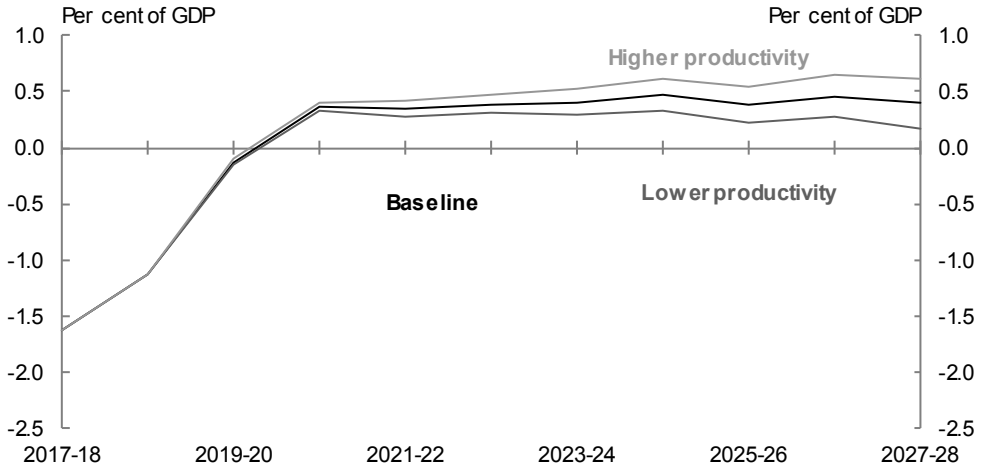
Source: ABS cat. no. 5206.0 and Treasury.

In Scenario 5, the underlying cash balance peaks at around 0.3 per cent of GDP in 2024-25, before falling to 0.2 per cent of GDP in 2027-28. This is because of lower projected receipts, owing to lower nominal GDP and a small increase in government payments. Gross debt would be higher, reflecting higher borrowing associated with larger Budget deficits. Public debt interest would also be higher.

Scenario 6 assumes a trend labour productivity growth rate of 1.7 per cent a year, which is 0.1 percentage points higher than the assumption factored into the Budget projections. This has broadly opposite effects on the economy compared with Scenario 5, resulting in higher real GDP and higher wages.

In Scenario 6, the underlying cash balance peaks at 0.6 per cent of GDP in 2026-27 (Chart 15). Gross debt would be lower, reflecting lower Government borrowing. Public debt interest would also be lower.

Chart 15: Underlying cash balance — Illustrative impact of higher and lower trend productivity growth



Source: Treasury projections.