Parliamentary
Budget Office

FISCAL SUSTAINABILITY

Long-term budget scenarios

Report No.
01/2021

April 2021

Contents

Overview

The coronavirus pandemic and associated policy responses have led to the largest deterioration in the Commonwealth Government's fiscal position since the Second World War.

Gross debt has increased from 28 per cent of GDP before the pandemic to over 40 per cent of GDP in 2020-21, and is expected to increase to over 50 per cent of GDP in 2022-23. The government projects debt will remain above 50 per cent of GDP for at least the next decade.

Public debt levels may become concerning if they result in governments having to devote an ever-increasing share of their revenue to meeting their interest expenses, leading in turn to a need to significantly increase taxes, cut spending, sell assets and/or further increase debt.

This report examines the sustainability of the government's fiscal position by calculating future paths for debt under various scenarios …

The long-run path for the debt-to-GDP ratio depends on three factors: economic growth, interest rates and the government's budget balance. This report shows the trajectory of the debt-to-GDP ratio for a range of scenarios based on the degree that these three factors have varied over time. We calculate the long-run size and growth of the economy through the 'three Ps' framework: population, participation and productivity, similar to the approach used in budget papers.

… indicating that the government's fiscal position is sustainable in the long term …

Our scenarios for GDP growth, interest rates and the budget balance suggest that the government will be able to maintain a sustainable level of debt relative to GDP over the coming decades.

We present 27 different scenarios, showing government debt stabilising or falling beyond the next decade. Debt interest payments also remain manageable. Only the highly unlikely scenario of a generation of low economic growth combined with high interest rates and large budget deficits results in debt increasing as a share of GDP, after 2050.

The scenarios also show that a sustainable fiscal position can be maintained even if the budget remains in a modest deficit position over the long term, although reaching that position will require governments to continue to increase revenue and/or contain spending to return the budget balance to the average levels recorded over time.

… but the level of debt is likely to remain high for a generation.

Reducing the government debt-to-GDP ratio to pre-pandemic levels will take decades, even under relatively optimistic scenarios. However, debt servicing costs should remain subdued as the existing debt was borrowed at historically low interest rates.

This report presents the Parliamentary Budget Office's framework for assessing fiscal sustainability, and uses this to assess fiscal sustainability in the aftermath of COVID-19. Using this framework, we analyse the trajectory of the debt-to-GDP ratio under different scenarios. This report follows our two *Medium-term fiscal scenarios* reports (June and August 2020), based on the RBA's economic forecasts, and our *Medium-term fiscal projections* report (December 2020) based on the 2020-21 Budget.   Our fiscal sustainability analysis will be updated with future editions of our annual *Medium-term fiscal projections* report. The next edition of that report is expected to be released later this year.

Box 1 – How this report differs from the Intergenerational Report

The *Charter of Budget Honesty* requires the Commonwealth Government to release an Intergenerational Report (IGR) at least every five years. The first IGR was released in 2002 and the most recent in 2015, with the next due in 2021, delayed due to the COVID-19 pandemic.[1] While our report and the IGR each examine the fiscal position over a long time horizon, there are important differences in the methodology and the intention of the analysis. The results are not directly comparable.

The IGR presents 40-year projections of the government's fiscal position, based on disaggregated modelling of government spending programs, accounting for demographic changes (the 'ageing population') and other trends. The projections are made on a 'no policy change' basis, meaning that the IGR illustrates how the fiscal position might evolve in the absence of new government policies. Previous IGRs have shown that this results in a deteriorating fiscal position, driven by higher expenditure on items such as health, aged care and pensions.

The IGR is not an attempt to predict the future, as the 2015 IGR notes on page xxv:

> *The projections in this report are very unlikely to unfold over the next 40 years exactly as outlined. Things will happen that are not anticipated in the report's assumptions, and government policy will change. The projections are not intended to be a prediction of the future as it will actually be, rather they are designed to capture some of the fundamental trends that will influence economic and budgetary outcomes should policies remain similar to current settings. They help to inform us about where there are opportunities to be seized, and where there are challenges to be overcome.*

Similarly, our scenarios are not an attempt to predict the future. Our approach is, however, different to the IGR. While the IGR is guided by the question, "How might the fiscal position evolve under current policy settings?" our scenarios are guided by the question, "If the government maintains a budget balance broadly in line with historical precedents, is the fiscal position sustainable?"

This means we assume that government policy changes over time in order to maintain the budget position, just as successive governments have, over time, adjusted policy settings as circumstances change. Our analysis uses inputs from the 2015 IGR, including participation rates by age and sex, but our approach is 'top-down' rather than 'bottom-up'. We do not identify *particular* policy areas that may be adjusted in the future. Instead, we focus on whether the general approach to budgeting needs to change. Our analysis suggests that governments will not need to resort to a fiscal strategy significantly different from the past. A measured pace of fiscal consolidation – even involving modest deficits – is consistent with a fiscally sustainable position.

The IGR has been an essential document for alerting the public to spending areas unsustainable under current policy settings, helping governments to explain the rationale for policy changes. This report serves a different purpose and should not be interpreted as a commentary on the IGR, nor should our scenarios be compared to the results in the IGR.

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[1] Coronavirus Economic Response Package Omnibus Bill 2020 (2020 Act No. 22), passed 23 March 2020: "An intergenerational report is to be publicly released and tabled on or before 30 June 2021".

1 Why fiscal sustainability matters

Fiscal sustainability refers to the government's ability to maintain its long-term fiscal policy arrangements indefinitely, without the need for major remedial policy action. A fiscally sustainable position enables the private sector to make financial decisions with confidence about the direction of government policy, helps the government achieve its objectives and gives it space to respond to an economic downturn by stimulating the economy, if needed.

Governments around the world have markedly increased their borrowing in order to fund their responses to the COVID-19 pandemic and also as a result of the impact of the ensuing economic downturn on their revenues. In Australia, the Commonwealth Government has provided an unprecedented level of emergency support. The initial response, including health measures, the JobKeeper Payment, cash flow boosts for employers, the Coronavirus Supplement and foregone revenue totalled almost $300 billion.[2]

Australia's substantial response has resulted in significant government debt. Despite its relatively high capacity to respond to the recession, reflecting a solid pre-pandemic fiscal position, the scale of the response may prompt concern that the stimulus has created future fiscal challenges which would require either exceptional short-term remedial action and/or long-term fiscal austerity.

This report uses a scenario approach to assess the long-term sustainability of the Commonwealth Government's fiscal position. Being the largest single economic agent in Australia, confidence in the government's stability, reliability and general predictability provides the basis for business, household and public sector financial decision making. An actual or perceived unsustainable fiscal position has the potential to undermine this confidence.

A fiscally sustainable public sector underpins private sector certainty

Individuals, firms and markets make decisions about employment, consumption and investment in light of current *and expected* government policy. These decisions are generally easier for the private sector to make when the actions of the public sector are considered likely to continue in line with established patterns.

A commitment to fiscal sustainability provides the private sector with certainty regarding the broad direction of government fiscal policy. It means that the private sector can reasonably expect that there will be a degree of fiscal consolidation during economic boom periods, and fiscal stimulus to support the economy in response to downturns. In addition, the private sector may justifiably expect that there will be policy changes, such as adjustments in personal income tax for bracket creep, and adjustments to manage expenditure (for instance, due to an ageing population). With a commitment to fiscal sustainability, the private sector is unlikely to anticipate abrupt increases to the overall level of taxes or reductions to the overall level of expenditure.

A perception that taxes need to markedly increase or spending reduce outside of the typical cycle may create uncertainty and reduce confidence for the private sector.[3] The consequences of this could include reduced consumption, business investment, and economic growth.

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[2] Australian Government (2020), Budget 2020-21 Overview. According to the IMF Fiscal Monitor database in October 2020, Australia's 'above the line' measures totalled 11.7 per cent of GDP, one of the largest responses of advanced economies.

[3] OECD (2011), Fiscal consolidation: targets, plans and measures, *OECD Journal on Budgeting*, 11(2), pp. 15–67.

In a more extreme case, if debt continues to grow unsustainably, this could have detrimental impacts for an economy through, for instance, investors seeking higher yields, with consequences for employment and the general standard of living.

Fiscal sustainability underpins public objectives

The first Intergenerational Report, published in 2002, noted that:

> *Government[s]…provide essential goods and services that the private sector does not provide sufficiently. For example, the government provides income support payments, funds for hospitals, schools, clean air and water, and promotes fairness in the distribution of public resources between generations of Australians.*[4]

A government can best achieve its public policy objectives when it has confidence that its fiscal position is sustainable, allowing it to plan provisions for the needs of society. A government unsure of its ability to manage its debt may be overly cautious, significantly reducing services or welfare payments or raising taxes. Such austerity, aimed at regaining control of government finances, may be partly counter-productive, reducing economic growth.

Alternatively, a government lacking confidence in its fiscal position may try to grow its way out of debt with a large increase in spending to stimulate the economy, but potentially generating high or volatile inflation and interest rates in addition to large budget deficits and more debt.

While we do not know the future, a government acting with a level of assurance over its fiscal position will be better placed to face current needs and to plan for future challenges.

A fiscally sustainable position makes it easier to respond to economic downturns

Economic downturns, such as those associated with the Global Financial Crisis and the COVID-19 pandemic, inevitably result in lower government revenue and higher government spending.[5]

One reason for this is the presence of 'automatic stabilisers' in the tax and transfer system, such that revenue falls and spending increases without the government needing to make explicit adjustments to policy. These help to stimulate the economy during a downturn, by reducing tax liabilities as incomes fall (for example, through the progressive personal income tax system and the company tax system) and increasing the number of people eligible for government support payments (such as JobSeeker and Family Tax Benefit).

Another reason is discretionary fiscal stimulus. Governments often respond to downturns by introducing specific policies, such as tax cuts or temporary spending increases, to stimulate economic activity. For example, the Australian Government's COVID-19 stimulus measures included the JobKeeper payment, Economic Support Payment, bringing forward personal income tax cuts, and temporary investment expensing for companies.

In order to respond to a downturn, through either automatic or discretionary mechanisms, governments need 'fiscal space': the flexibility in the budget for revenue and spending to adjust without undermining fiscal sustainability. This means strengthening the fiscal position in good economic times. Governments can introduce fiscal buffers, which are policies that seek to increase

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[4] Australian Government (2002), *Intergenerational Report 2002-03*, 2002-03 Budget Paper No. 5, p. 14.

[5] See Parliamentary Budget Office (2021), *National fiscal outlook: As at 2020-21 mid-year fiscal updates budgets*, 4 March 2021.

revenue or decrease spending in periods of higher-than-average economic growth. Operating alongside automatic stabilisers – which also result in increased revenue and reduced spending when an economy is growing quickly – fiscal buffers can also help keep inflation and interest rates at manageable levels.

Without adequate fiscal space for a government to respond, an economic downturn may be longer and more painful. But a slower economic recovery can also have an adverse impact on fiscal sustainability, particularly if the interest payments required to service existing debt exceed the rate at which the economy is growing.[6]

A fiscally sustainable budget position enables a government to provide necessary support when a downturn occurs at some time in the future.

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[6] Arellano, C. and Bei, Y. (2017), Fiscal austerity during debt crises, *Economic Theory*, 64(4), pp. 657–673; Auerbach, A. J. and Gorodnichenko, Y. (2017), *Fiscal stimulus and fiscal sustainability*, National Bureau of Economic Research.

2 How fiscal sustainability is assessed

There is no single agreed measure of fiscal sustainability. Some approaches to measuring fiscal sustainability are broad, involving qualitative assessments of structural factors, such as changes in demographics, that may result in particular spending growing faster or revenue growing slower than GDP, or a simple assessment of how quickly the budget is expected to return to surplus. Other approaches are narrow, mathematical formulations which attempt to calculate exactly how much the government would have to raise taxes or cut spending in order to meet a sustainability condition.

This chapter briefly reviews the presentation of fiscal projections in the government's budget papers and some other approaches to measuring fiscal sustainability, including from the academic literature, before introducing the approach used in this report.

The government's budget provides information on the short- to medium-term fiscal position

Long-term fiscal sustainability is dependent on past, current and future government activity.[7] The various aggregate measures presented in the budget are based on past and current activity.

Balance sheet aggregates shown in the budget, such as gross and net debt, largely reflect *past* government activity. While the level of debt may generate concern, these measures on their own do not provide information about their future trajectory.

The budget papers provide projections for balance sheet aggregates, but these are limited to the 'medium term', the period currently ending in 2030-31. Although this time period has been useful for assessing fiscal sustainability in the past, even immediately following the Global Financial Crisis, it is not a sufficient time period to assess the sustainability of the post-pandemic fiscal position – much of the debt incurred as a result of the pandemic and the recovery period will still exist in ten years' time and beyond[8] (see Box 4 on page 11). In addition, under the 2020-21 Budget assumption, interest rates (yields) on government bonds do not return to their long-run level for almost twenty years (see Figure 4 on page 12).

The ten-year projections typically presented in the budget papers have also been based on a single view of how the economy will perform. While a sophisticated analysis of alternative economic assumptions is provided for the near term, no similar analysis has been presented for debt over the medium term.[9]

Projections in the budget papers are also based on *current*[10] government policy.[11] They do not make an allowance for any future changes to government spending, and in some cases assume that spending programs do not extend beyond the time period currently specified in legislation.

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[7] Office for Budget Responsibility (2011), *Discussion paper No. 1: What should we include in the Fiscal sustainability report?*, March 2011.

[8] Assuming the debt is refinanced as it matures.

[9] The 'forward estimates' period is the period over which the government presents its budget estimates. It includes the budget year and the following three years. The 2020-21 Budget Paper 1, Statement 8 provides sensitivity analysis for the 'near term', but the sensitivity analysis for debt over the medium term is limited to alternative bond yields.

[10] Current policy means any policy that has been announced by government, irrespective of whether it has been legislated.

[11] The budget assumptions include an upper limit on the tax-to-GDP ratio, such that bracket creep does not continually increase revenue. This assumption therefore implicitly factors in unspecified tax cuts, should the projected tax-to-GDP ratio rise above the 'cap'. The expense side of the budget does not use such assumptions.

In addition to the budget, the government releases the Intergenerational Report (IGR), last published in 2015 with the next edition to be published later this year. As explained in Box 1, the IGR assesses the sustainability of *current* government policy over a 40-year period. Like the budget papers, it assumes that there is no policy change over the period and examines what is expected to happen to various expenditure items as demographics change. A 'no policy change' assumption is appropriate for assessing the fiscal position over a short time horizon, as per government budgets, or for assessing the sustainability of *current* government policy, as per the IGR. But for assessing whether the budget position might be sustainable, there are benefits to taking a 'top-down' approach, that simply considers changes in economic growth, interest rates and the budget balance, rather than building up a picture of the budget by modelling each of its major programs.[12] Our approach allows for policy change and swings in the economy, provided they are broadly in line with the past.

Measures of fiscal sustainability have limitations

Some approaches to assessing fiscal sustainability are based on projecting the economy in detail over many decades through complex modelling. The results are dependent on assumptions for key variables, including future government activity, and the methods tend to be inaccessible to a non-academic audience and difficult to reproduce without the exact model.

Quantitative measures of fiscal sustainability in the academic literature include the following:

1 **Fiscal gap:** a measure of how much the government's expenditure is expected to exceed its revenue over a fixed time horizon.[13] It indicates the cumulative size of the policy changes required to keep debt-to-GDP constant over the same time period, and relies on forecasts of economic and financial variables.

2 **Sustainable tax gap:** a measure of how much taxes would need to rise to keep debt-to-GDP constant for a given set of expenditure projections over a fixed time horizon. The measure itself is calculated as the difference between the sustainable tax rate and the actual tax-to-GDP ratio. This approach is conceptually similar to the fiscal gap.

3 **Intertemporal budget constraint:** a condition that states that the present value of all future government receipts should exceed the present value of all future spending, including the service costs of existing debt. If a government does not satisfy the constraint, the intertemporal budget gap measures the size of the permanent tax increase or spending cut relative to GDP that would ensure the constraint is meant. This approach requires 'discounting' future receipts and spending by an assumed benchmark interest rate.

While these measures give an indication of the degree to which government policy would need to respond to keep debt constant relative to GDP, the measures are subject to limitations:

• Fiscal consolidation policies may reduce GDP growth, which has an offsetting effect.[14] This means that each of the above measures may understate the size of government policy required to keep debt-to-GDP constant.

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[12] See Office for Budget Responsibility (2011), *Discussion paper No. 1: What should we include in the Fiscal sustainability report?*, March 2011, section 5.9 to 5.19.

[13] The approach taken by the IGR is broadly similar to the 'fiscal gap' method, in that it estimates the trajectory of expenditure under current policy settings, factoring in demographic changes, while holding revenue fixed as a share of GDP. The 2007 and 2010 editions of the IGR provided estimates of the fiscal gap.

[14] Chalk, N. and Hemming, R. (2000), *Assessing fiscal sustainability in theory and practice*, IMF Working Paper April 2000.

- Keeping debt-to-GDP at current levels is not the only way to achieve fiscal sustainability – if debt-to-GDP increases in the short term before stabilising, this may still be sustainable, although it would not appear sustainable according to the fiscal gap or the sustainable tax gap.

- The choice of the benchmark interest rate for 'discounting' when calculating the intertemporal budget constraint can greatly affect the conclusion.[15]

- The measures do not give any indication of the optimal timing for any policy change.

- The measures do not, as a general rule, account for uncertainty in the projections of debt.

Like the measures listed above, the analysis presented in this paper relies on long-term modelling in order to assess fiscal sustainability.[16] But there are some key differences in our approach: it does not rely on complex modelling but uses an accessible 'top-down' method; it explicitly looks at the trajectory of debt-to-GDP; and it implicitly accounts for uncertainty, as the following section explains.

Our scenarios are based on three drivers of debt

Consistent with other 'top-down' approaches and explained in detail in the next chapter, this report presents estimates of the debt-to-GDP ratio over time based on different scenarios for interest rates (r), economic growth (g) and the government's budget balance (B) – we refer to this as the r-g-B framework. One of the benefits of taking a top-down approach is it implicitly allows for policy changes – for instance, adjustments to spending or taxation that would offset the impact of demographic changes – without having to explicitly state what these are. In contrast, a bottom-up approach, as used in the budget and IGR, either assumes no policy changes, or otherwise explicitly models particular policy changes.

This analysis focusses on the *trajectory* of future gross debt under a range of scenarios as a measure of fiscal sustainability. The central question is whether, under plausible scenarios, gross debt stabilises and falls, or continues to increase. Using this framework, the fiscal position is sustainable under a particular scenario if the trajectory of gross debt is broadly stable or falling towards the end of the scenario period. Our scenarios extend to 2054-55, the end of the 2015 IGR projection period.

Our approach does not present one 'central' projection, but instead tests the trajectory for debt across a range of economic scenarios for r, g and B, based on the degree to which these factors have varied over time. This approach is attractive because it is allows us to present the uncertainties. As explained in Box 3 on page 8, the approach is relatively intuitive and only requires simple modelling through an accounting relationship. We have not, however, analysed scenarios which vary radically from historical ranges.[17]

In order to determine the potential size and growth of the economy, our approach uses the 'three-Ps' framework (see Box 5 on page 15): population, participation and productivity.[18] For simplicity we focus on 'gross debt', the face-value of government securities on issue. Box 2 outlines the differences between various alternative government balance sheet aggregate measures, noting that the measures have tended to move in similar ways over the last thirty years.

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[15] This 'discount rate' allows for a meaningful comparison between costs and benefits today with costs and benefits in the future.

[16] See also the PBO's 2017 report, *2017-18 Budget medium-term projections: economic scenario analysis*, Report no. 05/2017, December 2017.

[17] For example, a scenario where interest rates remain at 10 per cent for decades while nominal GDP grows at only 5 per cent would obviously result in the debt-to-GDP ratio rapidly increasing, but it is not consistent with history. We therefore consider this scenario neither plausible nor credible.

[18] This approach is consistent with the fiscal aggregate projection model underlying the budget papers and the IGR.
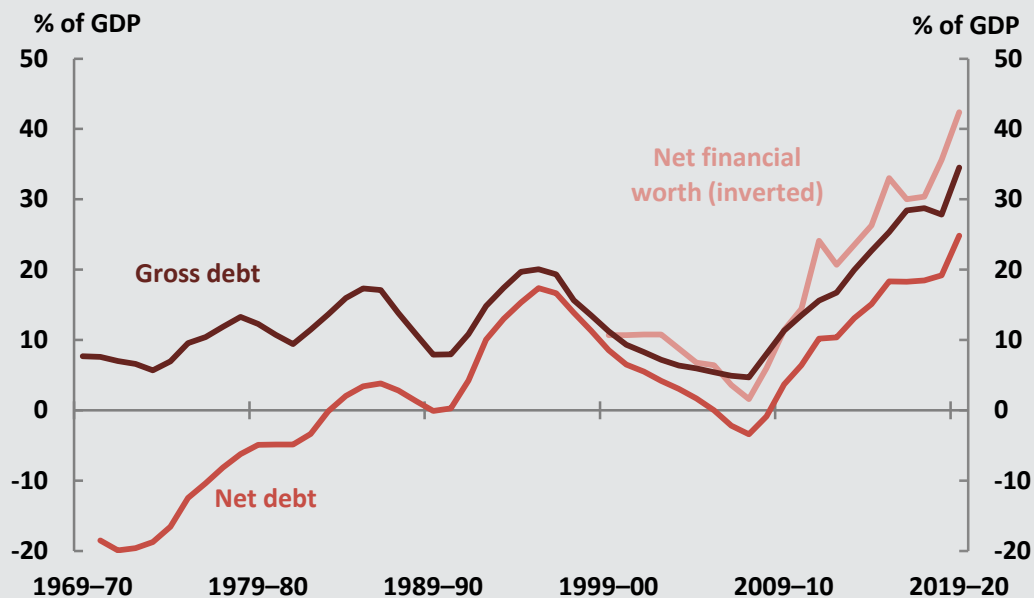
Box 2 – Gross debt, net debt and net financial worth

Gross debt measures the total amount of government interest bearing liabilities before considering any financial assets. There are, however, other measures that appear on the government's balance sheet that relate to fiscal sustainability:

- **Net debt** subtracts the value of selected government financial assets from gross debt. As such, this gives a more complete picture of the government's balance sheet than gross debt. In the budget papers, gross debt and net debt also differ due to the valuation method used – gross debt is based on the face value of the government's bonds on issue, while net debt is based on their market value.

- **Net financial worth** is a broader concept than net debt – it includes *all* financial assets and liabilities, including those not counted in net debt, such as equity investments and the government's unfunded superannuation liability.

- **Net worth** is a still broader concept, including non-financial assets such as land and structures, as well as financial assets and liabilities.

Figure 1 shows that gross debt, net debt and net financial worth have historically followed a similar trajectory. Gross debt, however, is conceptually simpler than net debt or net financial worth for the purposes of undertaking scenario analysis. Our analysis focuses on the *trajectory* of gross debt, as opposed to the level, which acts as a proxy for the trajectory of net debt and net financial worth. We do not consider cases where gross and net debt evolve on different paths.

Figure 1: Different measures of debt move in similar ways
Gross debt, net debt and net financial worth

Note: State debt managed by the Australian Government on their behalf is included in the historical tables in the Budget Papers, while the figure above does not include this State debt. Net financial worth is presented with the opposite sign for comparison purposes. This means that a downward movement on the graph is actually an improvement in net financial worth (and vice versa). Net financial worth is not available before 1999-00.
Source: Budget Papers 1970–2020 and Parliamentary Budget Office (PBO) analysis.

3 How the Commonwealth's debt has changed over time

The trajectory for gross debt relative to GDP depends on three factors:

1 The average interest rate (r) on the stock of Australian Government Securities (bonds) on issue. A higher interest rate generates higher interest payments on debt, which will in turn result in debt being higher than it would have otherwise been.

2 The growth rate of the nominal (dollar value) economy (g). The debt-to-GDP ratio will fall as GDP increases.

3 The budget balance (B), which depends on the economy and government policy. If debt-to-GDP is otherwise stable, a surplus means that debt can be paid down, while a deficit will lead to an increase in debt. Our analysis focuses on the *headline cash balance*, which directly affects the level of gross debt, rather than the underlying cash balance, which does not include items such as asset sales and purchases. Although interest payments are normally a component of the headline cash balance, our analysis separates these components. To avoid double-counting the interest payments, we use the headline cash balance excluding interest payments.

The difference between the interest rate on government debt and the rate of economic growth, ($r - g$), is the key to understanding how debt changes over time. For a budget in balance before interest payments, ($B = 0$), the debt-to-GDP ratio will increase when the interest rate exceeds the economic growth rate, and decrease when the economic growth rate exceeds the interest rate. This means that it is possible for debt-to-GDP to remain constant or fall even while running deficits. The algebraic formula for debt is shown in Box 3.

> **Box 3 – The trajectory of government debt: interest, GDP growth and the budget balance**
>
> Government debt (D) at the end of any year (t) is equal to remaining debt at the end of the previous year ($t - 1$) plus interest (I), less the budget balance excluding interest (B): a budget surplus ($B > 0$) will reduce debt while a deficit ($B < 0$) will increase debt.
>
> $$D_t = D_{t-1} + I_t - B_t$$
>
> Interest payments are the implied interest rate (r) applied to existing debt:
>
> $$D_t = D_{t-1} + r_t D_{t-1} - B_t$$
>
> Showing this relative to the size of the economy (*GDP*):
>
> $$\frac{D_t}{GDP_t} = \frac{(1 + r_t)D_{t-1}}{GDP_t} - \frac{B_t}{GDP_t}$$
>
> Now noting that GDP is equal to GDP of the previous year plus any growth in GDP (g):
>
> $$\frac{D_t}{GDP_t} = \frac{(1 + r_t)D_{t-1}}{(1 + g_t)GDP_{t-1}} - \frac{B_t}{GDP_t}$$
>
> The change in government debt as a share of the economy over time – the *trajectory* of the debt-to-GDP ratio – can therefore be expressed as:
>
> $$\frac{D_t}{GDP_t} - \frac{D_{t-1}}{GDP_{t-1}} = \frac{r_t - g_t}{1 + g_t} \times \frac{D_{t-1}}{GDP_{t-1}} - \frac{B_t}{GDP_t}$$

This chapter first outlines how the r-g-B framework has determined the trajectory of the debt-to-GDP ratio over history, then how the three factors are interrelated, and finally how we have generated our projection scenarios based on historical ranges.

Australia's historical debt-to-GDP ratio has been largely cyclical

Australia has experienced periods of high and low gross debt (Figure 2). Periods of increasing debt have tended to follow an economic downturn, including during the two world wars, the Great Depression, recessions in the 1970s, 1980s and 1990s, the Global Financial Crisis and, more recently, the COVID-19 recession.

Debt has tended to peak a few years after an economic downturn, while economic growth in the years following the peak has been a key driver of fiscal consolidation.

The debt-to-GDP ratio reached its peak of almost 100 per cent at the end of the Second World War. Over the following decade, the debt-to-GDP ratio fell rapidly, despite the value of debt remaining constant at around 160 million pounds. During this period, nominal GDP growth averaged 14 per cent while the interest payments amounted to around 3½ per cent of the debt. With g far larger than r, and the government running a largely balanced budget[19], the debt-to-GDP ratio fell rapidly.

The debt-to-GDP ratio also periodically increased during the series of global economic shocks between 1974 and 1990, but always decreased again despite the budget rarely achieving a surplus. The fiscal position remained manageable because nominal GDP continued to grow faster than interest rates.

By the mid-1990s, the rate at which the government was paying interest was regularly exceeding the growth rate in the economy, even though the interest rate on new debt had reduced from historically high levels in the 1980s. The reason for this is that the term length of government debt, in the form of bonds, is often ten or more years (see Box 4), and so the *implied* interest rate – total interest payments as a proportion of total debt – took a lot longer to come down from the historically high levels than did the interest rate on new bonds (see Figure 6 on page 16).

From the early 1990s, the Reserve Bank of Australia began setting a target for inflation between 2 and 3 per cent on average, which subsequently contributed to lower interest rates.[20] In addition, asset sales, particularly Qantas, the Commonwealth Bank and Telstra, helped the government to achieve budget surpluses to pay down public debt, taking pressure off the fiscal position while interest rates declined towards the growth rate of the economy.

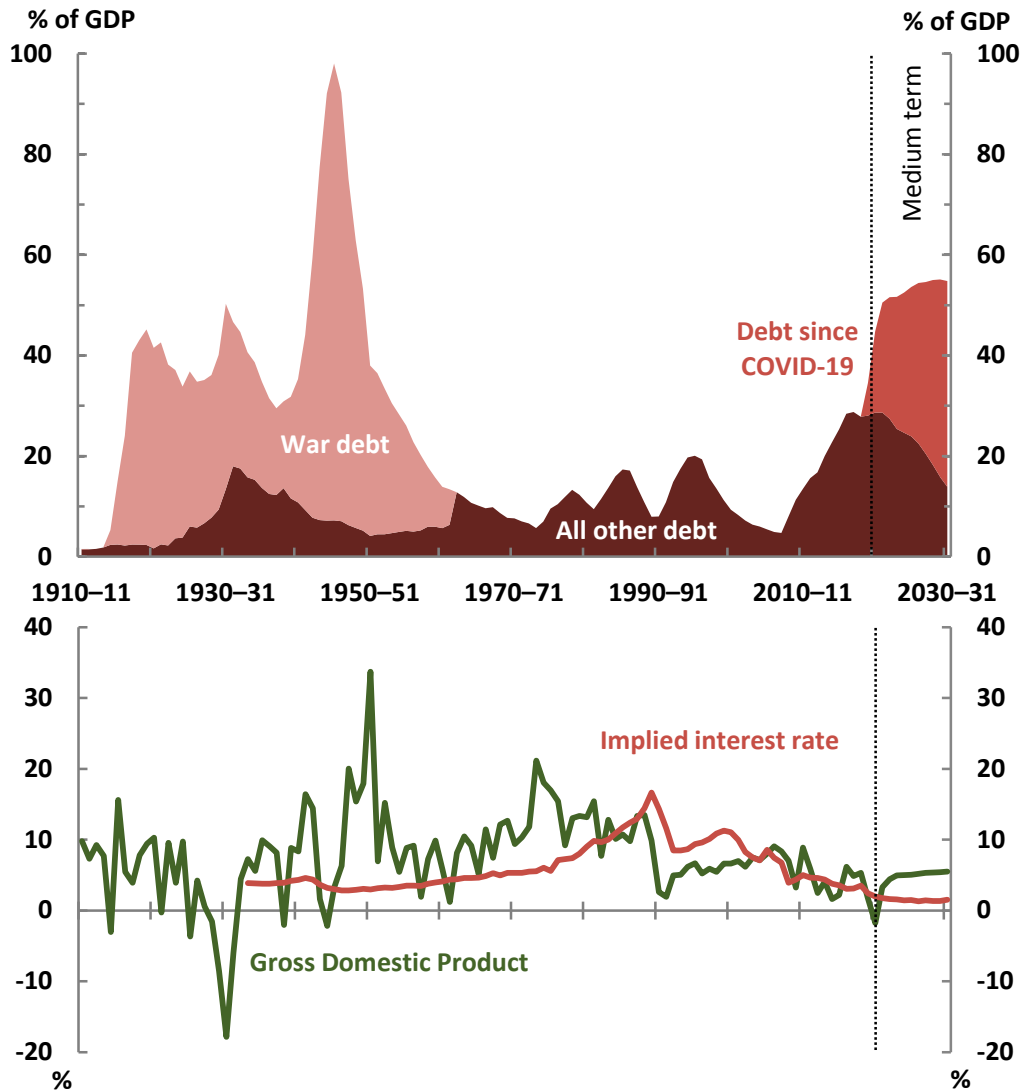Later, as the economy grew strongly through the early 2000s, the debt-to-GDP ratio continued to decline.

The Global Financial Crisis severely affected Australia's fiscal position in 2008 and 2009. At the time, the government provided significant financial assistance.[21] The resulting debt-to-GDP ratio did not decline, however, in part because nominal GDP growth did not recover in a manner similar to previous downturns.

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[19] Debelle, G. (2020), *Monetary Policy in 2020*, Speech to the Australian Business Economists Webinar, 24 November 2020.

[20] The Reserve Bank and government agreed on the importance of the inflation target and formalised this agreement in the 1996 Statement on the Conduct of Monetary Policy, see Debelle, G. (2018), *Twenty-five years of inflation targeting in Australia*, Speech to the RBA Conference 2018, Sydney, 12 April 2018.

[21] See, for instance, Kennedy, S. (2009), *Australia's response to the global financial crisis*, Speech to the Australia Israel Leadership Forum, 24 June 2009.

Figure 2: Past periods of high gross debt have not persisted

Note: Debt was zero from 1900-01 to 1910-11. War debt ceased being separately identified in Budget documents after 1962.[22] Debt since COVID-19 includes all debt incurred since the 2019-20 Mid-year Economic and Fiscal Outlook (MYEFO). The figures in this chart differ from those published in Table 5 of Budget Paper 1, Statement 11. Until the mid-1990s the Australian Government managed State debt on their behalf. This debt is included in the historical tables in the Budget Papers, while the chart above does not include this State debt. Consistent with the treatment in the Budget, securities held by government investment funds have been netted out (on a pro-rata basis between Commonwealth non-war debt and State debt). GDP figures before 1959-60 are based on growth rates calculated by NG Butler for the period to 1949-50 and from the Commonwealth Statistician, as published by the Reserve Bank of Australia for the period from 1949-50 to 1958-59.[23]

Source: Australian Bureau of Statistics (ABS), Budget Papers 1901–2020, Reserve Bank of Australia (RBA) and PBO analysis.

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[22] Although official documents report figures regarding war debt as being 'no longer available' after 1962 (eg Commonwealth Grants Commission 34th Report, 1967, p. 167), Parliamentary Hansard reports 'unacquired war debt' of over $1 billion (4 per cent of GDP) still outstanding as at 30 June 1968 (Question Upon Notice No. 951, from Mr Hayden to then Treasurer McMahon, answered 26 November 1968).

[23] *The Australians: Historical Statistics Chapter 8 – Australian National Accounts* (1987), accessed at: socialsciences.org.au.

Instead, growth remained in line with interest rates. Sustained low nominal GDP growth also made the return to surplus slower than otherwise.[24]
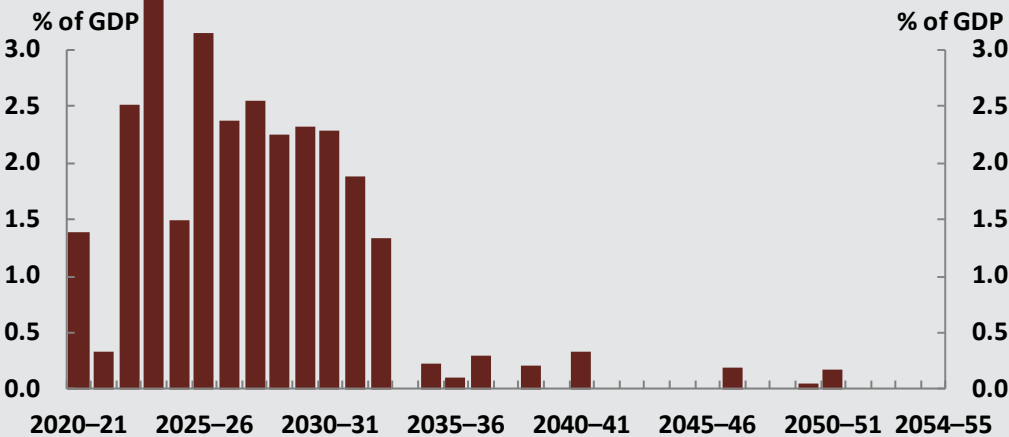
Nevertheless, the rate at which the government pays interest on its debt has continued to decline in recent years, and the increase in debt after the Global Financial Crisis was stabilising before the onset of the COVID-19 pandemic.

Box 4 – Long bond terms mean that public debt interest rates are slow to change

Governments borrow money by issuing bonds. The purchaser of a bond pays an agreed amount to the government in exchange for the bond value being paid back at a specified later date plus an additional amount, usually paid at regular intervals, known as the 'coupon'. The total return on a bond is known as the 'bond yield' or simply 'public debt interest'.

Bonds are issued for a variety of time periods, often three, five, ten or twenty years but sometimes up to thirty years. The value of current bonds on issue is shown in Figure 3, according to their dates of maturity in the future. These bonds will have been issued at various times in the past – some debt maturing in 2023, for example, could be 3-year bonds issued in 2020, some 5-year bonds issued in 2018, some 10-year bonds issued in 2013 and some 20-year bonds issued in 2003 (and other time periods).[25]

Figure 3: Some current bonds on issue do not mature until after 2050
Value of existing debt by maturity date

Note: 'Existing debt' includes all bonds issued as at 31 March 2021.
Source: Australian Office of Financial Management (AOFM) and PBO analysis.

The yield over the life of a bond will be broadly consistent with interest rates at the time of issue. But the prevailing yield on new bonds may change markedly over the life of a long-lived bond. For example, a thirty year bond issued in 1989 might have had an annual yield of 10 per cent. By the time the bond neared maturity in 2019, new ten-year bond yields had fallen to only 3 per cent. This means that public debt interest at any point in time relates to bonds issued at a variety of times in the past at a variety of yields, many of them significantly different to prevailing yields for new bonds. The average yield on bonds on issue is shown in Figure 6 on page 16, compared to the contemporary ten-year bond yield, illustrating that the term length of bonds means that the average yield tends to lag behind the current bond yield.

---

[24] The final budget outcome for 2018-19 was an underlying cash deficit of only $0.7 billion, which is the closest the Australian Government has come to achieving a surplus since the Global Financial Crisis.

[25] This example is purely illustrative – there were, in fact, no 20-year bonds issued in 2003.

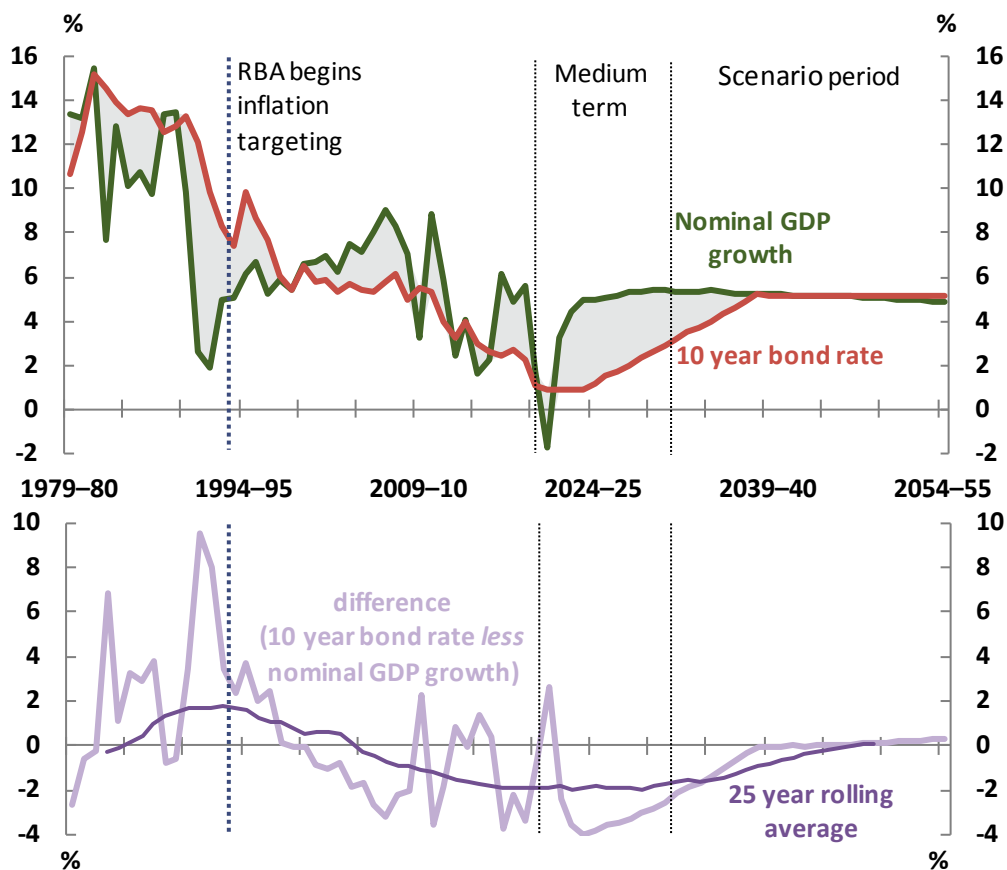## Interest rates, economic growth and the budget balance are interrelated

Government fiscal policy is often assessed by its budget impact, which has a direct effect on the level of debt. But government policy can also indirectly affect economic growth and interest rates, which affects the trajectory of debt relative to GDP. Similarly, the state of the economy may impact the effect of government policy on the budget. This means that the budget balance is interrelated with economic growth and interest rates.

There are a number of examples to illustrate this:

1 Raising taxes is usually associated with an economic cost, such as reduced employment or consumption. The increase in government revenue may help with fiscal consolidation, but may be partially offset through the negative impact on economic growth.

2 In a weak economy, the government may introduce fiscal stimulus measures, such as lower taxes, higher transfer payments, higher government spending, or infrastructure investment, to help boost economic activity. While the government does not control interest rates, the Reserve Bank may also choose to cut the official cash rate in a weak economy.

3 In a fast-growing economy, increased government spending or decreased taxation may contribute to a higher rate of inflation, potentially leading to higher interest rates.

While monetary policy can help stabilise the business cycle – lower interest rates during a downturn to stimulate the economy and higher interest rates during a boom period to contain inflation – it is possible for $(r - g)$ to be significantly positive or negative for brief periods. Figure 4 suggests that a large differential is unlikely to persist for long periods, particularly with r greater than g.

Figure 4: The difference between GDP growth and interest rates has been cyclical

Source: ABS, RBA, 2020-21 Budget and PBO analysis.

The scenarios presented in this report explore different combinations of interest rates, economic growth and the budget balance, but do not attempt to model the relationship between them. For example, we do not conclude that a scenario with a higher budget deficit will lead to higher economic growth, offsetting the impact of the higher deficit. Similarly, we do not assume that a scenario with lower GDP growth will prompt reductions in interest rates, offsetting the deterioration in the debt-to-GDP ratio. This means that the range of projected debt outcomes is the broadest possible given plausible values of r, g and B.

Our scenarios are based on historical precedents

We have prepared a middle, downside and upside scenario for each of the three factors, r, g and B using historical precedents combined with long-term demographic projections. Our scenarios start from 2030-31, the end of the 2020-21 Budget medium-term.

The resulting debt-to-GDP trajectories are generated from the equation shown in Box 3 using the 27 combinations of middle, downside and upside scenarios for each of the three factors. The scenarios all begin with the current array of bonds on issue and their yields. When the bonds mature in the future and the amounts borrowed are repaid, we assume that new bonds are issued at future assumed yields in line with the interest rate for the scenario. For the 2020-21 Budget medium-term projection period (to 2030-31), all scenarios are from the 2020-21 Budget.

A precise view on a 'baseline' is not necessary for our analysis – we are not trying to predict the most-likely path for government debt-to-GDP, but to illustrate what this may look like under plausible economic and policy conditions, which includes policy changes that would at least partly offset the fiscal impact of demographic change, depending on the scenario.

It is important to be clear about the differences between forecasts, projections and scenarios. A *forecast* is an attempt to estimate the future for short-term specific planning purposes, which plays a central role in government budget processes. The volatile and rapidly changing nature of economies mean that changing circumstances can sometimes render forecasts out-of-date almost as soon as they are printed.

A *projection* is different to a forecast in that it does not attempt to estimate what will occur in any particular year, but instead is a presentation of the most likely trends in the economy over a long time-period. For example, a projection for GDP growth of 5 per cent each year over the next decade is not suggesting that there will be no economic cycles of booms and downturns during that time, but it is not specific about the timing or magnitude of these cycles. The growth rate it assumes is an average – periods of higher and lower growth will cancel out over time (see Box 6 on page 23 for more detail).

A *scenario* is similar to a projection, but instead of trying to predict the most-likely future state of the world, it should be interpreted as a possible future state. The time horizon for a scenario tends to be much longer than for a projection. While we expect that the most-likely scenario would be near the average of our downside and upside scenarios, our middle scenario should not be interpreted as being our preferred or most-likely case.

GDP growth scenarios

As noted in Chapter 2, this report follows the 'three-Ps' approach – population, participation and productivity – to determine the potential size and growth of the economy. This is described in more detail in Box 5.

This approach implicitly accounts for both the economic booms and the downturns that have occurred historically. For instance, while growth in productivity – GDP per hour worked – is usually higher during boom periods and lower during downturns, we take a historical average over a period that includes both booms and downturns.

Population

We have used the same projected population that underpins the 2020-21 Budget for the period to 2030-31 (the 2020-21 Budget 'medium-term' period), generated by the government's Centre for Population.[26] As these projections do not extend beyond the medium-term, each scenario is built on population growth from the long-term projections published by the Australian Bureau of Statistics (ABS) in *Population Projections, Australia, 2017 (base)*, which extend to 2065.[27] The middle scenario uses the medium series (series B), while the upside and downside series use the high (series A) and low (series C) series respectively. Each series is underpinned by assumptions about the future levels of fertility, mortality and overseas migration, and these are applied to a base population.

Our scenarios assume that, while the projected population *level* in 2030-31 will have changed from those in the 2017 ABS projections, the projected percentage *growth* in population will be unchanged.[28] These population projections are shown in the Technical Appendix.

Participation

Participation rates are based on the age and sex specific participation rate projections published in the 2015 IGR, which are available to 2054-55. These age and sex specific participation rates have been applied to the respective population projections under each scenario.

Interestingly, both the 'upside' and 'downside' population scenarios result in *lower* participation rates than the middle scenario. This is because the 'upside' population scenario is based on lower mortality rates, resulting in more people of non-working age and a slightly lower total participation rate than for the middle scenario. Conversely, the lower fertility rates of the 'downside' population scenario results in less working age people in the future and a significantly lower total participation rate than for the middle scenario.

These scenarios are shown in the Technical Appendix.

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[26] *Population Statement*, Centre for Population (2020)

[27] Formerly catalogue number 3222.0.

[28] The assumptions underpinning the population projections from 2017 are somewhat out-of-date, most significantly owing to reduced migration because of COVID-19 travel restrictions. The degree to which this affects our scenarios will depend on the extent to which the impact of the 'lost' migrants affects the *growth rate* of the population beyond 2030-31. For example, if the average age of the 'lost' migrants in 2020-21 was 30 years, the impact on fertility by 2030-31 will have been largely incorporated into the Centre for Population's projections, such that the ABS 2017 population growth projections beyond 2030-31 may be a reasonable approximation. Updated population projections by the ABS or the Centre of Population beyond 2030-31 will be included in future updates to our scenarios.

Productivity (GDP per hour worked)

The middle assumption for productivity growth is yearly growth of 1.5 per cent, consistent with the 2020-21 Budget long-run assumption, which is based on the average growth rate for the last 30 years (the average growth rate is also 1.5 per cent for the last 25 years, as well as for the entire history of ABS productivity data going back to 1980). Figure 5 shows that while productivity growth is volatile on a yearly basis, it tends to be stable over longer periods. The upside scenario is based the highest point of the 25-year rolling average of GDP per hour worked, 1.8 per cent.

Our approach for the downside scenario is a little different. The lowest point of the 25-year rolling average of GDP per hour worked is for the most recent 25 years, primarily because productivity growth has slowed over the last five years, averaging only 0.5 per cent. Even if productivity growth recovers over the next few years, the 25-year rolling average may continue to fall. Our downside scenario assumes productivity growth of 1.2 per cent, based on an estimated 25-year rolling average if productivity growth remains at 0.5 per cent for the next three years.[29] Such an assumption is considerably weaker than any previous 25-year period.

> ### Box 5 – The 'three Ps' framework for GDP
>
> Long-term projections for GDP can be broken down using the 'three Ps' framework: population, participation and productivity.
>
> $$GDP = \underbrace{\frac{GDP}{hours\ worked}}_{productivity} \times \underbrace{\frac{hours\ worked}{employment}}_{average\ hours} \times \underbrace{\frac{employment}{labour\ force}}_{employment\ rate} \times \underbrace{\frac{labour\ force}{population}}_{participation\ rate} \times \underbrace{population}_{population}$$
>
> Long-term projections assume that average hours worked remains constant (although 'participation' could also be defined on an hours worked basis). With the unemployment rate assumed to be constant (at a rate consistent with stable inflation), the employment rate is therefore also constant. This leaves the three remaining factors, population, participation and productivity, as the fundamental drivers of the long-run economy.
>
> The three-Ps framework results in projections for the structural level of the *volume* of production, or 'real' GDP. Projections for nominal GDP require an assumption for price growth in order to convert a volume into a value. Our projections assume price growth in the long run of 2½ per cent, the middle of the RBA's target band for inflation.
>
> To illustrate the magnitudes of each term, a projection for long-run yearly nominal GDP growth of 5 per cent might assume around 1½ per cent growth in productivity, around 1¼ per cent growth in population, -¼ per cent growth from falling participation, and 2½ per cent growth in prices. In actual budget and IGR projections, productivity growth has been assumed to be constant, while contributions from population vary with demographic trends in fertility and life expectancy, as well as current government policy on migration. Participation rate projections vary with demographic trends.
>
> A lasting impact of COVID-19 for the economy is its effect on net overseas migration (which was negative in the June and September quarters of 2020) affecting the long-term population. This may also affect long-term participation rates, as migrants tend to be of working age.

---

[29] While average productivity growth of 0.5 per cent for the next three years is a prudent technical assumption for a 'downside' scenario, this seems unlikely in reality given that productivity growth for the 2020 *calendar* year was around 2.5 per cent. Even modest growth in GDP per hour worked for the March and June quarters in 2021 will see productivity growth of between 1.5 and 2.0 per cent for the 2020-21 full year.

Figure 5: While productivity growth is variable, it is relatively stable over 25 years
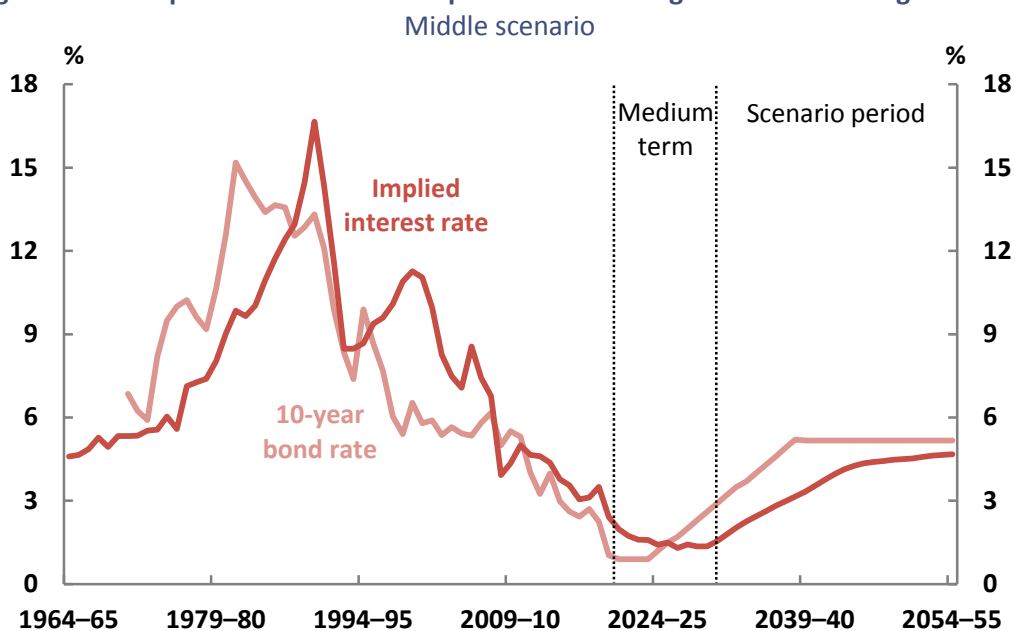Yearly growth in GDP per hour worked

Source: ABS and PBO analysis.   Note: dotted line shows the 25-year rolling average if productivity growth equals 0.5 per cent for the next three years.

Interest rate scenarios

Interest rates are based on the yield curve assumptions underpinning the 2020-21 Budget.[30] In the 2020-21 Budget, the 10-year bond yield is assumed to remain fixed over the forward estimates (to 2023-24) before converging in a linear fashion to the long-run yield, 15 years after the end of the forward estimates. The yields for bonds with a different term-length, such as 3-year, 20-year and 30-year bonds, are assumed to follow similar linear paths. As explained in Box 4, the average interest rate paid on the stock of debt (the implied interest rate) tends to lag current bond rates, such that the 'implied' interest rate takes longer to reach the long-run yield (Figure 6).

Figure 6: The implied interest rate is expected to take longer to reach its long-run level
Middle scenario

Source: RBA, 2020-21 Budget and PBO analysis.

Note: 'Medium-term' in this and the other charts in the report refers to the periods known as the *forward estimates* and *medium term* in the 2020-21 Budget, from 2020-21 to 2030-31.

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[30] 2020-21 Budget, Budget Paper 1, Statement 7: Debt Statement, Chart 7: Yield curve assumptions from 2020-21 to 2023-24 and Chart 8: Convergence to long-run yield curve.

The major change to the mechanism for determining the RBA's cash rate – inflation targeting – was less than thirty years ago, which is too short a time period for observing a range of values in line with our approach for productivity growth and the budget balance.[31]

The upside and downside scenarios therefore present interest rates with the same variance as for the GDP profile (plus-or-minus 0.6 per cent). This assumption extends the range of the difference between r and g to plus-or-minus 1.2 per cent under the best and worst case scenarios. As explained earlier, such a large difference between r and g over several decades is highly unlikely, so the extreme cases over-estimate the degree of uncertainty around the impact on debt.

Budget balance scenarios

Scenarios for the budget balance (B) are based on the headline cash balance excluding interest payments since 1964-65, noting that interest payments are separately factored into our analysis. The most recent 25-year average (excluding 2019-20) is a headline cash balance surplus of 0.4 per cent of GDP before interest payments, corresponding to a deficit of 0.5 per cent of GDP when interest payments are included. Our middle scenario assumes that the headline cash balance gradually returns to this level after the end of the medium term (2030-31). This can be thought of as being the long-term *structural* budget balance for the middle scenarios – that is, the budget position adjusted for cyclical and temporary factors.[32]

The upside scenario is based on the highest point of the 25-year rolling average of the headline cash balance (before interest payments) as a share of GDP, a surplus of 1.5 per cent before interest payments, resulting in a smaller, but steadily growing surplus after interest payments are included. The lowest point of the 25-year rolling average corresponds to a headline cash balance of zero[33] before interest payments and an increasing deficit after interest payments are included. Figure 7 shows the history of the headline cash balance, and our scenarios.
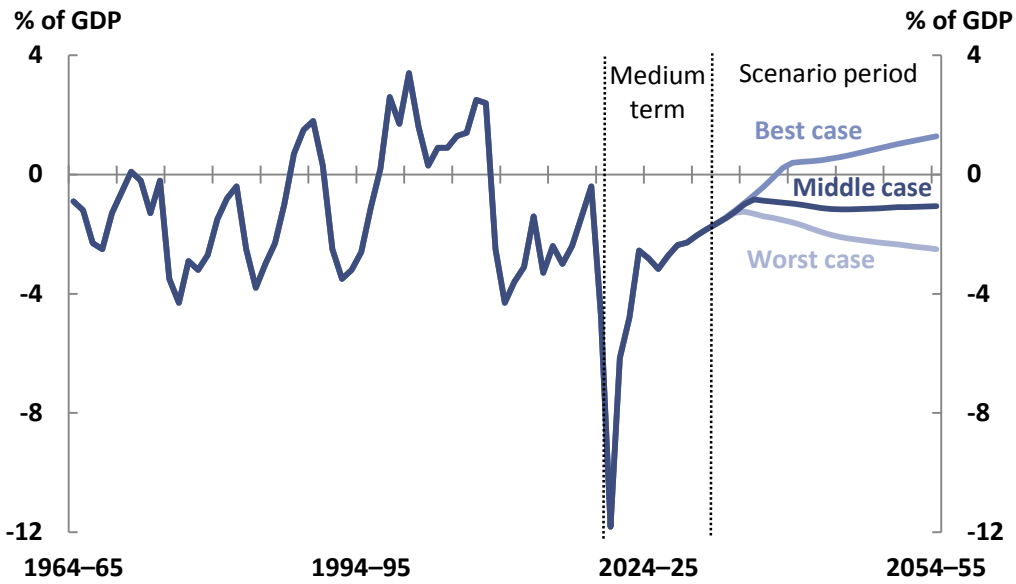
Similarly to productivity growth, the budget balance has varied significantly from one year to the next, but over a long time period the average range is relatively small. In the scenario period, both the middle and downside scenarios correspond to a headline cash balance deficit when interest payments are included – it is only the upside scenario that is a surplus. The upside and downside scenarios for the headline cash balance including interest appear to diverge from each other – this reflects changes in interest payments under the two scenarios.

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[31] As shown in Figure 4, since the advent of formal inflation targeting by the RBA, 10-year bond yields have been consistently below g. Our 'middle' scenario of no long-term gap between r and g is already pessimistic compared to most of the last 25 years.

[32] For more information, see Parliamentary Budget Office (2013), *Estimates of the structural budget balance of the Australian Government, 2001-02 to 2016-17*, 22 May 2013.

[33] The lowest 25-year period is centred on 1975-76. The average headline cash balance for the most recent 25-year period was 0.4 per cent of GDP, excluding interest payments. Excluding the large asset sales of the 1990s and 2000s (the Commonwealth Bank, Qantas, Telstra and major airports), the 25-year average is -0.1 per cent of GDP.

Figure 7: Australia has averaged small headline cash balance deficits
Headline cash balance, including interest payments, percentage of GDP
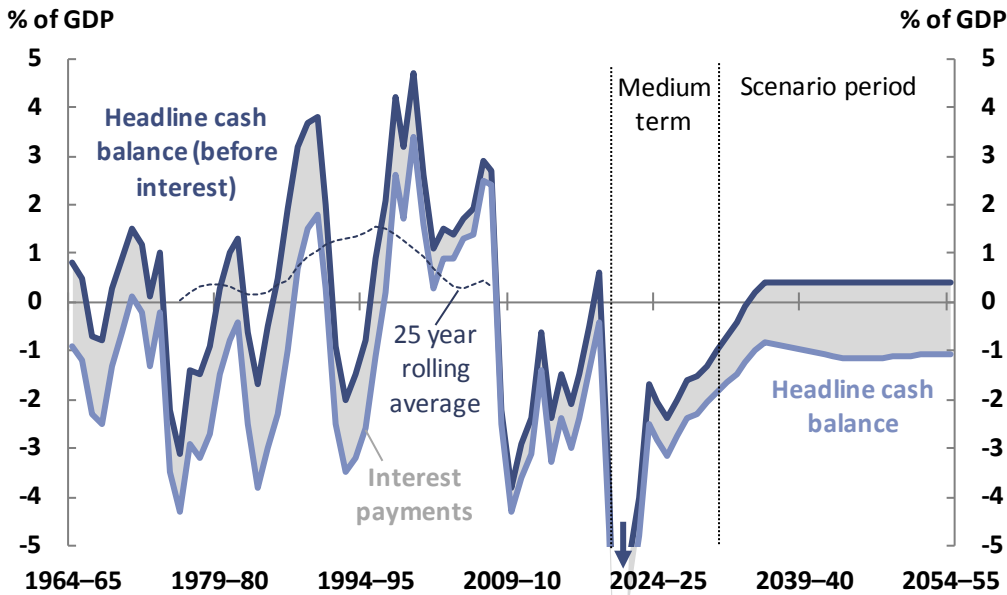

Source: Budget Papers and PBO analysis.

Figure 8 shows the historical and scenario headline cash balance both with and without interest payments. Interest payments have averaged roughly 1 per cent of GDP, which in several years has been the difference between a headline cash surplus and deficit.

This approach implicitly accounts for the fiscal policy response to both economic booms and downturns over time. While governments may run greater deficits during downturns, stimulus spending reduces during boom periods so that the historical average includes both booms and downturns.

Figure 8: Interest has contributed around 1 per cent of GDP to the headline cash balance

Source: 2020-21 Budget and PBO analysis.

4 Australia's fiscal position is sustainable under a range of scenarios

Our scenarios show that Australia should be able to sustainably maintain its debt over the next 40 years, provided future governments are able to implement policies to achieve budget balances similar to historical precedents, even modest deficits. Our scenarios for future economic growth, interest rates and the budget balance result in the level of government debt falling or, at worst, remaining broadly unchanged.[34]

Debt is likely to steadily decline beyond 2030-31

Under all scenarios, debt-to-GDP declines for at least 13 years from 2030-31.

The main driver of the debt reduction is the historically low interest rates on debt issued over the past year,[35] coupled with the expectation that interest rates are likely to remain low for the next decade. Even though the interest rate on *new* debt issued under the middle scenario converges to a value that slightly exceeds GDP growth, the average interest rate on all outstanding debt remains lower than GDP growth for a number of years, owing to the term length of the bonds (Figure 6).

While debt-to-GDP is declining under our scenarios, interest payments rise. Under the middle scenario interest payments peak at around 1.6 per cent of GDP in 2045-46 (Figure 9).

Figure 10 provides details on debt under the middle scenario, separating out the stock of existing debt from matured debt (the existing debt after it has been rolled over on maturity) and new debt required because of deficits beyond the budget period.

Figure 11 presents our middle, best and worst case scenarios for the debt-to-GDP ratio. The best case scenario incorporates the upside case for all three inputs while the worst case scenario incorporates the downside case on all three inputs. Both of these should be considered as highly unlikely bounds on our scenarios.
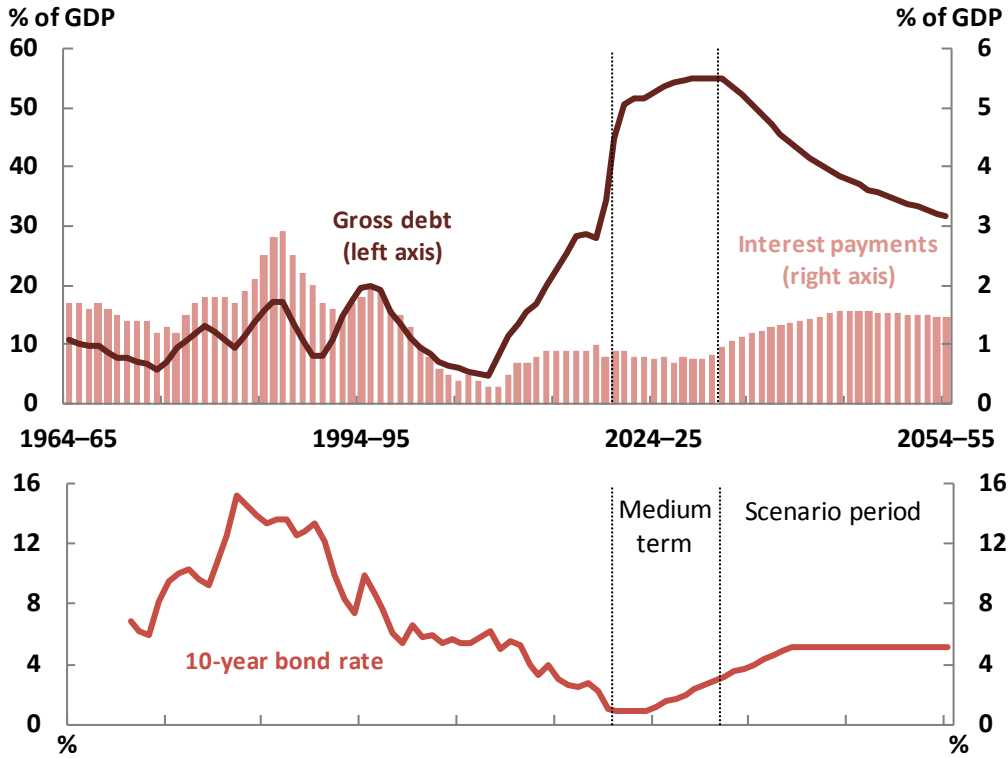
Under all three scenarios, the debt-to-GDP ratio peaks over the medium-term and declines over the following decade. Our 'best case' scenario (low interest rates, high GDP growth and small budget surpluses) results in the debt largely eliminated. Our 'worst case' scenario (high interest rates, low GDP growth and a higher-than-average budget deficit) results in debt falling before slightly increasing later.

Figure 12 demonstrates the impact of debt on interest payments under our middle, best and worst case scenarios. Under the best case scenario, interest payments peak after the end of the medium-term and decline to near historical lows by 2054-55. Under the middle case, the rollover of existing debt to higher interest rates results in interest payments continuing to climb even as debt declines, peaking at 1.6 per cent of GDP in 2045-46 before declining to 1.5 per cent of GDP in 2054-55. Under the worst case scenario interest payments climb consistently over the projection period, reaching 2.5 per cent of GDP in 2054-55, still below the peak of 2.9 per cent in 1986-87.

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[34] Other analyses have reached similar conclusions. For example: Debelle, G. (2020), *Monetary Policy in 2020*, Speech to the Australian Business Economists Webinar, 24 November 2020 – 'In Australia, public debt is very manageable … even after the sizeable stimulus that is being implemented'; and Edmond, C., Holden, R. and Preston, B. (2020), 'Should we worry about government debt? Thoughts on Australia's COVID-19 response.' *Australian Economic Review*, 53(4).

[35] Debelle, G. (2020), *The Reserve Bank's policy actions and balance sheet*, Speech to the Economic Society of Australia.
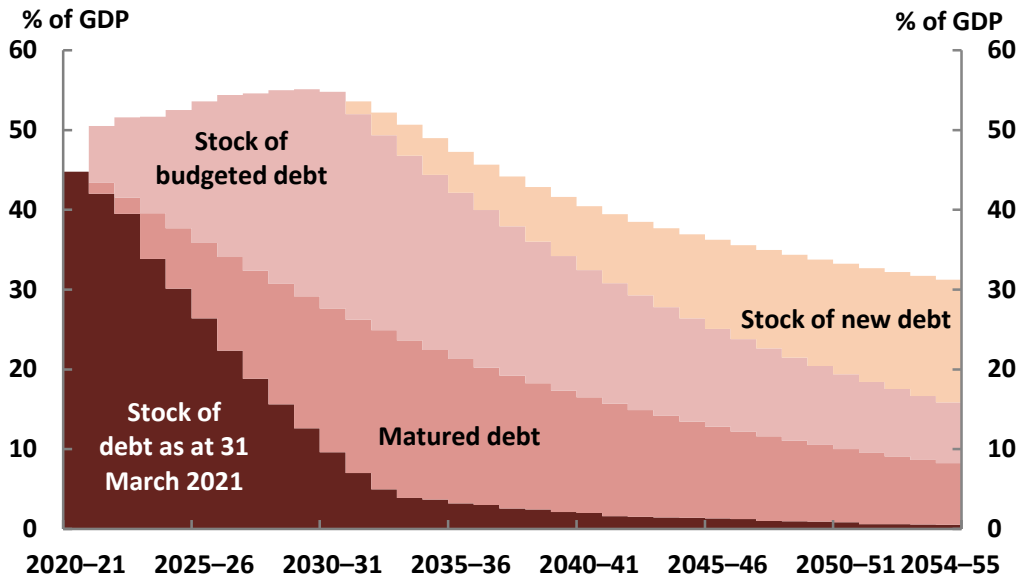
Figure 9: Our middle scenario results in a steady decline in the debt-to-GDP ratio

Note: Until the mid-1990s the Australian Government managed State debt on their behalf. This debt is included in the historical tables in the Budget Papers, while the chart above does not include it.

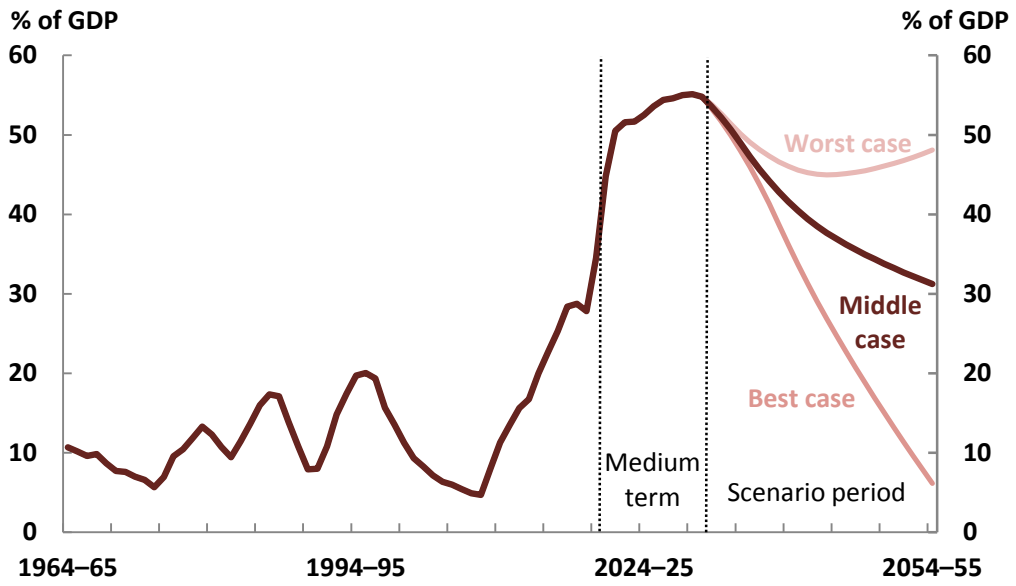Source: RBA, Budget Papers 1970–2020 and PBO analysis.

Figure 10: Some debt issued over the next few years will still exist in 2054-55
Decomposition of debt under middle scenario

Note: 'Budgeted debt' includes all debt projected to be issued by the end of the medium term, as per the 2020-21 Budget.
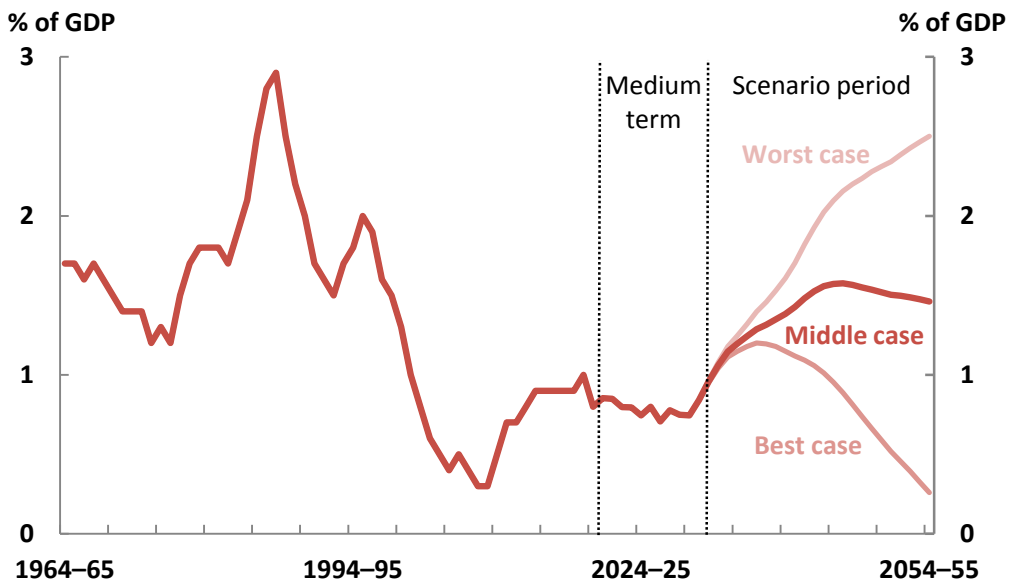
Source: RBA, 2020-21 Budget and PBO analysis.

Figure 11: Our middle case and extreme scenarios all show that debt is sustainable
Gross debt

Source: 2020-21 Budget and PBO analysis.

Figure 12: All scenarios result in manageable interest payments
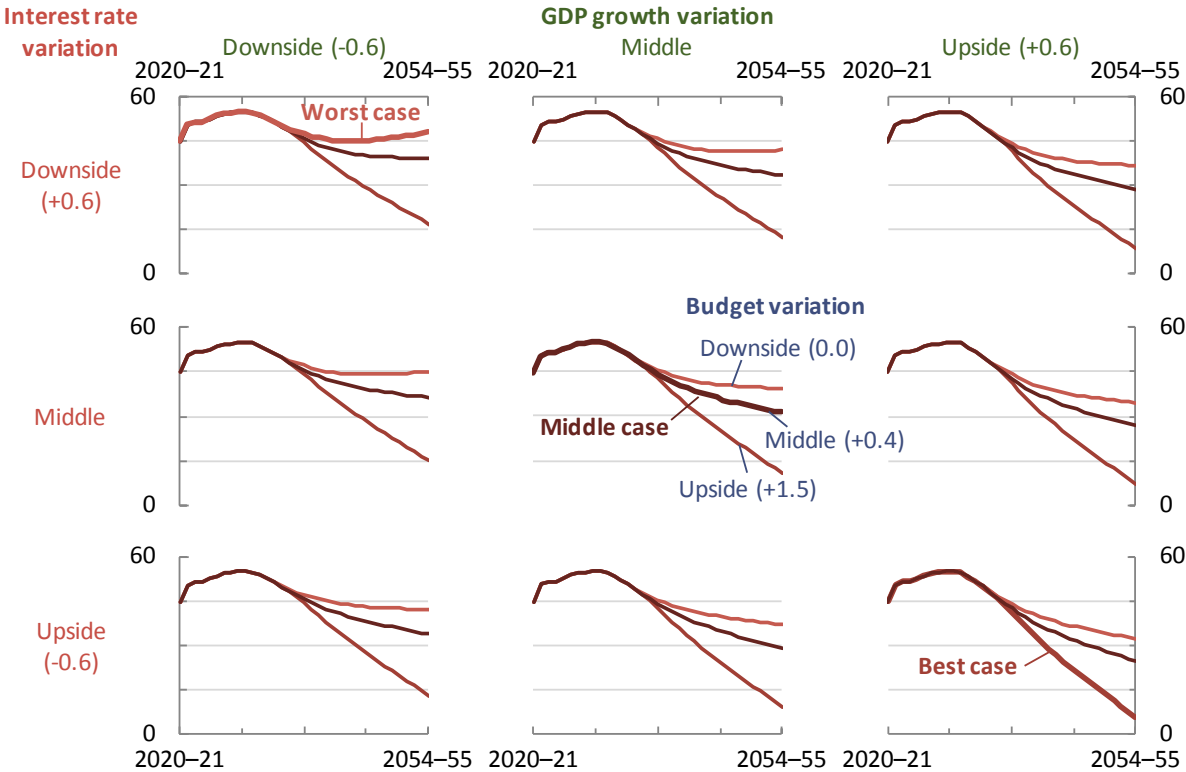Public debt interest

Source: 2020-21 Budget and PBO analysis.

Figure 13 contains the results from all 27 of our scenarios for the gross debt-to-GDP ratio under all combinations of the three inputs: r, g and B. We cannot know which scenario is most likely, but our 'best case' and 'worst case', being the simultaneous combination of the 'best' and 'worst' scenarios for each the three inputs, are very unlikely.

Debt-to-GDP falls under most of the 'middle' and 'downside' scenarios, each of which assumes a continual budget deficit, illustrating that fiscal sustainability is not dependent on achieving budget balances, even following a large build-up of debt.

Our scenarios do not explicitly model an economic cycle of peaks and troughs. Box 6 explains how the results would change if a cycle were incorporated while maintaining the same average GDP growth and budget balance. In this case the long-run trajectory for debt is unchanged compared to our scenarios.

Figure 13: Debt-to-GDP is decreasing under almost every scenario
Gross debt, percentage of GDP

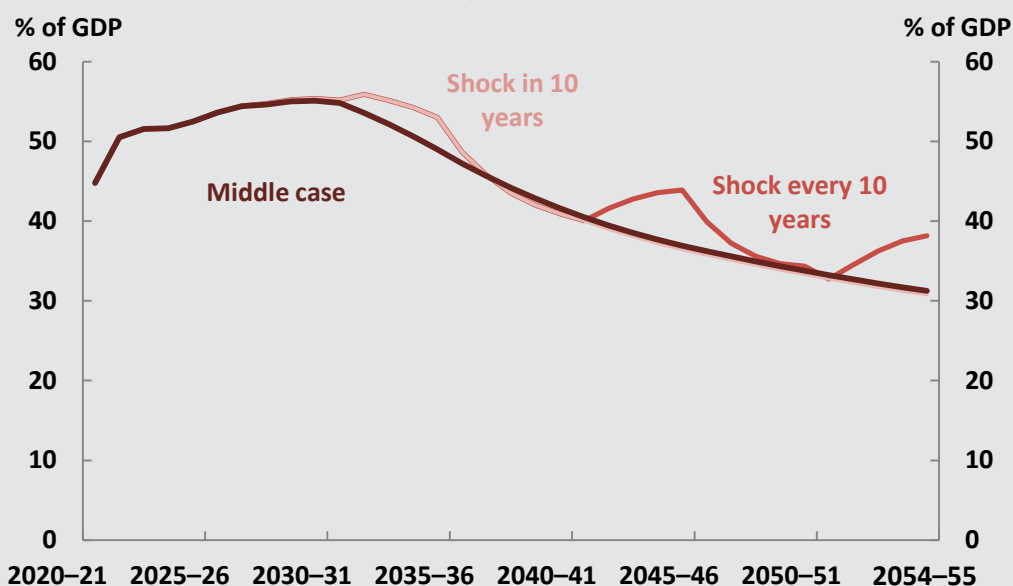
Source: 2020-21 Budget and PBO analysis.

The long-run averages used to construct the scenarios presented in this report incorporate the peaks and troughs of historical economic cycles, so that the scenarios also implicitly incorporate these cycles.

For example, experience shows that periods of weaker GDP growth are usually followed by periods of stronger GDP growth. Similarly, while governments typically run deficits greater than average during a downturn, these are offset by smaller deficits and surpluses in other years. Whether we explicitly try to model the cycle or use historical averages, the long-term debt-to-GDP position will be similar in our scenarios.

Figure 14 demonstrates the impact on gross debt of a scenario that explicitly incorporates a single economic shock in 10 years' time (in the first year outside the medium-term period) and a scenario that incorporates an economic shock every 10 years. This is compared to the middle scenario where shocks are not explicitly modelled.

Figure 14: Explicitly modelling shocks ends up at the same outcome
Gross debt, middle scenario

Source: 2020-21 Budget and PBO analysis.

The economic shocks and fiscal policy responses in the scenarios are equivalent to those of the early 1990s recession: real GDP contracts by 0.6 per cent (nominal GDP growth reduces to 1.9 per cent)[36] and the headline cash balance (before interest payments) runs at a deficit, accumulating to 5.2 per cent of GDP over the 4 years following the shock.

Each shock results in debt levels higher than under the middle case scenario, but only temporarily. GDP is assumed to recover to the same level, while the high deficit during the shock is offset in the following years.[37]

Consistent with the analysis used throughout this report, both shock scenarios converge back to the middle scenario, reflecting the underlying mathematical debt relationship (Box 3) and the assumption that the government is able to, on average, maintain a balanced budget.

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[36] Due to the inflation assumptions over the projection period, real GDP in our scenarios will differ to outcomes of the 1990s recession.

[37] Note that the effect of this shock appears less pronounced as the early 1990s recession, due to interest rates in that period being around twice those covered by our scenarios.

But there are still challenges to Australia's fiscal position

As many reports have noted, the future will present a range of challenges.

Some challenges, such as the ageing population and climate change, are relatively foreseeable. Other challenges may provide surprises.

This report has shown that, despite the impact of COVID-19, Australia's fiscal position remains sustainable, provided economic growth can be maintained, interest rates are contained and governments can achieve a measured pace of fiscal consolidation.

The scenarios we have examined are built around historical variations, which means the results cover a wide range of outcomes for debt-to-GDP. Over time, governments have managed to return budgets to balance, even after deep downturns. Successive governments have responded to the particular fiscal challenges of the time. The historical averages used in the scenarios therefore include periods of significant reform, including to the process for setting monetary policy, micro-economic reform and social reform. The averages have also been influenced by specific initiatives such as asset sales, the introduction of capital gains tax, fringe benefits tax, the GST, the superannuation guarantee and the establishment of the Future Fund.

By building our scenarios around historical averages, we have implicitly captured the impact of future economic shocks and policy changes, to the extent that these are of a similar magnitude to those that appear in the historical record.

We have not attempted to model scenarios that go beyond historical experience for a sustained period of time (twenty five years or more). If future economic shocks were consistently larger or more frequent than historical shocks, or if long term structural shifts meant that growth rates were much lower than they have been historically, this would make it more difficult for Australia to maintain a fiscally sustainable position, through both lower average economic growth (g) and larger budget deficits (B). Shocks of this type might occur if, for example, domestic or international concerns about globalisation, together with significantly different global policy responses, affected productivity and population growth, leading to lower economic growth.[38]

Sustained significant shocks are also likely to affect interest rates. A permanent structural change to $(r − g)$ may, for example, result from a significant and sustained reduction in Australia's attractiveness as a location for global investment, relative to other locations. Yet Australia's position as an attractive destination for capital in the long run could also be maintained through an adaptive economy, stable institutions and sound fiscal management.

Our analysis has shown that, for scenarios consistent with our historical experience, government actions consistent with historical experience would maintain a sustainable fiscal position. Sustained challenges outside of that range would need government responses beyond what has occurred historically.

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[38] According to Edmond *et al.* (2020) 'a rise in global interest rates (driven, for example, by increased political tensions in the United States, or by the sheer amount of new government debt issued around the world), would likely lead to rising interest rates in Australia'; see Edmond, C., Holden, R. and Preston, B. (2020), 'Should we worry about government debt? Thoughts on Australia's COVID-19 response.' *Australian Economic Review*, 53(4).

A Fiscal Sustainability: Technical Appendix

The scenarios presented in this report reflect variations in three key factors: GDP growth, interest rates and the headline cash balance (before interest rates). All scenarios take 2030-31, the end of the medium-term projection period as presented in the 2020-21 Budget, as the starting point. This technical appendix provides further detail on the methodology used to determine the middle, upside and downside scenarios.
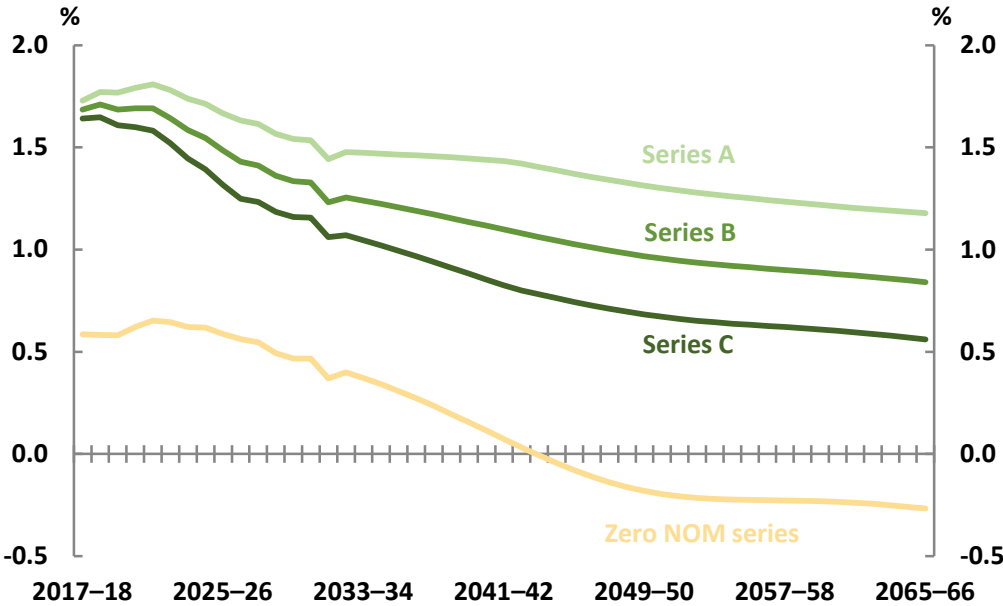
GDP growth

The scenarios for GDP growth were constructed using the 'three-Ps' framework (the algebraic derivation of real GDP under the 'three-Ps' framework is shown in Box 5 of the report).[39] Under this framework, the middle, upside and downside scenarios are focused on long-run trajectories for population, participation and productivity.

Unemployment is assumed to reach its long-term level (known as the non-accelerating inflation rate of unemployment or 'NAIRU') of 5 per cent by the end of the 2020-21 Budget medium-term period and remain stable at this level. Average hours worked are also assumed to be constant. To convert our estimate of real GDP into nominal terms, we assume that price inflation is constant in the middle of the RBA's target band of 2 to 3 per cent.

Population

Long-term population growth under each scenario is based on the projections published by the Australian Bureau of Statistics (ABS) in *Population Projections, Australia, 2017 (base)*.[40] The middle scenario uses the medium series (series B). The upside and downside scenarios use the high (series A) and low (series C) series respectively (see Figure A–1).

Figure A–1: ABS population growth projections, 15 years and over

Source: ABS.

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[39] This approach is consistent with the fiscal aggregate projection model underlying the budget and intergenerational reports, see Woods, D., Farrugia, M., and Pirie, M., *The Australian Treasury's fiscal aggregate projection model*, available at https://treasury.gov.au/sites/default/files/2019-03/3_Fiscal_aggregate_model.rtf

[40] Formerly catalogue number 3222.0.

Each series is underpinned by assumptions about the future levels of fertility, mortality and overseas migration, and these are applied to a base population (applied by sex and single year of age). The base population is the preliminary estimated resident population at 30 June 2017, incorporating the 2016 Census of Population and Housing. These assumptions are detailed in Table A–1.

Table A–1: Assumptions underpinning the ABS population projections

	Total fertility rate (babies per woman)	Male life expectancy at birth (years)	Female life expectancy at birth (years)	Net overseas migration (people per year)
High series (A)	1.95	87.7	89.2	275,000
Medium series (B)	1.80	83.0	86.0	225,000
Low series (C)	1.65	83.0	86.0	175,000

The *growth* rates for the ABS' population projections have been applied to projections for the population *level* in the 2020-21 Budget, developed by the Centre for Population. These projections are available to the end of the medium-term (2030-31). Unlike the ABS series, the Centre for Population projections incorporate more recent data and detailed projections of the impact of COVID-19.[41]

The assumptions underpinning the ABS' population projections from 2017 are somewhat out-of-date, most significantly owing to reduced migration because of COVID-19 travel restrictions. The degree to which this affects our scenarios will depend on the extent to which the impact of the 'lost' migrants affects the growth rate of the population beyond 2030-31. For example, if the average age of the 'lost' migrants in 2020-21 was 30 years, the impact on fertility by 2030-31 will have been largely incorporated into the Centre for Population's projections, such that the ABS 2017 population growth projections beyond 2030-31 may be a reasonable approximation. Updated population projections by the ABS or Centre for Population beyond 2030-31 will be included in future updates to our scenarios.
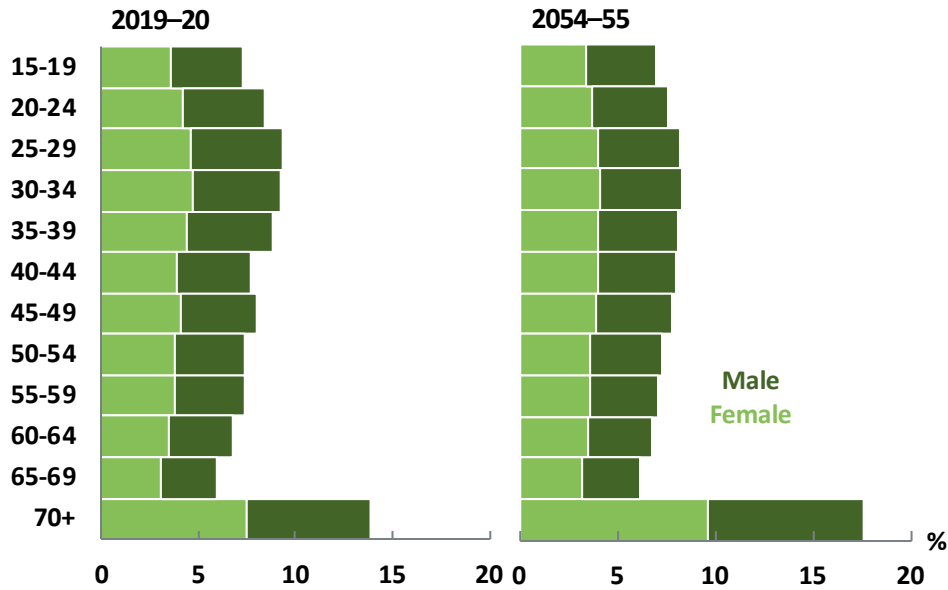
Participation rate

Participation rates are based on the age and sex specific participation rate projections published in the 2015 IGR. These age and sex specific participation rates have been applied to the respective population projections (see Figure A–2 for middle scenario) under each scenario. The resultant profile for the overall participation rate was then applied from the end of the 2020-21 Budget medium-term period.

Interestingly, the participation rates for the middle scenario are higher than for the upside scenario, reflecting the ABS' assumptions around fertility and mortality – the upside scenario results in a larger proportion of the population aged 70 and over, where participation rates are lower. In the downside scenario, the lower fertility rate assumption results in a smaller proportion of people of working age during the scenario period, meaning that the participation rate is lower than in both the middle and upside scenarios.

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[41] Details on the method and underlying assumptions used in these projections can be found in the December 2020 Population Statement, available at https://population.gov.au/publications/publications-population-statement.html.

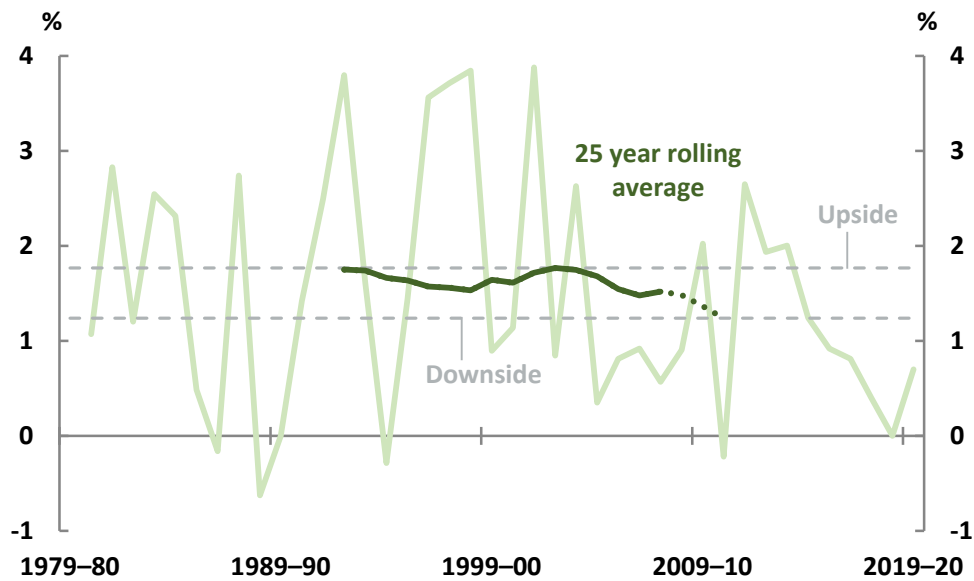## Figure A–2: Share of working age population by age and gender, middle scenario

Source: ABS and PBO analysis.

Productivity

The middle scenario for productivity growth is 1.5 per cent, consistent with the 2020-21 Budget. The upside and downside scenarios are based on the highest and lowest point of the 25-year rolling average of GDP per hour worked (a measure of productivity) from 1979-80. As noted in the report, we assume productivity growth of 0.5 per cent over the next three years, reflecting lower-than-average productivity growth in recent years – this results in a much lower downside scenario. The resulting assumptions are productivity growth of 1.8 per cent under the upside scenario and 1.2 per cent under the downside scenario (Figure A–3).
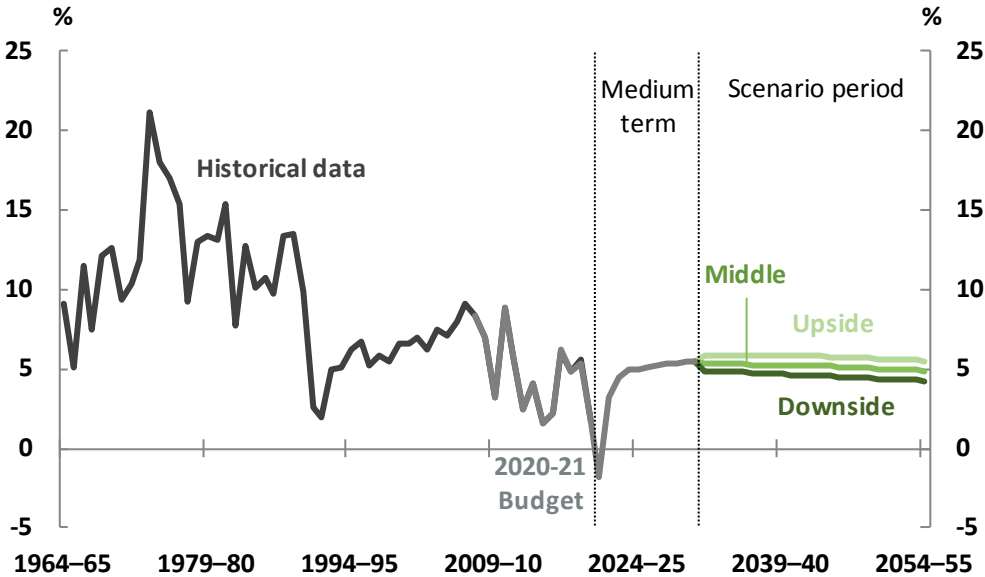
Figure A–3: Growth in GDP per hour worked (productivity)

Source: ABS and PBO analysis.   Note: dotted line shows the 25-year rolling average if productivity growth equals 0.5 per cent for the next three years.

The resulting middle, upside and downside scenarios for GDP growth are shown in Figure A–4. GDP growth in the upside and downside scenarios is 0.6 per cent higher and lower, respectively, than the middle scenario.

Figure A–4: Growth in nominal GDP

Source: ABS, 2020-21 Budget and PBO analysis.

Interest rates

Interest rates are based on the yield curve assumptions underpinning the 2020-21 Budget.[42] In the 2020-21 Budget, the 10-year bond yield is assumed to remain fixed over the forward estimates period before converging in a linear fashion to a long-run yield of around 5 per cent over a 15-year period. For the middle scenario, we assume that the 3-year, 20-year and 30-year bond yields follow the same linear path, but reach the long-run rate 20 years after the end of the forward estimates. The long-term bond yield assumptions are shown in Table A–2.
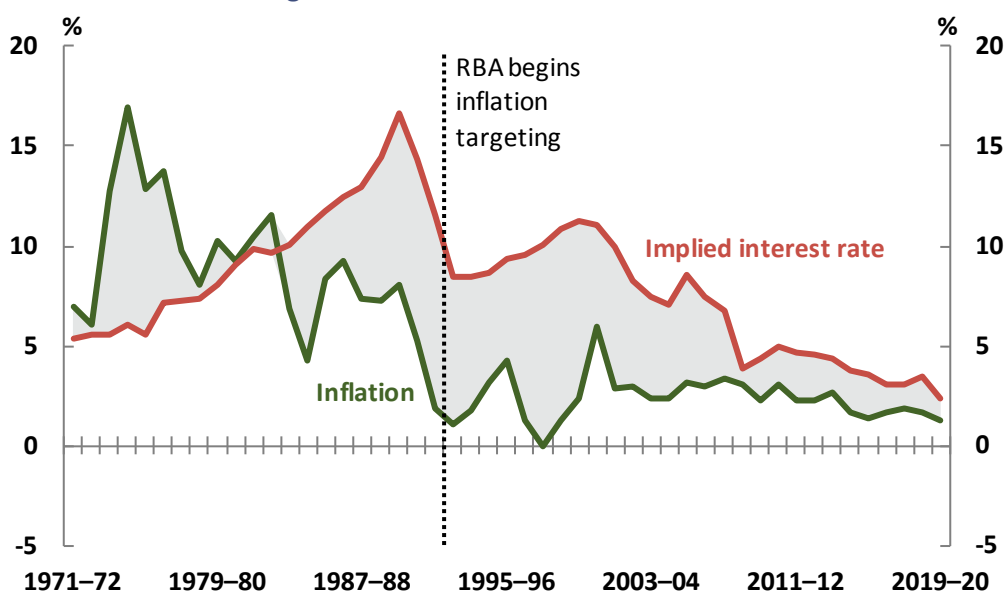
Table A–2: Long-term bond yield assumptions

	10Y
Middle	5.17
Downside	5.75
Upside	4.58

Since the introduction of formal inflation targeting by the Reserve Bank in the early 1990s there has been a substantial change in the relationship between interest rates and inflation. Figure A–5 shows that the gap between interest rates and inflation has significantly narrowed in the last 20 years.

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[42] 2020-21 Budget, Budget Paper 1, Statement 7: Debt Statement, Chart 7: Yield curve assumptions from 2020-21 to 2023-24 and Chart 8: Convergence to long-run yield curve.

Figure A–5: Interest rates and inflation

RBA begins inflation targeting

Implied interest rate

Inflation

Source: ABS and PBO analysis.

The economic growth scenarios include an assumption for price inflation of 2½ per cent, based on the middle of the RBA target band. Given the relatively short time frame since the advent of inflation targeting, we choose not to determine upside and downside scenarios for interest rates using historical data.
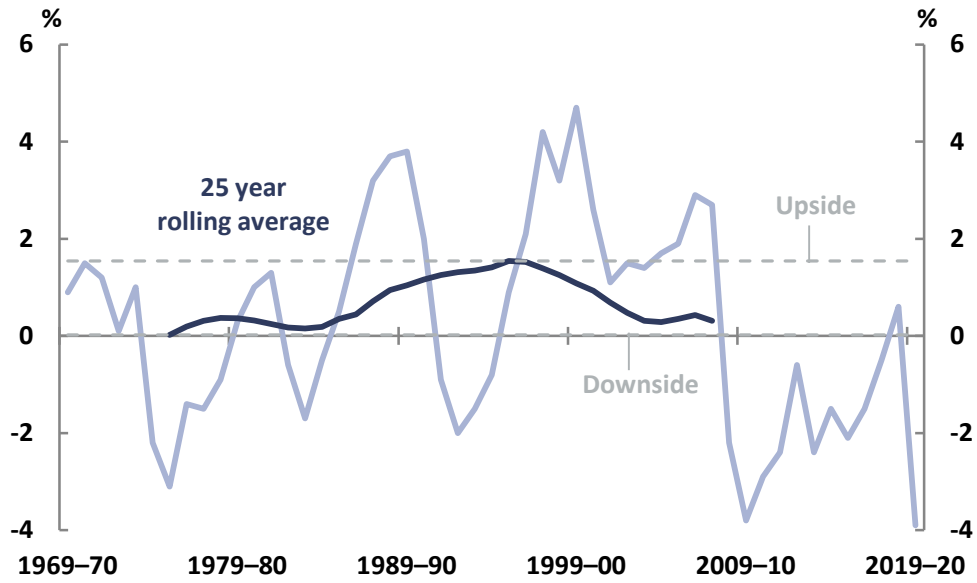
Instead, for the upside and downside scenarios we assume the same deviation from the middle scenario as we do for the upside and downside scenarios for GDP growth (± 0.6 per cent). This assumption extends the range of $(r - g)$ to ± 1.2 per cent under the best and worst case scenarios.

Headline cash balance

Our scenarios use the headline cash balance before interest payments, because interest payments have been separately identified in the interest rate scenarios. The middle assumption for the headline cash balance is a structural surplus of 0.4 per cent of GDP (before interest payments), which is the most recent 25-year average (excluding 2019-20). The upside and downside scenarios are based on the highest and lowest points of the 25-year rolling average of the headline cash balance (before interest payments) as a share of GDP from 1969-70 (Figure A–6).

This results in a structural surplus of 1.5 per cent of GDP under the upside scenario and a structural balance of zero (before interest payments) under the downside scenario. We assume that the budget gradually transitions after 2030-31 under each scenario. Both the middle and downside scenarios are deficits once interest is incorporated.

Figure A–6: Headline cash balance (before interest payments)

Source: Budget Papers and PBO analysis.

This approach implicitly accounts for the fiscal policy response to both economic booms and downturns that have been present over time. For example, while governments may run greater deficits during downturns, periods of higher economic activity are usually associated with a stronger budget position.