5 June 2020

Medium-term fiscal projection scenarios: technical appendix

The PBO's report, *Medium-term fiscal projection scenarios: impact of COVID-19 pandemic and response*, uses publicly available information and technical assumptions to produce scenarios of the impact of the COVID-19 pandemic and associated policy response on the medium-term fiscal position. This technical appendix provides detail on the methodology underlying the results presented in this report.

The framework constructs a pre-pandemic scenario and a post-pandemic scenario. Each of these scenarios comprise a set of economic inputs and government policy that are translated into fiscal projections through an accounting framework. The difference in the fiscal results between the pre- and post-pandemic scenarios represents the estimated impact of (or deviation due to) the pandemic. The deviations are then applied to the 2019-20 Mid-Year Economic and Fiscal Outlook (MYEFO) fiscal estimates.

Macroeconomic accounting framework

Given that the PBO does not produce macroeconomic forecasts, the macroeconomic accounting framework uses the internally consistent official set of economic forecasts published by the Reserve Bank of Australia (RBA) in their Statements on Monetary Policy (SMP). The economic forecasts from the RBA's February 2020 *Statement on Monetary Policy*[1] are used for the pre-pandemic scenario and the forecasts from the May 2020 *Statement on Monetary Policy*[2] are used for the post-pandemic scenarios. The May Statement included three scenarios: baseline, upside and downside. More detailed forecasts were published for the baseline scenario than for the other two scenarios.

The PBO's fiscal projection scenarios do not assume changes to any economic variables beyond those published in the SMP. For the RBA's upside and downside scenarios, the PBO constructed the components of GDP such that they differ proportionally with gross domestic product (GDP) from the RBA's baseline scenario.

The RBA's economic forecasts cover the period 2019-20 to 2021-22. For years from 2022-23 onwards, the PBO framework applies the medium-term projection methodology used in budget papers.

From 2022-23 to 2029-30 the analysis assumes that the real GDP output gap closes over the five-year period from 2022-23 to 2026-27. The real GDP output gap is the difference between the level of real GDP at a point in time and the theoretical level of potential real GDP if there was full employment and stable inflation. From 2027-28 to 2029-30, real GDP is assumed to grow at a rate consistent with growth in potential GDP, as published in the 2019-20 Budget. Between the baseline and the pandemic scenarios, the level of real GDP is therefore unchanged for the period 2027-28 to 2029-30.

Nominal GDP is the value of all economic production in current dollars, representing the broad base for government tax receipts. Nominal GDP varies between the scenarios because of variations in real GDP and/or variations in prices.

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[1] https://www.rba.gov.au/publications/smp/2020/feb/

[2] https://www.rba.gov.au/publications/smp/2020/may/

Short-term inflation varies in each scenario according to the RBA forecasts. International trade prices also vary in each scenario according to the RBA forecasts of the terms-of-trade. From 2022-23 to 2029-30, price growth does not change between the scenarios, consistent with the budget approach of the consumer price index (CPI) growing at 2.5 per cent, the mid-point of the RBA's inflation target band.

Aggregate wages, forming most of the personal income tax base, also vary in each scenario according to the RBA forecasts for employment and labour costs. Business profits, the basis of business income tax, vary according to the non-wage component of nominal GDP. Nominal consumption, the basis of consumption taxes, varies in each scenario according to the RBA forecasts for real consumption and the CPI.

Fiscal accounting framework

The purpose of the fiscal accounting framework is to translate the economic scenarios into pre- and post-pandemic fiscal scenarios in order to estimate the impact of the post-pandemic scenario. The fiscal accounting framework comprises simplified versions of general government financial statements (the operating statement, balance sheet and cash flow statement) broadly anchored to nominal GDP growth, with specific adjustments to account for progressivity in taxation rates in the personal income tax system, and the debt financing task.

Personal income tax varies between scenarios proportionally to variations in aggregate wages plus an allowance for progressivity in the personal income tax system. This means that taxes on wages will fall proportionally further than the wages themselves.

Goods and services tax (GST) receipts are assumed to vary in the scenarios according to changes in nominal consumption expenditure. GST receipts are separately calculated as these are paid to the states and territories, so are both a receipt and offsetting payment for the Commonwealth Government.

Other taxes, excluding personal income tax and GST receipts, and non-tax receipts, both vary in the scenarios with nominal non-wage GDP. A tax-to-GDP cap of 23.9 per cent is applied, consistent with budget updates. The simplified approach for this analysis does not account for some impacts on revenue not directly related to GDP, such as capital gains and losses, the business tax instalment system, and carried forward losses. These mostly relate to the timing of revenue between different years. The most significant omission in our scenario analysis for revenue is likely to be the impact on capital gains tax.

Public debt interest payment variations are determined from a somewhat simplified approach compared to a full financing task calculation. In our scenarios, all variations to the headline cash balance are financed through issuance of debt, split evenly into four tranches: three year, 10 year, 20 year and 30 year, with corresponding interest rates on Australian Government Securities based on a yield curve that increases asymptotically such that the 10-year bond yield converges to 5 per cent, similar to the budget approach.

All other items on the cash flow statement are calculated from the projected line items.

For the operating statement, we calculate the cash-accrual wedges between operating revenue and receipts, and between operating expenses and payments over the forward estimates period and grow these with nominal GDP over the medium term. We then add the cash-accrual wedges to total payments and total receipts respectively to derive the total revenue and total expense projections over the medium term. Net acquisition of non-financial assets is grown with nominal GDP over the medium-term. Total other economic flows are a residual item that ensures the comprehensive change in net worth on the operating statement is equivalent to the change in net worth on the balance sheet. All other items on the operating statement are calculated from the projected line items.

For the balance sheet, most line items simply vary between the scenarios with nominal GDP: cash and deposits; other receivables; other interest bearing liabilities; advances paid; investments, loans and placements; other payables; and non-financial assets. The scenarios do not include any variance to the government's superannuation liability or to programs subject to alternative financing approaches, such as the NBN. All other items on the balance sheet are calculated from the projected line items.

The scenarios incorporate the Government's published costs for its COVID-19 policy response measures: the JobKeeper Payment scheme ($70 billion); Boosting cash flow for employers ($32 billion); Supporting Individuals and Households ($25 billion); Supporting the flow of credit ($15 billion); Other support for business ($8 billion); and legislated Advances to the Finance Minister ($40 billion) for unforeseen expenditure. The list of measures in the Treasury's *Economic Response to the Coronavirus* document contains details for many of these.[3]

Detailed methodology

Fiscal accounting framework

Line item	Approach to calculating variations between scenarios
Operating statement	
Revenue	
Total operating receipts	See methodology for *Total receipts* below. Total operating receipts is Total receipts less Cash receipts from the sale of non-financial assets.
Wedge between revenue and operating receipts	Varies with nominal GDP
Total revenue	Sum of Total operating receipts and Wedge between revenue and operating receipts
Expenses	
Total operating payments	See methodology for *Total payments* below. Total operating payments is Total payments less Cash payments from the purchase of non-financial assets less Capital lease payments.
Wedge between expenses and payments	Varies with nominal GDP
Total expenses	Sum of Total operating payments and Wedge between expenses and operating payments
Net purchases of non-financial assets	Varies with nominal GDP
Total other economic flows	Residual/balancing item: Net operating balance less change in net worth from balance sheet
Net operating balance	Total revenue less total expenses
Fiscal balance	Net operating balance plus net purchases of non financial assets
Memo item: Comprehensive change in net worth	Net operating balance plus total other economic flows

[3] treasury.gov.au/sites/default/files/2020-05/Overview-Economic_Response_to_the_Coronavirus_3.pdf

Line item	Approach to calculating variations between scenarios
Balance sheet	
Financial assets	
Cash and deposits	Varies with nominal GDP
Advances paid	Varies with nominal GDP
Investments, loans and placements	Varies with nominal GDP
Equities	Varies with nominal GDP
Other receivables	Varies with nominal GDP
Total financial assets	Sum of Cash and deposits, Advances paid, Investments, loans and placements, Equities and Other receivables
Total non-financial assets	Varies with nominal GDP
Total assets	Sum of Total financial assets and Total non-financial assets
Liabilities	
Australian Government Securities on issue	Varies according to the financing task set by the cumulative variation in the headline cash balance, such that the additional issuance is allocated equally to four tranches that represent three year 10 year, 20 year and 30 year debt
Other interest bearing liabilities	Varies with nominal GDP
Public sector superannuation liability	Varies with nominal GDP
Other provisions and payables	Varies with nominal GDP
Total liabilities	Sum of Australian Government Securities on issue, Other interest bearing liabilities, Public sector superannuation liability and Other provisions and payables
Net debt	Sum of Australian Government Securities on issue and Other interest bearing liabilities less sum of Cash and deposits, Advances paid and Investments, loans and placements
Net financial worth	Total financial assets less Total liabilities
Net worth	Total assets less Total liabilities
Memo item: Change in net worth	Year-on-year differencing of Net worth, will be equal to the Comprehensive change in net worth from the Operating statement, by construction under this methodology

Line item	Approach to calculating variations between scenarios
Cash flow statement	
Receipts	
Tax receipts	Personal income tax (PIT) receipts vary with compensation of employees, as determined by the RBA forecasts for employment and wages GST varies with nominal consumption, as forecast by the RBA Capital gains tax varies with nominal GDP Other taxes, of which company tax is a key component, vary with the sum of gross operating surplus and gross mixed income adjusted for depreciation Unconstrained tax receipts are the sum of PIT, GST and other tax receipts as defined above; Constrained tax receipts are the minimum of 23.9 per cent of GDP (the 'tax-to-GDP cap') and unconstrained tax receipts in a given year
Non-tax receipts	Varies with nominal GDP
Total receipts	Tax receipts plus non-tax receipts
Memo item: Tax receipts without tax-cap	Unconstrained tax receipts as described above
Memo item: ex-UCB Future Fund net earnings	Does not vary
Memo item: Net cash flow from investments for policy purposes	Varies with nominal GDP
Payments	
Payments excluding public debt interest	GST payments to the states vary with GST receipts Payments related to CPI and wages vary with the RBA forecasts for CPI and wages, according to a rule-of-thumb of $1 billion per one percentage point variation between scenarios Payments related to unemployment vary with the RBA forecasts for the unemployment rate, according to a rule-of-thumb of $1.8 billion per one percentage point variation between scenarios New policy measures applied as net payments according to their announced costs. In particular, net payments related to COVID-19 policy measures are as published by the Treasury on 25 May 2020, and also take account of the $40 billion in available expenditure under an Advance to the Finance Minister, as set out in the *Supply Act (No. 1) 2020-21* and *Supply Act (No. 2) 2020-21*, which both received royal assent on 24 March 2020. Other payments (with the exception of public debt as described below) do not vary between scenarios
Public debt interest	Varies according to the change in debt, applying an interest rate yield curve which increases asymptotically, with the ten-year yield converging towards 5 per cent in the long run
Total payments	Total payments excluding public debt interest plus public debt interest
Memo item: superannuation payments	Varies with nominal GDP
Underlying cash balance	Total receipts less Total payments less ex-UCB Future Fund net earnings
Headline cash balance	Underlying cash balance plus ex-UCB Future Fund net earnings plus Net cash flow from investments for policy purposes

Macroeconomic accounting framework

Macroeconomic variable	Projection methodology: Baseline uses February 2020 RBA SMP Forecasts; Scenario uses May 2020 RBA SMP Forecasts
Gross domestic product (Expenditure, chain volume measure)	
Household consumption	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Public demand	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Dwelling investment	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Business investment	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Ownership transfer costs and change in inventories	Calculated as a residual in order to match RBA forecast growth rates for gross national expenditure to the sum of its components
Gross national expenditure	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Imports	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Exports	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Statistical discrepancy	Residual balancing item to ensure that real GDP (constructed as Gross national expenditure less Imports plus Exports) equates back to real GDP according to RBA forecast growth rates; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Gross domestic product	RBA forecast growth rates applied over SMP horizon; growth rates fixed at real GDP growth rate required to close the output gap by 2026-27 thereafter
Gross domestic product (potential)	Potential GDP level for 2027-28 calculated from growth rates from 2019-20 Budget Paper 1, Statement 7
Implicit price deflators	
Household consumption	RBA forecast CPI inflation growth rates applied over SMP horizon; set at 2.5 per cent (midpoint of RBA target inflation band) from 2022-23 onward
All other domestic demand deflators	Do not vary between scenarios
Gross national expenditure	Calculated from projected nominal and real flows
Imports	Varies with the CPI
Exports	Calculated from the imports price deflator and the RBA forecast for the terms of trade. The terms of trade does not vary between scenarios.

Macroeconomic variable	Projection methodology: Baseline uses February 2020 RBA SMP Forecasts; Scenario uses May 2020 RBA SMP Forecasts
Statistical discrepancy	Not applicable
Gross domestic product	Calculated from projected nominal and real flows
Gross domestic product (Expenditure, current prices measure)	
Household consumption	Set at real flow multiplied by implicit price deflator
Public demand	Set at real flow multiplied by implicit price deflator
Dwelling investment	Set at real flow multiplied by implicit price deflator
Business investment	Set at real flow multiplied by implicit price deflator
Ownership transfer costs	Set at real flow multiplied by implicit price deflator
Total private investment	Sum of Dwelling investment, Business investment and Ownership transfer costs
Domestic final demand	Sum of Household consumption, Public demand and Total private investment
Change in inventories	Set at real flow multiplied by implicit price deflator
Gross national expenditure	Sum of Domestic final demand and Change in inventories
Imports	Set at real flow multiplied by implicit price deflator
Exports	Set at real flow multiplied by implicit price deflator
Statistical discrepancy	Not applicable
Gross domestic product	Calculated as Gross national expenditure less Imports plus Exports plus the Statistical discrepancy
Gross domestic product (Income, current prices measure)	
Compensation of employees	Varies with employed persons multiplied by average hours multiplied by implied unit labour costs, all grown at RBA forecast rates over the SMP horizon, and determined over the medium term with a labour market projection framework that accounts for short-term variation but converges to steady-state levels for the number of persons employed and the unemployment rate
Gross operating surplus	Growth rates for Gross operating surplus, Gross mixed income and Taxes less subsidies on production and imports vary according to the residual between nominal GDP and compensation of employees. The business tax base is the gross operating surplus and gross mixed income less an invariant amount for depreciation.
Gross domestic product	Set equal to the Gross domestic product (Expenditure, current prices) series described above