Monetary Policy Tools with Near Zero Policy Rates:
A review of the Australian experience

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Abstract

The Reserve Bank of Australia encountered the Zero Lower Bound for the first time during the 2020 pandemic. It successfully provided critical monetary accommodation that supported the economy during the downturn, but faced challenges in normalizing policy, in the face of an unexpectedly strong recovery and global inflationary shocks. In retrospect, the accommodation provided through asset purchases and an innovative three-year yield target was not removed in a timely fashion. This study reviews RBA monetary policy decisions and communication in the 2020-22 period, and draws lessons regarding the monetary policy strategy and tools that can protect an economy in future downturns when policy rates are near zero.

Keywords: Reserve Bank of Australia, RBA review, zero lower bound, balance sheet policies, yield target, forward guidance.

JEL Classification: E52, E58, E61.

I.   Introduction

At the onset of the Covid-19 pandemic, the Reserve Bank of Australia (RBA) put in place extraordinary policy measures to support the Australian economy.   Similar to other central banks in advanced economies, the RBA unleashed the power of its balance sheet to circumvent the Zero Lower Bound (ZLB).   Among others tools, the RBA introduced an innovative yield target that successfully compressed the cost of financing for business and households without the need to engage in massive purchases of government debt.   The RBA's policies were successful in cushioning the economic blow that resulted from the health crisis in 2020.

The ensuing recovery was faster than expected, but policy accommodation was not adjusted accordingly.   Instead, additional stimulus was added during 2021 through a bond purchase program, stoking inflation concerns.   The stimulus was not removed in a timely fashion, resulting in an overheated economy that together with adverse global shocks produced a spike in inflation during 2022.

This study reviews RBA monetary policy decisions and communication in the 2020-22 period in the context of the RBA Review.   Drawing on the RBA's experience, compared to that of other central banks with policy rates near zero, it contributes to the debate on the RBA's choice of monetary policy tools during 2020-22, and lessons for the future.   It addresses the overarching question: What monetary policy tools should the RBA preference in future downturns beyond movements in the policy rate to around zero?

The study is organized in 9 sections.   Following this introduction, section 2 presents an overview of the RBA as an Inflation Targeting central bank.   Sections 3 and 4 discuss three global encounters with the ZLB since 1999, and the non-standard tools that have been employed by various central banks to provide additional monetary stimulus. Drawing on the evolution of RBA's projections, section 5 provides a real-time analysis of key RBA decisions, while section 6 discusses factors that compromised the RBA's yield target, leading to its disorderly abandonment.   Section 7 takes a closer look to the global dimension of the post-pandemic inflation surge.   Section 8 draws lessons for future downturns and section 9 concludes.

II.   The RBA as an Inflation Targeting central bank

To place the RBA's recent policies in context, this section presents a brief overview of the RBA's experience with Inflation Targeting and comparison with central banks of other advanced economies.

The RBA's mandate, spelled out in Reserve Bank Act, 1959, is to exercise its powers so as to best contribute to:
a)   the stability of the currency of Australia;
b)   the maintenance of full employment in Australia; and
c)   the economic prosperity and welfare of the people of Australia.

Similar to many other central banks, in the 1970s and 1980s the RBA failed to protect price stability and did not fulfil its mandate satisfactorily.[1]   Inflation and unemployment were both high and volatile (Figure 1).   Subsequently, this changed drastically, reflecting a number of policy changes in Australia including the adoption of Inflation Targeting by the RBA in 1993.

The RBA was among the first central banks to follow the lead of the Reserve Bank of New Zealand (RBNZ) and the Bank of Canada (BOC) that introduced the framework in 1989 and 1991, respectively.

The introduction of the Inflation Targeting framework reflected a growing appreciation among central bankers that delivering price stability over time was a prerequisite for advancing economic prosperity and for enhancing economic stability.   Anchoring inflation expectations would reduce the risk of inflation scares and afford the central bank greater flexibility to ease monetary policy in downturns, thereby improving countercyclical stabilization policy and better promoting full employment.[2] Key features of the framework included (1) the announcement of a quantitative definition of price stability—an inflation target; (2) a commitment to a forward-looking approach to

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[1] The Great Inflation represented a global policy failure that led to a revamping of central bank policy strategies—a rebirth of modern central banking (Bordo and Orphanides, 2013).

[2] This argument was well articulated at the time by Marvin Goodfriend drawing on the experience of the Federal Reserve. (Goodfriend, 1993; Orphanides and Williams, 2022).

adjusting the stance of monetary policy so that the medium-term forecast of inflation would be consistent with the inflation target.

The RBA's implementation of Inflation Targeting remained fairly stable over time, at least until the pandemic when RBA policy was hampered by the ZLB.   The RBA adopted a "thick point" of 2-3% inflation as the definition of price stability, and a forward-looking approach to adjusting policy in response to macroeconomic shocks so that the RBA's inflation projections would systematically converge to this goal (Debelle and Stevens, 1995).   Over this period, and until the pandemic, Australia managed to avoid recessions.   The improvement in macroeconomic stability following the adoption of Inflation Targeting was remarkable.

Macroeconomic stability generally improved in advanced economies since the 1980s, reflecting a global consensus that a monetary policy strategy that defends low and stable inflation enhances economic stability and thus supports full employment and economic prosperity.   Over time, a growing number of central banks adopted Inflation Targeting, either implicitly or explicitly.   Among advanced economies, a symmetric 2% inflation goal has become a global standard, either as a point target or the midpoint of a target range.   Both the RBNZ and BOC are in this group.   This definition of price stability has also been adopted by the Federal Reserve (FRB/Fed) in 2012, the Bank of Japan (BOJ) in 2013 and the European Central Bank (ECB) in 2021.

Figure 2 compares inflation and unemployment in Australia to other advanced economies since 1990.   The grey area in the figures denotes the interquartile range of all advanced economies, as classified by the International Monetary Fund (IMF). Australia compares favorably to other advanced economies.   In the 21st century, in particular, inflation in Australia has been relatively stable, and the unemployment rate has been consistently at the low end of the interquartile range of advanced economies.

The RBA's definition of price stability is somewhat higher than that of peer central banks. The midpoint of the RBA's "thick point" is 2.5%, half a percentage point above the global norm of 2%.   Correspondingly, over the past two decades, average inflation in Australia has been somewhat above that of most other advanced economies.   While a 2% inflation rate has the advantage of being closer to literal price stability, the RBA's definition provided an additional margin for easing policy in response to a downturn, and reduced the risk that RBA policy would be hampered by the ZLB.   This became

noticeable in the period between the GFC and the pandemic: A number of other central banks faced the ZLB and experienced persistently too low inflation.   As can be seen in the figure, even though inflation in Australia was somewhat below the RBA's midpoint for a time before the pandemic, inflation was even lower for most other advanced economies (recall that the shaded area in the figure shows the interquartile range across all advanced economies).

The end of the sample in Figure 2 reveals another commonality across advanced economies.   The economic impact of the Covid-19 pandemic, and associated policy response, resulted in higher unemployment in 2020.   Subsequently, as the economy recovered in 2021-22, inflation surged, far above the price stability objectives of virtually all advanced-economy central banks.   The inflation surge is discussed in greater detail later on.   As is evident in the figure, although inflation has surged in 2021-22, Australia's performance does not compare unfavorably to that of other advanced economies.

Figures 3 and 4 provide some additional information for the practical implementation of Inflation Targeting in Australia, as seen through the lens of the RBA's projections and surveys of inflation expectations.   The dashed orange lines in Figure 3 trace the paths of RBA's inflation and unemployment projections as published in the 4th quarter of each year from 2007 to 2022. (The last projection shown, published in November 2022, extends to 2024Q4.)   The blue lines show the realized inflation and unemployment rates until 2022Q4.   Joint inspection of the inflation and unemployment projections is informative for assessing the RBA's policy strategy in responding to economic shocks.[3] Focusing on the inflation projections alone provides information on the systematic nature of monetary policy: In general, more persistent deviations of the inflation projections from the midpoint of the 2-3% band suggest a less strict implementation of Inflation Targeting.   The resulting "flexibility" has pros and cons.   A serious drawback is that a flexible implementation risks disanchoring inflation expectations, compromising the overall ability of the central bank to defend both price stability and full employment.   An advantage is that it allows the central bank to dampen economic

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[3] A thorough analysis would require substantially more information regarding the RBA's policy process than is presently available to the public, including the evolution of real-time estimates of natural rate concepts.   Tulip and Wallace (2012) provide an evaluation of the RBA's projections.   Pagan and Wilcox (2015) present an informative external review of the RBA's economic group forecasts and analysis.

fluctuations somewhat better, provided inflation expectations stay well-anchored over time.

The top panel of Figure 4 presents the median two-year-ahead inflation expectation from surveys of union officials and market economists.   As can be seen, although these expectations remain within the 2-3% band much of the time, they vary considerably. Long-lasting deviations from the 2.5% midpoint of the RBA's "thick point" suggest inflation expectations are not as well-anchored as could otherwise be.

The RBA's 8-quarter-ahead inflation projections (shown in the bottom panel) suggest the imperfect anchoring of inflation expectations can be attributed to the degree of flexibility that characterizes the RBA's implementation of Inflation Targeting. Evidently, in the presence of shocks, the stance of monetary policy is not systematically adjusted to ensure that the inflation projection 8 quarters ahead will remain close to 2.5%.   The projections of underlying inflation in the four years before the pandemic provide a notable example: These were systematically closer to the lower end of the 2-3% band, instead of the 2.5% midpoint.   A less flexible implementation during this period would have suggested somewhat easier monetary policy in the four years before the pandemic, which would have resulted in somewhat higher inflation at the onset of the pandemic, closer to 2.5%.   With somewhat higher inflation, the ZLB would have been less binding during the pandemic.   In the event, realized inflation during this period was too low (Figure 3, top panel).

Another risk associated with a "too flexible" implementation of Inflation Targeting can be seen at the tail end of the sample, the post-covid inflation surge.   In light of the inherent flexibility in the RBA's implementation of Inflation Targeting, union officials' inflation expectations surged to well above 3% in 2022, complicating the RBA's task to attain its mandate.   This experience suggests potential benefits to a somewhat less flexible interpretation of Inflation Targeting, one that places greater emphasis on maintaining inflation expectations well anchored and in line with the 2.5% midpoint of the RBA's "thick point" target.   Notwithstanding this observation, the RBA's approach to Inflation Targeting, at least until the pandemic, has been successful and represented a vast improvement compared to pre-1990s policy.

III.   Three global encounters with the ZLB

Until March 2020, most central banks around the world, including the RBA, could implement monetary policy by conventional means—adjusting their policy rate. However, the global decline of the equilibrium level of interest rates implied that interest rates in most advanced economies were so low that the remaining room available for conventional policy easing could be exhausted in the event of a major adverse shock.   Covid-19 was this shock.   In March 2020, for the first time in its history, the RBA's monetary policy was hampered by the Zero Lower Bound (ZLB). Policy was quickly adapted with the adoption of other tools.

Though the experience was new for the RBA, there were two earlier encounters with the ZLB in the modern era that affected other advanced economy central banks.   The first encounter was in February 1999, in the aftermath of the Asian financial crisis.   That episode affected only the BOJ.   While the Asian crisis was a global shock that necessitated policy easing in most advanced economies, the Japanese economy was particularly vulnerable as it had yet to recover from the collapse of an asset price bubble several years earlier.   The Japanese experience after this episode promoted policy research to prepare other central banks for dealing with the ZLB that proved consequential later on.   The second encounter was in September 2008, and is associated with global financial crisis that plunged several advanced economies to unusually deep and painful recessions.

To assess the RBA's use of non-standard tools near zero policy rates, it is instructive to briefly review the interest rate and balance sheet policies of central banks that encountered the ZLB in all three episodes, including the pandemic.   Figures 5 and 6 summarize policy adopted by the RBA and six other central banks using two policy indicators: The policy rate and the size of the central bank's balance sheet, scaled by the size of its respective economy.   The seven central banks are split in two groups. The top panel shows policy for four central banks that had encountered the ZLB before the pandemic: FRB, ECB, BOJ and the Swiss National Bank (SNB). The bottom panel shows policy for the RBA, RBNZ and BOC that first encountered the ZLB with the pandemic.

Some general observations regarding the policy responses of central banks to encounters with the ZLB are evident in the figures.   One commonality is that once

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policy rates are reduced to the level that the central bank considers to be the effective lower bound (ELB), additional accommodation is provided in the form of expanding the central bank's balance sheet.   (This reflects the activations of various policy tools associated with the balance sheet, which will be discussed in the next section.)   The figure shows variation in the timing and extend of these balance sheet expansions.   The forcefulness of activation of the balance sheet tool has increased from one episode to the next, reflecting accumulated experience.   In the case of the BOJ, for example, the balance sheet expansion following the encounter with the ZLB in both February 1999 was quite timid.   This became more aggressive after the second episode, starting in 2013.   Similarly, the ECB exhibited noticeable timidity in expanding its balance sheet the first time it encountered the ZLB after September 2008.   ECB policy became more aggressive in 2015.

The power of the balance sheet was most forcefully demonstrated after the third encounter with the ZLB.   Central banks that had prior experience with the ZLB eased particularly aggressively.   In part, this reflected the accumulation of evidence from earlier experience, including the realization that the policy multipliers associated with balance sheet expansions were lower than originally thought (Orphanides, 2021).   From the four central banks shown in the top panels, only the Fed expanded its balance sheet sufficiently to escape the ZLB before the pandemic.

Another feature of policy near zero rates that is evident in the figures is that views regarding the effective lower bound (ELB) evolved over time.   Although it has long been recognized that the effective bound need not be zero, it remains uncertain how low rates can be pushed by the central bank before adverse effects outweigh the benefits. The effective "zero" can be somewhat positive or somewhat negative and the answer can vary from economy to economy.   Observed central bank behavior is consistent with probing over time how low rates can be set without causing disruptions and experiencing potential adverse side effects.   For example, having first adopted zero rates in 1999, the BOJ moved to a slightly negative policy rate in 2016.   While the ECB reduced policy rates considerably in 2008-2009, it was reluctant to embrace zero for some time but then moved more aggressively and into negative territory in a series of small steps from 2012 to 2019.   Similarly, SNB policy rates ratcheted down in steps after the GFC.   In contrast, while the Fed adopted zero very quickly with the GFC shock in 2008, and returned to zero in 2020, it decided against reducing rates into negative territory.

The response of rate and balance sheet policies for all seven central banks, including the RBA, during the pandemic is summarized in Figure 7. With the experience accumulated in previous encounters with the ZLB, all central banks eased policy aggressively in March 2020, as was appropriate.

The RBA eased interest rate policy in two steps. In March 2020, the policy rate was cut to 25 bps. Later on, in November, the policy rate was reduced further, to 10 bps. With regard to balance sheet policy, the RBA initially expanded less than other central banks, but then increased the pace and expanded more than other central banks in 2021, following the introduction of a bond purchase program in November 2020.

All in all, in addition to bringing or sustaining policy rates to their effective lower bound, the central banks shown in the figure provided massive additional accommodation: Over the year or so following the March 2020 shock, they increased their balance sheets by the equivalent 20-30% of 2019 GDP.

In the next section, we review the specific policies available to provide this additional accommodation.

IV.   Non-standard tools

When interest rate policy is hampered by the ZLB, central banks need to activate additional tools to provide the necessary policy accommodation. This section provides a brief overview of the available tools, with examples about their use drawing on the experience of the central banks discussed in the previous section.[4]

Negative Interest rates:

The adoption of negative interest rate policy (NIRP) is a tool that partially circumvents the ZLB. Since the GFC, the BOJ, ECB, SNB, and a few other central banks have pushed overnight interest rates somewhat below zero as a means to engineer some additional room for conventional monetary policy. Other central banks, including the

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[4] Recent surveys discussing these tools include Bernanke (2020), CGFS (2019), Carlson et al (2020). An early survey prompted by the Japanese experience in 1999 is Clouse et al (2000).

Fed, RBA, BOC and RBNZ avoided this tool.   One of the concerns with negative rates is that if they are in place for too long, they may compress interest margins, compromise profitability in the financial sector and become counterproductive.   NIRP could potentially lead to hoarding of currency notes, inhibiting financial intermediation. Other concerns include potential market disruptions.   On the other hand, available evidence suggests that NIRP is quite effective, indeed that it has similar effectiveness to conventional policy (Brandao et al, 2021).   To date, no central bank has attempted to push rates to minus 1%, so the additional room for cutting rates is limited.   However, even a smaller deviation from zero, such as driving overnight rates on to minus 50bps would add significant accommodation without the need to introduce other tools whose multipliers are more uncertain.

Asset purchases:

Asset purchases by the central bank distort market prices relative to those that would prevail otherwise with the effect of reducing financing costs, thereby boosting aggregate demand and imparting upward pressure on wages and prices and downward pressure on the exchange rate.   The canonical form of such quantitative easing is to purchase long-dated government debt: The central bank generates reserves and uses them to purchase government debt, thereby raising bond prices.   Through these purchases, the central bank can compress term premia at the targeted maturities, reducing yields of those securities and their close substitutes.[5] Estimates of the empirical magnitude of this effect vary, reflecting the greater multiplier uncertainty associated with non-standard measures in general, relative to the policy rate.   Nonetheless the experience since the GFC has confirmed that it is economically significant and persistent.[6]

By compressing term premia and reducing the cost of refinancing government debt, the central banks can also generate additional fiscal space.   This may be employed by the government for expansionary fiscal policy that would otherwise be less available.[7]

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[5] The effectiveness of asset purchases for distorting prices arises from their imperfect substitutability, cf. Modigliani and Sutch (1967), Tobin (1969), Andres et al. (2004) and Vayanos and Vila (2021).

[6] Section 2 in Carlson et al (2020) provides a review.   Other recent studies include Ihrig et al. (2018), Sudo and Tanaka (2021), and Kawamoto et al. (2021).

[7] Hofmann et al (2021) discuss the importance of such fiscal-monetary interactions at the ZLB. Blanchard (2021) stresses the benefits of fiscal deficits in a low interest rate environment.

Bond purchases had been used by the Fed, ECB, BOJ and other central banks before the pandemic, and more central banks, including the BOC and RBNZ at the onset of the pandemic in March 2020.   The RBA adopted this tool later, in November 2020.

A potential drawback of this tool is that it can lead to a considerable increase in the size of the balance sheet of the central bank and expose the central bank to interest-rate risk and potential losses.   If the implementation of a bond purchase program proves overly successful, inflation, short-term interest rates and longer-term yields will rise, reducing the value of the central bank's asset holdings.   The central bank may well experience massive accounting losses as a result.   Though such losses need not affect the central bank's ability to perform its functions, they would lead to the suspension of dividend payments from central bank profits, attracting criticism and that might weaken a central bank's independence.

Asset purchases could also target other domestic assets.   These could include corporate debt, exchange-traded funds (ETFs), real-estate investment trusts (REITs) and other assets.   Examples of the use of this tool include the ECB, BOJ and Fed.   Such purchases ease financing conditions in the targeted sectors, which may be perceived as more effective for promoting growth.   This may provide more direct assistance to a particular sector (such as real estate), with the drawback that it would involve the central bank in credit allocation, with potentially outsized distributional consequences. Since such policy decisions could be seen as outside the purview of the central bank, it may be preferable to limit asset purchases to government debt and let the government implement policies with such distributional consequences.

In small open economies, asset purchase programs can also target foreign assets, focusing the central bank's attention on influencing the stance of monetary policy through the exchange rates.   This type of programs can be effective in defending against currency appreciation pressures, thereby providing accommodation through a weaker exchange rate than would otherwise prevail.   In smaller open economies, this may be critical for preventing imported deflation.   A prime example of using this tool has been the SNB.   Figure 8 provides a comparison of the composition of the SNB and RBA balance sheets that shows the extent to which the SNB had eased through purchases of foreign assets.   A potential drawback of this tool is that it exposes the

central bank to foreign exchange rate risk, and the risk that it may register sizeable losses in its domestic currency.

Liquidity provision through collateralized lending programs:

Instead of outright asset purchases, the potentially unlimited liquidity a central bank can make available by creating reserves can be used for lending operations. Such operations can lend funds to the banking sector for long periods. The central bank can lend at terms more favorable than those prevailing in markets. For example, in times of turmoil, when markets are disrupted, this type of operations can be effective in averting or containing crises. These operations may be targeted, implicitly or explicitly and serve as substitutes for asset purchases. For example, during the GFC, the ECB extended liquidity to euro area banks as a means of easing policy anticipating that banks would use this liquidity to purchase government debt that the ECB could have otherwise purchased outright. Lending may also be targeted to direct funding to specific sectors of the economy. The provision of long-term liquidity at attractive interest rates to banks may be subject to the condition that the liquidity will be used to extend lending by the banks to households and firms. The term funding facility employed by the RBA during the pandemic falls in this category.

Liquidity provision involves collateralized central bank credit operations. As a result, the central bank may ease policy is by relaxing collateral terms, such as broadening collateral eligibility and reducing haircut schedules.

Similar to the purchase of any assets other that government debt, a drawback of these types of operations is that it raises the profile of the central bank in the allocation of credit in the economy, with outsized distributional consequences.

Targeting interest rates, yields and asset prices:

Policies that involve asset purchases can be implemented in two ways: With a quantity target and with a price target. The central bank can announce the quantity of assets it wishes to purchase in the open market aiming to boost the price of the targeted asset. For example, the central bank may announce the purchase of a certain amount of 10-year government debt, aiming to reduce 10-year government bond yields by 10 bps. An alternative way to implement such a program would be through targeting a

specific asset price or yield.   In the example above, the central bank may announce that it aims to engage in asset purchases, as needed, to reduce 10-year government bond yields from a specific level to a new level 10 bps lower.   Conceptually monetary policy can be implemented either by targeting quantities or by targeting the prices of the underlying assets whose price determine interest rate and yields.

Indeed, in conventional monetary policy operations, short-term interest rates are targeted in this manner.   Open market operations effectively involve purchases and sales of short-term government securities at quantities that are adjusted as needed to achieve the desired interest rate target.   The optimal combination of implementing policy through quantity or interest rate targets depends on the source of shocks that can affect the pertinent market (Poole, 1970).   In recent decades, most central banks have opted for price over quantity targets in implementing conventional monetary policy.

At the ZLB, once short-rates have reached their effective limit, the central bank can continue to operate similarly by targeting increasingly longer horizon yields and compressing them towards the limit of short-term rates.   This has the advantage of being more straightforward to calibrate, and more transparent for describing policy. Targeting yields may achieve a similar degree of stimulus with a smaller amount of bond purchases than a quantity-based asset program.   Targeting an asset price or yield may be symmetric or one-sided, and may be presented as a range to reduce the need for fine-tuning operations through frequent purchases and sales of assets.   The BOJ has been operating with yield targets on horizons extending to 10 years since 2016 and has succeeded in compressing yields and providing monetary stimulus in this manner.   The RBA's three-year yield target served as another example.

Similar to targeting bond yields, in a small open economy the central bank may target the exchange rate instead of targeting a quantity of purchases of foreign assets.   The SNB served as an example of this strategy between September 2011 and January 2015.

A disadvantage of targeting yields and the exchange rate to ease monetary policy is that it exposes the size of the central bank balance sheet to greater volatility.   At times, the central bank may be forced to purchase more assets than it might have expected to in order to defend a specific price/yield/exchange rate.   Tightening policy may become more challenging.   A yield or exchange rate target may not be maintained at the same level for an arbitrarily long period and would need to be adjusted as economic

conditions evolve—similar to the adjustment of overnight policy rates under ordinary circumstances.

Ending the targeting of asset-price/long-term-yield/exchange-rate targets may prove more challenging than ending asset purchases of the underlying assets. Ending a price target when the underlying fundamental price differs materially from the target in the absence of central bank support, will invariably cause some temporary market turmoil. The SNB's abandonment of its exchange rate floor on 15 January 2015 serves as an example of such a short-lived turmoil but also as an illustration that such a turmoil need not have any material adverse effects for the effectiveness of monetary policy.[8]

Policy communication and forward guidance:

In one way or another all of the non-standard tools described above as well as the setting of the policy rate under ordinary circumstances, rely on the central bank's legal authority and the power of the central bank's balance sheet: The ability of a central bank to generate potentially unlimited liquidity in the currency it issues, and use this liquidity in various ways. As with any policy tool, the effectiveness of non-standard policy measures will vary depending on the overall policy strategy followed by the central bank and how this shapes expectations about the use of its tools in the future. For this reason, the communication of monetary policy strategy is important, and communication regarding future policy decisions—forward guidance—can be seen as a policy tool, though not independently of the central bank's overall policy strategy.

In circumstances when the central bank's overall policy goals and strategy are not well understood by markets, market expectation of future policy may deviate considerably from the intentions of the central bank. Misalignments of the central bank intentions and market perceptions of future policy may be particularly counterproductive at the ZLB when the policy rate remains unchanged at zero in conditions that would otherwise warrant further cuts.

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[8] Adjustment of quantity-based non-standard tools may cause similar market disruptions. The Fed's experience with the so-called "taper tantrum" in 2013 serves as an example. As a rule, whether or not tightening policy by reversing stimulus provided with a non-standard tool might cause a short-lived market turmoil will critically depend on the overall success of the central bank to communicate its overall policy strategy and systematic reaction to the evolution of the economy.

All central banks discussed in the earlier section adjusted their communication strategies at the ZLB in one way or another, as they attempted to improve the effectiveness of policy actions.   In the face of too low inflation, and with the ZLB constraining policy rates, all central banks communicated that they intended to keep policy rates low.   This buttressed their commitment to raise inflation in line with their respective definitions of price stability.   The credibility and effectiveness of such forward guidance varied.[9]   Ultimately, the best form of forward guidance is clear communication of a central bank's policy goals and the systematic strategy the central bank intends to follow to achieve these goals as the economy evolves, both with policy rates and non-standard tools.   Seen in this manner, successful forward guidance requires clarity of the central bank's implicit policy reaction function, both for policy rates, and for non-standard policy tools such as bond purchases or yield targets, when these tools are activated at the ZLB.

V.   The RBA's response to the pandemic

The RBA responded to the pandemic with several tools.   It cut the policy rate (CRT) to 10 basis points and associated ES balances rate to zero, it adopted a three-year yield target, it introduced a term funding facility (TFF) and a bond purchase program (BPP) targeting securities with 5-10 maturities.   This section provides a real-time analysis of key RBA decisions and communication by examining the evolution of the economy as reflected in the RBA's projections.   This serves as background for tracking interest rates and evaluating the effectiveness of the RBA's easing actions in 2020, and the challenges it faced during the recovery, leading to the disorderly abandonment of the three-year target.   Figure 9 provides a summary view of the interest rate target decisions, together with the yields on the April 2023 and April 2024 AGS, that served as benchmarks for the implementation of the three-year yield target.

The first major set of policies was adopted at a special meeting of the Board on 18 March 2020.   The Board agreed on a package of measures that were announced the

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[9] The Fed set an interesting example of enhanced communication to improve policy at the ZLB.   In 2012, when the Fed started to provide forward guidance through the Summary of Economic Projections, it also published a statement describing its monetary policy strategy aiming to improve understanding of the systematic nature of its policy.   Orphanides (2020) provides additional information on this episode.

following day.   The CRT was reduced to a historic low of 25 bps and an innovative new tool was introduced—a yield target: The RBA would target the yield of the three-year Australian Government Security (AGS) at around 25 bps, the same level as the policy rate.   The Minutes of the meeting explained the rationale: "The specific proposal was to target the rate at the three-year mark, given its importance as a benchmark rate in financial markets and its role in funding across much of the Australian economy."   Furthermore, the Minutes noted that the Board discussed the importance of communication and provided the following forward guidance:

> "Members thought it likely that the target for three-year yields would be maintained until progress was made towards the Bank's goals of full employment and the inflation target.   Furthermore, they expressed the view that it would be appropriate to remove the yield target before the cash rate itself was raised."

The deterioration in the outlook that prompted this action can be assessed by comparing available projections before the pandemic to those published after the special meeting. To that end, Figure 10 compares the November 2019 and February 2020 projections with those published in May 2020.   Before the pandemic, the unemployment rate hovered around 5% and was expected to decline slightly over the projection horizon. Inflation had been too low but rising towards 2% during 2019.   It was projected to move sideways at the lower edge of the 2-3% target range over the projection horizon, around 2%.   The comparison with the May 2020 projections points to a catastrophic deterioration in the outlook due to the pandemic.   Despite the massive policy easing announced on 19 March, and subsequent weeks, the RBA projected that unemployment would jump to 10% and inflation would briefly turn negative during 2020.   Financial markets had been anticipating that policy would ease substantially beyond the 25-bps cut in the CRT that was already in place, as reflected in OIS and other rates in Figure 11. The reduction in the CRT was not a surprise.   In contrast, the introduction of a three-year yield target was.   The success of the policy measure was reflected in the drop of the yield on the April 2023 AGS.   As can be seen, the drop in government yields was larger than the reaction of the 3-year OIS rate, suggesting a notable compression of the term-premium, exactly as the policy intended.   The RBA's ultra-accommodative policy was further supported through the introduction of a term funding facility (TFF) that encouraged credit, especially to small and medium-sized businesses, by providing 3-year funding to the banking system, also at the policy rate.

In the months following this decision, the severe impact of the pandemic became clearer with incoming data: The unemployment rate rose considerably, though less than had been anticipated. Inflation fell to slightly below zero, also somewhat less than had been expected. However, the August and November 2020 projections (Figure 12) suggested it would take longer than had been anticipated in May for inflation to rise towards the 2-3% range. This prompted the Board to adopt a series of additional easing measures leading to a second major package on 3 November 2020. On 1 September, the TFF was expanded, raising the envelope of this facility to around $200 billion. The Minutes of the meeting communicated an additional notable easing action through the implementation of the yield target: In mid-October, the focus of the yield target would shift from the April 2023 AGS that had been originally employed to the April 2024 AGS. In effect, this would extend the horizon over which the target compressed term-premia by one year, to at least three and a half years.

At its 6 October meeting, the Board decided to adopt a significant change in its forward guidance, communicated in a speech by the Governor on 15 October (Lowe, 2020). According to the Minutes of the meeting:

> "The Board also considered the nature of the forward guidance regarding the cash rate. Over recent months, the Board had communicated that it would 'not increase the cash rate target until progress is being made towards full employment and it is confident that inflation will be sustainably within the 2–3 per cent target band'. Given the higher level of uncertainty about inflation dynamics in the current economic environment, the Board agreed to place more weight on actual, not forecast, inflation in its decision-making. Members indicated that they would also like to see more than just progress towards full employment before considering an increase in the cash rate, as the Board views addressing the high rate of unemployment as an important national priority. Members recognised that while inflation can move up and down for a range of reasons, achieving inflation consistent with the target is likely to require a return to a tight labour market."

In effect, with this decision, the RBA revamped its policy strategy away from the forward-looking orientation it had followed in implementing Inflation Targeting since the 1990s to a more myopic approach, guided more by "actual, not forecast inflation."

On 3 November, the RBA embraced zero rates. It reduced the CRT and yield target to 10bps, and lowered the rate on ES balances to zero. This represented significant

additional policy easing.   The evolution of interest rates around that meeting (Figure 13) suggests that this additional interest rate easing was anticipated. Markets had interpreted correctly the communication the RBA had provided earlier, including the Governor's speech on 15 October.

Having embraced zero rates, at the November meeting the Board also discussed whether further cuts into negative territory should be considered.   It decided against moving in that direction.   A summary was provided in the Minutes:

> "Members agreed that, with the cash rate target at 10 basis points and the interest rate on Exchange Settlement balances at zero, interest rates would have been lowered as far as it made sense to do so in the current environment. They considered that there was little to be gained from short-term interest rates moving into negative territory and continued to view a negative policy rate as extraordinarily unlikely."

One additional decision at that meeting proved highly consequential for the challenges the RBA faced later on: Despite the success of the yield target in compressing spreads and lowering yields at the horizon the RBA had identified as most relevant for the economy—around three years—the RBA introduced a separate bond purchase program (BPP) meant to compress spreads at longer horizons: $100 billion of government bonds of maturities of around 5 to 10 years, about $5 billion per week, would be purchased over the following 6 months.   This measure could compress spreads at much longer horizons than the yield target.   According to the Minutes, Board Members saw yields of 10-year AGS as high relative to other advanced countries and "observed that this was partly because the holdings of government debt by the Bank were relatively low as a share of GDP."

By the February 2021 meeting, incoming data suggested the economy had improved significantly faster than had been anticipated and the new projections reflected this improvement (Figure 14). The revised outlook for unemployment projections was almost a whole percentage point below the November path and suggested that by the end of the forecast horizon it would be close to 5%, similar to just before the pandemic. The inflation outlook indicated inflation would temporarily rise above 3% during 2021, due to supply disruptions that had started to become evident globally.   It was subsequently projected to fall and remain a bit below 2% by the end of the forecast horizon in mid-2023.   Despite the dramatic improvement in the economy, the Board

decided in favor of providing additional stimulus: It expanded the TFF once more; and it announced that an additional $100 billion would be added to the BPP, with purchases at a pace of $5 billion per week to commence after the original program ended.

The projections presented in May 2021 (Figure 15) confirmed that the economic recovery was progressing far more strongly than had been anticipated in earlier months. The revised projection for unemployment suggested a path more favorable than the conditions prevailing before the pandemic.   Headline inflation was expected to spike above 3% in the year ending in June, but was still projected to decline to below 2% before turning to about 2% at the end of the projection.

The Minutes of the 6 July meeting noted that the recovery was transitioning to expansion with a "solid momentum in growth."   Members acknowledged that "that the economic recovery in Australia had been stronger than earlier expected and that this was forecast to continue."   Two decisions taken at the 6 July meeting are noteworthy: First, in implementing its yield target, the Board decided to retain the 2024 AGS as the benchmark security that would guide its policy.   In this manner, the Board communicated that it would be reducing the target horizon as time progressed but also that in the baseline it would start raising rates in 2024.   The Minutes reaffirmed the RBA's forward guidance as follows:

> "The Board remained committed to maintaining highly supportive monetary conditions for a return to full employment in Australia and inflation consistent with the 2 to 3 per cent target.   It will not increase the cash rate until actual inflation is sustainably within the target range.   The Bank's central scenario for the economy is that this condition will not be met before 2024."

The second noteworthy decision regarded bond purchases.   The Board announced additional significant easing through an expansion of the BPP by $40 billion. Purchases would continue beyond the end of the program that was already in place, until at least mid-November 2021.   The pace of purchases would be $4 billion per week.   The minutes revealed that the Board remained concerned that, "economic outcomes were still well short of the Bank's goals for inflation and employment," and that this consideration could have supported easing policy by even more, a pace of $5 billion peer week.   They also suggested some discomfort with the calendar-based implementation of bond purchases:

> "Given the high degree of uncertainty about the economic outlook, members agreed that there should be flexibility to increase or reduce weekly bond purchases in the future, as warranted by the state of the economy at the time, rather than a commitment to a specific rate of purchases over an extended period."

The projection prepared for the 3 August 2021 meeting once again suggested an underlying momentum beyond what had been expected in prior rounds.   The unemployment rate was now projected to decline to about 4 % in 2023.   Inflation through June had increased to 3.8% though this was seen as a temporary spike. Projected inflation was uniformly higher than the path in the previous projection round reaching around 2¼% by the end of the forecast horizon.   However, outbreaks of the Delta variant of Covid-19 and lockdowns had interrupted the recovery and posed downside risks to this baseline projection.

Concerns relating to the pandemic became more acute by the 7 September meeting. According to the Minutes of that meeting, the outbreak of the Delta variant had interrupted the recovery in a manner that was more severe than expected a month earlier.   Although incoming data confirmed considerable momentum in the economy prior to the outbreak, the Board decided to provide yet more accommodation by extending bond purchases once again beyond mid-November.   Purchases at the rate of $4 billion a week would continue until at least mid-February 2022, adding $40 billion to the BPP envelope.

By the October meeting, Covid-related downside risks abated.   According to the Minutes, as a result of rising vaccination rates and declining case numbers, restrictions on activity would ease sooner than previously expected.   With downside risks abating, the Minutes noted that upside risks to inflation had become more pronounced, but downplayed these risks:

> "Members noted that, while it was possible that underlying inflationary pressures in Australia could build more quickly than currently envisaged, the central forecast scenario was still that domestic inflation would pick up only gradually over the medium term."

The shift in the distribution of risks to the outlook for inflation and economic activity suggested increasing odds that the RBA would need to start removing accommodation

earlier than suggested in the communication following the September meeting.   By the 5 October meeting, this shift had become evident in market expectations for liftoff. According to the Minutes: "Market pricing implied that the first increase in the cash rate was expected around the end of 2022."   Nonetheless, the Board decided to reaffirm its earlier policy settings: It maintained the CRT and yield target at 10bps, and maintained its plan to keep purchasing bonds, until at least mid-February 2022.   It also maintained its forward guidance, reiterating: "[The Board] will not increase the cash rate until actual inflation is sustainably within the 2 to 3 per cent target range.   The central scenario for the economy is that this condition will not be met before 2024."

As October progressed, the chasm between the RBA's guidance on the policy rates and market perceptions of how the RBA would need to respond to incoming data widened. Two- and three-year OIS rates continued to rise (Figure 17), implying that the term premium on the April 2024 AGS had to be pushed further down for the RBA to sustain its yield close to the 10bps target.   In mid-October, the RBA purchased $1 billion of the April 2024 bond to defend the yield target.

On 27 October, the Australian Bureau of Statistics announced that inflation over the twelve months to the September 2021 quarter had risen to 3%.   This was about ¼ percentage point higher than implied in the August projection, reinforcing market perceptions that the RBA's forward guidance on the policy rate was no longer consistent with reasonable expectations about how the RBA would need to adjust policy over the next two years to defend against too high inflation.   To sustain the yield target, the RBA would have needed to engage is large additional bond purchases, while the incoming data, and market perceptions, suggested policy was already far more accommodative than it needed to be.   In this light, the RBA decided against additional bond purchases to defend the target, thereby abandoning it.

The official decision to discontinue the yield target was taken by the RBA Board a few days later, at its 2 November 2021 meeting.   The Minutes pointed to the "faster-than-expected progress towards the Bank's goals and the revised outlook for inflation" as rationale for the decision.   Indeed, the revised projections (Figure 18) recorded a further reduction in unemployment, well below its level before the pandemic, and suggested inflation would remain at or above the midpoint of the 2-3% band in every quarter.   While the Board confirmed the abandonment of the yield target, it reaffirmed the other two major policy settings.   The Board decided to maintain the policy rate at

10 bps, and to continue to provide accommodation through purchases of government bonds at longer horizons "until at least mid-February 2022."

The RBA decided to end bond purchases under the BPP only at its 1 February 2022 meeting. By then, the unemployment rate was at its lowest level since 2008 and expected to decline further, while the outlook for inflation had deteriorated markedly, with incoming data continuing to add to the string of upside surprises (Figure 19). And yet, the Board decided to maintain the policy rate at 10 bps. Liftoff would come on 3 May 2022. By then inflationary pressures had broadened and inflation was projected to persist, having risen to 5.1% over the twelve months to the March 2022 quarter.

VI. The substitutability of the BPP and the yield target

The disorderly abandonment of the RBA's yield target on 27 October 2021 generated doubts about the wisdom of using this tool as a means of providing policy accommodation at the ZLB. However, the introduction of the yield target on 19 March 2020 and its recalibration on 3 November 2020, when the RBA embraced zero, were both incredibly effective. The yield target succeeded in lowering funding costs across the economy, as intended, flattening the term structure of government bond yields to at least the targeted three-year horizon without requiring outsized purchases of government bonds. In this sense, the yield target was quite successful. What was then the underlying cause of its demise? The answer lies in the introduction of the BPP. This section discusses how the introduction of the BPP compromised the success of the yield target and subsequently contributed to the delayed start to the policy normalization process.

To understand how the BPP compromised the success of the yield target, it is helpful to revisit two challenges associated with the appropriate calibration of the stance of monetary policy more generally: One that relates to the use of an interest rate instrument (regardless of whether this is the overnight rate or the three-year yield), and one that relates to the use of multiple policy tools that can substitute for each other in determining the overall policy stance.

One challenge with implementing monetary policy through nominal interest rates is that the policy setting requires adjustment in line with the evolution of economic

fundamentals.   That monetary policy "cannot peg interest rates for more than very limited periods" was the very first of the fundamental limitations Milton Friedman had identified in his 1967 Presidential address (Friedman, 1968, p. 3).   This applies to the overnight rate, when policy is not constrained by the ZLB, and even more so to longer-term interest rates.   Reducing nominal interest rates in response to an adverse economic shock, and keeping them low for a time, provides powerful accommodation by reducing *real* interest rates.   As this accommodation stimulates the economy and inflation rises, real interest rates fall even more, providing even greater stimulus to the economy.   With inflation rising, the central bank needs to raise nominal interest rates just to stop adding monetary accommodation.   It subsequently needs to hike nominal rates even more, to normalize real interest rates and keep inflation in line with the central bank's goal.   The greater the stimulus originally provided by pegging nominal rates at a low lever, the sooner the peg would need to be abandoned.   A delay in removing monetary accommodation could keep short- and medium-term nominal interest rates low for a while longer, but will subsequently require even greater hikes than would have otherwise been necessary.   For this reason, successful implementation of monetary policy with an interest rate instrument must be systematic and forward looking.   Nominal rates can be sustained at low levels for some time to facilitate raising inflation in line with a central bank's definition of price stability, but not indefinitely.

The second challenge is that when multiple tools are employed to ease monetary policy, what matters for the policy stance is the overall degree of accommodation.   In the case of the RBA, once zero was embraced, the yield target, the TFF, and the BPP were all providing additional monetary accommodation in different ways.   Given interest rates, the TFF boosted aggregate demand by supporting low-cost credit.   All else equal, the yield target and bond purchases both boosted aggregate demand by compressing term premia, thereby reducing longer-term interest rates and boosting prices of other assets. The accommodation provided through the yield target and the BPP were substitutable. Though they primarily affected different segments of the term structure, arbitrage across the term structure implied they were closely related.

When the RBA decided to introduce the yield target in mid-March 2020, the Board considered the possibility of accommodating either with a yield target or with a bond purchase program similar to that implemented by other central banks during the GFC. According to its Review of the Yield Target (RBA, 2022a), the Board recognized

relative advantages in the yield target and decided to adopt it instead of a bond purchase program: The yield target would be easier to calibrate as an extension to the CRT. And the three-year horizon was particularly appealing given its importance as a benchmark in Australia, as the Board communicated with its decision in March 2020.

The degree of accommodation provided with a yield target could be adjusted in two ways: Accommodation could be increased by lengthening the targeted horizon and by reducing the level of the target.   The RBA demonstrated the former with its September 2020 decision to extend the targeted horizon from the 2023 AGS to the 2024 AGS, and the latter with the reduction of the target to 10 bps in November 2020.

The introduction of the BPP in November complicated the assessment of the stance of policy.   According to the Review of the Bond Purchase Program (RBA, 2022b) the BPP is estimated to have lowered government bond yields at the 5–10-year part of the yield curve and in this manner, it added stimulus beyond what was already in place through the yield target.   However, it is unclear that this additional stimulus was necessary, given the underlying conditions prevailing in the economy, or how the RBA calibrated the size of the program, accounting for the sizeable stimulus already in place with the yield target.

The BPP was subsequently expanded in three steps, on 2 February, 6 July and 7 September 2021.   On each occasion, the program was implemented based on the calendar: The envelope of purchases was announced, and purchases proceeded over several months, regardless of changes in underlying economic conditions that argued against the provision of additional accommodation.

A comparison of OIS rates with the yield on the April 2024 AGS, as the BPP envelope increased during 2021, illustrates the resulting tension (Figure 20).   When zero was embraced in November 2020, and over the subsequent three months, the 3-year OIS rate about tracked the three-year yield at 10 bps.   During this period, the 3- and 5-year OIS rates suggested that market expectations were consistent with the policy rate remaining unchanged until 2024, and rising beyond that.   Following the February expansion of the BPP envelope, the 3-year OIS rate diverged notably from the yield target and the 5-year OIS rose substantially.   From that point on, markets expected an earlier lift-off and larger hikes following lift-off.

By providing even greater stimulus during 2021 than what had been put in place in 2020, the BPP extensions prompted revisions in expectations about how soon the RBA would need to raise interest rates to avoid overheating the economy.   With rising expectations that lift-off would be warranted before April 2024, the RBA needed to keep term premia increasingly more negative to defend its yield target.   The tension, already evident following the February BPP extension, increased further with the expansion of the BPP envelope in July and September.   In effect, by continuing to compress yields at the 5–10-year horizon when a recovery was already underway and inflation was rising, the BPP reduced the limited period over which the RBA could reasonably peg shorter-term nominal interest rates, such as the yield target.   The widening spreads in September and October 2021 suggested increasing conviction among market participants that the RBA would soon realize that it needed to reduce monetary stimulus in the economy.

Indeed, the RBA acknowledged that its policy was overly stimulative by abandoning the yield target on 27 October, when the data validated concerns that inflation was becoming too high.   In this manner, the RBA let yields and the cost of funding at intermediate horizons rise, while continuing to compress term premia at longer horizons.   It should be noted that once the RBA acknowledged that economic fundamentals warranted an adjustment in its policy stance, it had the option of implementing such an adjustment by ending the BPP instead of abandoning the yield target.   If needed, it could have further adjusted the yield target by raising its level and/or reducing the target horizon.   In the event, the RBA continued the calendar-based implementation of the BPP until February 2022.

VII.   The post-pandemic inflation surge

In retrospect, the policy stimulus provided by the RBA during 2021, notably through repeated expansion of the BPP, proved overdone.   While the accommodation provided during 2020 proved appropriate, the delayed start and exceedingly gradual removal of this accommodation, overheated the Australian economy.   The deteriorating outlook for inflation was already evident before end-2021.   By February 2022, the RBA projected that inflation would exceed the 3% upper limit of the 2-3% goal band for some time, while the unemployment rate would fall below 4%, a rate not seen in over four decades.   (Figure 21).   At the time, this was not considered exceedingly

worrisome as the RBA projected that inflation would not exceed 4% and indeed would decline to the upper half of the band in 2023-24.

Subsequent developments proved that this assessment was also exceedingly optimistic. By end-2022, the unemployment rate declined significantly more than expected, and inflation surged to over 7%, prompting a sequence of rate hikes.

Though the RBA's excessively accommodative policy stance contributed to this inflation surge, it would be incorrect to attribute the rise in inflation during 2022 primarily to RBA policy.   The surge in inflation was not unique to Australia. Adverse global developments, including the war in Ukraine, had an outsized effect on inflation in numerous advanced economies.   Major supply disruptions in energy and other markets were a common global factor that led to an inflation surge in most advanced economies.   Figure 22 traces the evolution of inflation in New Zealand, and Canada, together with the inflation projections published by the RBNZ and the BOC from 2019Q4 to 2022Q4.[10]   As can be seen, the inflation surge and pattern of inflation forecasts is broadly similar to that for Australia, shown in the top panel of Figure 21.

The exceptional nature of shocks, starting with the health crisis in 2020, the rapid improvement in 2021 and geopolitical events in 2022, blindsided many policymakers in advanced economies.   Errors in forecasting inflation over this period were unusually large not only for the RBA, RBNZ and BOC, as evident in the figures, but in several other advanced economy central banks as well.

VIII.   Lessons for future downturns

The RBA's activation of non-standard tools during the pandemic was effective and supported the Australian economy from the worst of the crisis.   That said, a number of lessons can be drawn from this encounter with the ZLB for improving the formulation and implementation of policy in the future.   These can be broadly classified in two categories: Lessons for the RBA's overall policy strategy and policy communication; and lessons for the specific tools to be employed in future encounters with the ZLB.

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[10]   The top panel is based on projections in successive RBNZ Monetary Policy Statements, published in the second month of each quarter.   The bottom panel shows BOC projections published in the first month of each quarter and is based on Chart 1 in Kryvtsov et al (2023).

The RBA's overall policy strategy and communication:

Australia benefited from the RBA's adoption of Inflation Targeting in the 1990s. The original implementation of that strategy, as described in Debelle and Stevens (1995) served the RBA reasonably well. The experience of the past few years suggests some refinements that could help improve future performance, including at the ZLB.

The RBA adopted a 2-3% "thick point" target and aimed to guide inflation and keep inflation inside this band, but without a uniformly strong focus on the 2.5% midpoint. The experience with low inflation in the few years before the pandemic, as well as the swings in inflation later on, suggest that policy could be more effective if a less flexible approach is followed: Policy could be calibrated so as to more systematically aim to achieve 2.5% inflation in the medium term, with the 2-year horizon serving as a benchmark. Following this somewhat stricter strategy systematically would anchor inflation expectations better than in the past, allowing the RBA greater flexibility to respond forcefully to downturns. Had this strategy been followed before the pandemic, the RBA would have guided inflation to 2.5% by early 2020, instead of tolerating readings around 2% and would have been in a better place when the pandemic shock hit. In addition, with inflation expectations better anchored at 2.5%, the RBA would have faced less pronounced disinflationary risks in 2020 and an easier task to counteract the inflation spike in 2022.

A second lesson for overall policy strategy is the importance of maintaining a forward-looking orientation to policy, guided by short-term projections, even while recognizing that projections are imperfect and subject to error. Given the monetary policy transmission lags, and the noise in actual inflation data, it was unwise to shift away from this orientation in October 2020, and place more weight on actual inflation as a policy guide. This is not to deny the importance of recognizing the limits of forecast-based policy. Under unusually uncertain circumstances, baseline forecasts should be expected to prove wrong. Instead of moving towards a more myopic approach to policy, this challenge is better addressed with a more systematic analysis of the risks to the outlook, and a risk-management approach to calibrating policy. The decision-making process would benefit from a systematic study of risk scenarios. While policy should remain forward-looking, it need not be based mainly on the baseline scenario when asymmetric risks become more pronounced. In such circumstances, policy can

be tilted to better protect the economy against the more pronounced asymmetric risks. Risk scenarios can also be helpful in communicating more clearly policy decisions that deviate from the policy that would have been expected on the basis of the RBA's baseline projections.

Another lesson relates to the benefits of a more systematic approach to policy overall, as opposed to meeting-by-meeting discretionary decision making.   During the pandemic, and in its reviews of the tools it employed (RBA, 2022a, 2022b, 2022c) the RBA revealed a preference for greater "flexibility."   But more flexibility makes policy less systematic.   The RBA's experience over the past several years, both before and during the pandemic, serves as a warning that flexibility can be counterproductive.

To guard against policy being insufficiently systematic, it would be useful for the RBA to cross-check its policy decisions against simple benchmark policy rules.   The RBA could benefit from a more systematic analysis identifying and communicating a simple robust rule as a guide for monetary policy in Australia.   The development of such a rule, could draw on the vast literature on policy evaluation that has developed over the past several decades, and the selected rule should be subject to periodic review and adaptation, reflecting the evolving nature of the economy.[11]

As an illustrative example, consider a simple rule that has been proven helpful for assessing Fed and ECB policy in the past.[12]   Let n denote the projected growth of nominal income over one year ending three-quarters ahead, and n^* the corresponding natural growth rate—the estimated growth of potential real GDP plus the central bank's inflation goal.   A policy that adjusts the rate of interest from one quarter to the next based on the difference, $(n - n^*)$, can deliver price stability while systematically responding to business cycle fluctuations in a forward-looking manner, consistent with the Inflation Targeting approach to policy:

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[11] Taylor and Williams (2011) survey this literature, including lessons with the ZLB during the GFC. Orphanides (2020) outlines how simple rules can be systematically employed as a guide for policy decisions and policy communication, drawing on the Fed's experience.

[12] This particular policy rule is an example of a generalized Taylor rule that benefits from the robustness properties of the nominal income and money-growth targeting approaches to policy.   See Hartmann and Smets (2018) and Orphanides and Wieland (2012) for applications for the ECB; and Orphanides (2003) and Tetlow (2015) for applications for the Fed.

$$\Delta i = 0.5(n - n^*)$$

Figure 23 shows prescriptions from a variant of this policy rule that employs inflation and unemployment projections for Australia:[13]

$$\Delta i = 0.5(\pi_{t+3|t} - 2.5) - (u_{t+3|t} - u_{t-1|t})$$

Though not developed explicitly for the Australian economy, this simple rule is suggestive as to how the RBA could have been responding to the evolution of the outlook to attain its mandate.[14]   In early 2020, the rule would have suggested massive policy easing—far more than could be implemented with rate cuts, in light of the ZLB. In this manner, this rule confirmed the need for the adoption of non-standard tools.   As the recovery took hold, on the other hand, this rule suggested that policy needed to become less accommodative earlier than the RBA recognized it needed to change tack. With inflation too high, this rule could have also helped the RBA explain more clearly why it subsequently needed to tighten policy.   Indeed, based on this simple benchmark, the RBA should have tightened policy more aggressively during 2022.

A final lesson for the RBA's overall policy strategy relates to policy communication and forward guidance.   One of the appealing characteristics of the Inflation Targeting approach is that it simplifies policy communication through inflation projections.   If inflation is projected to be too high over the next year or two, a policy tightening should be expected.   Correspondingly, an easing can be expected if inflation is projected to be too low.   The more systematic and less discretionary the application of Inflation Targeting, the more transparent becomes the implicit policy reaction function that is subsequently reflected in market expectations of future policy.   Explicit, additional forward guidance, in the form of statements about the future setting of the policy rate, is

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[13] The approximation implied by Okun's law is applied to obtain this formulation.   For more details see Orphanides and Williams (2002), and Orphanides (2020).   The formulation based on nominal income requires information about the RBA's real-time estimates of potential GDP growth that are not readily available.

[14] The specific response parameters to the RBA's inflation projection and projected changes in the unemployment rate could be adjusted on the basis of macroeconometric policy evaluations, to better reflect the characteristics of the Australian economy.

not essential when the systematic nature of policy strategy is communicated well. The best way to provide coherent forward guidance is with clear communication of the central bank's policy rule. This applies both under normal circumstances, and also when the policy rate is constrained at the ZLB. In the latter case, policy needs to be clearly communicated in terms of the tools employed to provide additional accommodation. This will subsequently be reflected in expectations of the policy rate and, more importantly at the ZLB, in other indicators of financing conditions, such as medium- and longer-term real interest rates.

During the pandemic, the RBA effectively adopted a time-based communication for its policy rate, and later for bond purchases, that deviated from these principles. For a time, forward guidance appeared to be employed more or less as an independent policy tool as opposed to a communication tool meant to explain more clearly the actual and projected, state-contingent policy actions. Unsurprisingly, this proved unhelpful. As conditions evolved during the pandemic, the RBA recognized (with a delay), that it needed to adjust policy in a manner that differed from the time-based communication it had provided earlier. This had a negative impact on the Bank's credibility that could have been avoided with a better communication strategy. Going forward, it would be advisable to avoid treating forward guidance as a separate policy tool, and instead place greater emphasis on ensuring that the Bank's policy reaction function to the evolving macroeconomic outlook is better understood.

Tools for easing at the ZLB:

The RBA's policy response, starting with the package announced on 19 March 2020, was impressive, as was appropriate. This suggested that the RBA had some preparation about what tools to employ in the event it encountered the ZLB. The experience of the ZLB encounter in 2020 can help refine the RBA's approach in future encounters.

A first lesson is that additional study is warranted to assess whether the RBA's effective lower bound can be moved further down. Negative interest rates should be considered. The successful experience with negative rates by several central banks over the past decade argues in favor. At the next downturn, minus 1% could well be the new zero. A global consensus has yet to emerge on the cost-benefit tradeoff associated with negative policy rates as the evaluation depends, in part, on idiosyncratic conditions.

Even if it is assessed that negative rates could only be considered in future, and not right away, steps towards the necessary preparation must be taken to allow the option.   This ranges from stress-testing software in financial institutions that may require updates to handle negative interest rates, to formulating the specifics of implementation of such a policy by the RBA, to the preparatory work for any necessary adjustments in legislation and regulation.

Once the ELB is determined, the response to a shock that requires accommodation beyond the ELB should be immediate.   The policy rate should be cut to allow the overnight rate to fall to the ELB with no delay.   This is the indicated response to an adverse shock that may require the activation of non-standard tools, recognizing that those tools are subject to greater multiplier uncertainty than the policy rate (cf Orphanides and Wieland, 2000).

Judging from the RBA's experience in 2020, if prior analysis had determined that the RBA could take overnight rates to zero, but not below, the RBA could have implemented that policy right away, on 19 March 2020.   If the outlook for the economy was recognized to be as dire as the RBA suggested with its projections later in the year, there was no downside to embracing zero already on 19 March.   The added stimulus would have reduced the need for providing accommodation with balance sheet expansion.

The next lesson regards the application of balance sheet tools.   The RBA employed three such tools during the pandemic.   The TFF, the yield target and the BPP.   For assessing what monetary policy tools the RBA should preference in future downturns, it is instructive to discuss the TFF separately and then the yield target and BPP jointly.

In a strict sense, programs such as the term funding facility are better classified as credit policy instead of monetary policy.   While both credit easing and monetary easing can be effective in providing stimulus, credit easing raises the profile of the central bank in credit allocation decisions that could be considered as more appropriate for the government, instead of the central bank.   This is particularly so when the central bank provides liquidity at a subsidy rate that is not available to all actors in the economy. From a governance perspective, it would be preferable for the RBA to only consider engaging in such decisions in close coordination with the government.   The RBA could consider supporting the allocation of liquidity, but it would be preferable for the

facility to be structured in such a manner that the government assumes the responsibility for the subsidies involved and associated credit risk. This would improve governance and also protect the RBA from the appearance that it engages in fiscal support measures akin to monetary financing. The unusual nature of the pandemic emergency could be seen as justifying the swift action taken by the RBA to introduce the TFF in March 2020. However, in a typical downturn, this tool should not be preferenced over balance-sheet based monetary policy tools.

While overnight rates may be stuck at zero, policy can be eased further by compressing premia on government securities along the term structure of interest rates, thereby reducing financing costs, raising asset prices, and weakening the exchange rate. Compressing term premia in this manner provides accommodation beyond what is provided through expectations of the setting of the overnight interest rate in the future.

This can be achieved either by targeting the quantity of purchases or yields. A quantity of purchases may be calibrated aiming to compress spreads by some amount. In light of the uncertainty involved, the actual effect on yields may be smaller or larger. The alternative is to set a yield and engage in purchases (and potentially, later on, sales) of bonds as needed. The yield target introduced by the RBA in March (and later adjusted in November) represented the latter approach.

A similar degree of stimulus could be provided instead with bond purchases. As discussed in section 6, the RBA Board discussed the two alternatives and judged that the yield target was the better method. Judging from the success of this policy in providing monetary stimulus, this could be the balance sheet tool of choice in future downturns as well. However, its effective implementation could benefit from some changes relative to the experience during the pandemic.

First, it would not be advisable to introduce a quantity-based program similar to the BPP at the same time. While it is not impossible to implement such programs at the same time, it unnecessarily complicates policy, as described in section 6, inviting errors.

Second, the yield target could be implemented in a manner that allows for systematic adjustments as the economy evolves: It should accommodate adding and removing stimulus in small steps. To that end, some modification on the specification of the target could be examined. The target could be based on fitted constant maturity yields,

based on multiple AGS issues, instead of a specific AGS.   Using a constant maturity in this manner would allow for smaller adjustments, as needed, and not be restricted by the dates of specific AGS issues.   Once the ZLB is reached, additional easing could be provided by targeting successively longer horizons between one and three years, thereby compressing yields at least up to the targeted horizon.   An adjustment towards tighter policy would be implemented by targeting successively shorter horizons, which would see yields beyond the newly adopted shorter horizon rise.

Third, the target could be specified with a symmetric tolerance range, for example plus/minus 10 bps, and implemented with purchases as well as sales of securities, as needed.   The securities employed for this operation need not be restricted to the securities with maturities closest to the targeted horizon.   Instead, a wider range of maturities spanning the target horizon could be used for such purchases/sales, thereby avoiding concentration of operations on specific issues.

Similar to the setting of the policy rate away from the ZLB, it is critical to set the yield target parameters in a systematic fashion, responding to the evolution of the outlook for inflation and economic activity.   More systematic policy provides better protection against the risk of market disruptions when policy tightens.   As the economy improves, and the ZLB becomes less binding on overnight rates, the target maturity should be reduced and eventually the yield target removed before raising policy rates.

IX.   Concluding remarks

Reflecting on the Bank of Japan's early experience with the ZLB, Kazuo Ueda, who at the time was a Member of the BOJ Board, remarked:

> "Do not put yourself into the position of zero rates.   I tell you it will be a lot more painful than you can possibly imagine." (Ueda 2000, p. 1109.)

Two decades later, as a result of the pandemic shock that swept the world in 2020, policymakers at the RBA and many other central banks, faced for the first time the added complications arising in this environment.

Drawing lessons from Japan and, later on from central banks that experienced the ZLB during the GFC, the RBA was better prepared.   The RBA employed a number of non-standard tools that proved effective in supporting the economy.   The introduction of a yield-target, a natural extension of implementing policy with an overnight policy rate in

normal circumstances, was particularly effective.   The RBA can continue to employ its toolkit to ease policy near zero rates in future, but not all available tools need to be employed simultaneously and in the same manner.   The introduction of BPP added an unnecessary complication to policy that proved counterproductive.   There would be benefits to reconsidering the RBA's approach to forward guidance and refining its overall monetary policy strategy.

The RBA should evaluate the benefits of being more open to somewhat negative interest rates.   If this evaluation shows that the effective lower bound can be reset to minus 1%, instead of zero, this would reduce the need for additional balance sheet tools whose calibration is more complicated and subject to greater uncertainty.

Overall, there would be benefits from a more systematic policy framework—an overall strategy for both easing and tightening policy in response to the evolution of economic conditions.   An implementation of Inflation Targeting with less emphasis on flexibility and discretionary action, in favor of better anchoring inflation expectations at the 2.5% midpoint of the RBA's target, would likely result in better stabilization performance.   Even with the best intentions, discretionary policy worsens policy tradeoffs and yields inferior economic performance over time.

Policy could also benefit from the systematic use of risk scenarios to facilitate risk management, and the cross-checking based on a simple robust policy rule, using short-term projections as inputs.   Such a rule could also facilitate the RBA's policy communication and forward guidance.   Although forecasts are inherently uncertain, policy must remain forward-looking, properly accounting for the lags associated with the monetary policy transmission mechanism.

The RBA's performance over the past decades compares favorably with that of other advanced-economy central banks.   Learning from past experience can help improve the RBA approach to Inflation Targeting and better prepare it to address future challenges.

References

Andres, J., Lopez-Salido, J. David, and Nelson, Edward (2004). Tobin's imperfect asset substitution in optimizing general equilibrium. Journal of Money, Credit and Banking, 36(4), pp. 665-690.

Bernanke, Ben (2020). The New Tools of Monetary Policy. American Economic Review, 110(4), pp. 943–983.

Blanchard, Olivier (2021). Fiscal Policy under Low Rates: Taking Stock. The 2021 Mayekawa Lecture.   Monetary and Economic Studies, November. Bank of Japan.

Bordo, Michael and Athanasios Orphanides (2013). The Great Inflation: The Rebirth of Modern Central Banking. NBER. https://www.nber.org/books-and-chapters/great-inflation-rebirth-modern-central-banking

Brandao Marques, Luis, Marco Casiraghi, Gaston Gelos, Gunes Kamber and Roland Meeks (2021). Negative Interest Rates: Taking Stock of the Experience So Far.   IMF Monetary and Capital Markets Department, No. 21/03. https://www.imf.org/en/Publications/Departmental-Papers-Policy-Papers/Issues/2021/03/01/Negative-Interest-Rates-Taking-Stock-of-the-Experience-So-Far-50115

Carlson, Mark, Stefania D'Amico, Cristina Fuentes-Albero, Bernd Schlusche, and Paul Wood (2020). Issues in the Use of the Balance Sheet Tool. Finance and Economics Discussion Series, 2020-071, August. https://doi.org/10.17016/FEDS.2020.071

Clouse, James, Dale Henderson, Athanasios Orphanides, David Small, and Peter Tinsley (2000). Monetary Policy When the Nominal Short-Term Interest Rate is Zero. Finance and Economics Discussion Series, 2020-51, November. https://www.federalreserve.gov/econres/feds/monetary-policy-when-the-nominal-short-term-interest-rate-is-zero.htm

Committee on the Global Financial System (2019).   Unconventional monetary policy tools: a cross-country analysis. CGFS Papers No 63, October. https://www.bis.org/publ/cgfs63.pdf

Debelle, Guy, and Glenn Stevens (1995). Monetary Policy Goals for Inflation in Australia. In AG Haldane (ed), Targeting Inflation: A Conference of Central Banks on the Use of Inflation Targets. Bank of England, pp 81–100. https://www.rba.gov.au/publications/rdp/1995/9503/

Friedman, Milton (1968). The Role of Monetary Policy. American Economic Review, 58(1), March, pp. 1-17.

Goodfriend, Marvin (1993). Interest Rate Policy and the Inflation Scare Problem: 1979-1992. Federal Reserve Bank of Richmond Economic Quarterly 79(1), pp. 1-23. https://www.richmondfed.org/-/media/RichmondFedOrg/publications/research/goodfriend/EQ-1993.pdf

Hartmann, Philipp, and Frank Smets (2018). The first 20 years of the European Central Bank: Monetary policy. Brookings Papers on Economic Activity, Fall, 1-146. https://www.brookings.edu/bpea-articles/the-first-20-years-of-the-european-central-bank-monetary-policy/

Hofmann, Boris, Marco Jacopo Lombardi, Benoit Mojon, and Athanasios Orphanides (2021). Fiscal and Monetary Policy Interactions in a Low Interest Rate World. BIS Working Paper No. 954. https://www.bis.org/publ/work954.htm

Ihrig, Jane, Elizabeth Klee, Canlin Li, Min Wei, and Joe Kachovec (2018). Expectations about the Federal Reserve's Balance Sheet and the Term Structure of Interest Rates. International Journal of Central Banking, 14(2), pp. 341-391. https://www.ijcb.org/journal/ijcb18q1a8.htm

Kawamoto, T., Nakazawa, T., Kishaba, Y., Matsumura, K., and Nakajima, J. (2021). Estimating effects of expansionary monetary policy since the introduction of quantitative and qualitative monetary easing (QQE) using the macroeconomic model (Q-JEM). Bank of Japan Working Paper Series 21-E-4, Bank of Japan. https://www.boj.or.jp/en/research/wps_rev/wps_2021/wp21e04.htm

Kryvtsov, Oleksiy, Jim MacGee, Luis Uzeda (2023). The 2021–22 Surge in Inflation. Bank of Canada Staff Discussion Paper, 2023-3, January. https://www.bankofcanada.ca/wp-content/uploads/2023/01/sdp2023-3.pdf

Lowe, Philip (2020). The Recovery from a Very Uneven Recession. 15 October. https://www.rba.gov.au/speeches/2020/sp-gov-2020-10-15.html

Modigliani, Franco and Sutch, Richard (1967). Debt management and the term structure of interest rates: An empirical analysis of recent experience. Journal of Political Economy, 75(4), 1967, pp. 569–589.

Orphanides, Athanasios (2003). Historical Monetary Policy Analysis and the Taylor Rule. Journal of Monetary Economics, 50(3), pp. 983-1022.

Orphanides, Athanasios (2020).   Monetary Policy Strategy and its Communication. In Challenges for Monetary Policy, Proceedings of the 2019 Jackson Hole Economic Policy Symposium, Jackson Hole, WY: August 2019. https://www.kansascityfed.org/documents/6954/Orphanides_Jh2019.pdf

Orphanides, Athanasios (2021).   The Power of Central Bank Balance sheets. Monetary and Economic Studies, November. Bank of Japan. https://www.imes.boj.or.jp/research/papers/english/me39-4.pdf

Orphanides, Athanasios, and Volker Wieland (2000). Efficient Monetary Policy Design near Price Stability. Journal of the Japanese and International Economies, 14(4), December, Pages 327-365.

Orphanides, Athanasios, and Volker Wieland (2012). Complexity and Monetary Policy. International Journal of Central Banking, January, pp. 167-203. https://www.ijcb.org/journal/ijcb13q0a8.pdf

Orphanides, Athanasios, and John C. Williams (2002). Robust Monetary Policy Rules with Unknown Natural Rates. Brookings Papers on Economic Activity, (2), pp. 327-365. https://www.brookings.edu/bpea-articles/robust-monetary-policy-rules-with-unknown-natural-rates/

Orphanides, Athanasios and John C. Williams (2022). Taming Inflation Scares. In Essays in Honor of Marvin Goodfriend: Economist and Central Banker, Robert G. King and Alexander L. Wolman editors. FRB Richmond, pp. 217-227. https://www.richmondfed.org/publications/research/goodfriend/orphanides_and_williams

Pagan, Adrian, and David Wilcox (2015). External Review: Reserve Bank of Australia Economic Group Forecasts and Analysis. https://www.rba.gov.au/speeches/2016/pdf/sp-ag-2016-04-06-external-forecast-review-final-report.pdf

Poole, William (1970). Optimal Choice of Monetary Policy Instruments in a Simple Stochastic Macro Model. Quarterly Journal of Economics, vol. 84 (May), pp. 197–216

RBA (various). Monetary Policy Minutes. https://www.rba.gov.au/monetary-policy/rba-board-minutes/

RBA (various). Statement on Monetary Policy. https://www.rba.gov.au/publications/smp/

RBA (2022a). Review of the Yield Target. June. https://www.rba.gov.au/monetary-policy/reviews/yield-target/index.html

RBA (2022b). Review of the Bond Purchase Program. October. https://www.rba.gov.au/monetary-policy/reviews/bond-purchase-program/

RBA (2022c). Review of the RBA's Approach to Forward Guidance. November. https://www.rba.gov.au/monetary-policy/reviews/approach-to-forward-guidance/index.html

Sudo, Nao and Masaki Tanaka (2021). Quantifying stock and flow effects of QE. Journal of Money, Credit and Banking, 53(7) October, pp. 1719-1755.

Taylor John, and John C. Williams (2011). Simple and Robust Rules for Monetary Policy. Chapter 15, Handbook of Monetary Economics, 3, Benjamin Friedman and Michael Woodford (Eds.), Elsevier, pp. 829-859.

Tetlow, Robert (2015). Real-Time Model Uncertainty in the United States: `Robust'
Policies Put to the Test. International Journal of Central Banking, 11(1), pp. 113-155.
https://www.ijcb.org/journal/ijcb15q2a4.htm

Tobin, James (1969). A General Equilibrium Approach to Monetary Theory. Journal of
Money, Credit and Banking, 1(1), pp. 15-9.

Tulip and Wallace (2012). Estimates of Uncertainty around the RBA's Forecasts. RBA
Research Discussion Paper – RDP 2012-07.
https://www.rba.gov.au/publications/rdp/2012/pdf/rdp2012-07.pdf

Vayanos, Dimitri and Jean-Luc Vila (2021). A preferred-habitat model of the term
structure of interest rates. Econometrica, 89(1), pp. 77-112.

Ueda, Kazuo (2000).   Japan's Experience with Zero Interest Rates. Journal of Money,
Credit and Banking Vol. 32, No. 4, Part 2: Monetary Policy in a Low-Inflation
Environment, November, pp. 1107-1109.

Figure 1
Inflation and Unemployment in Australia: 1960–2022

Inflation
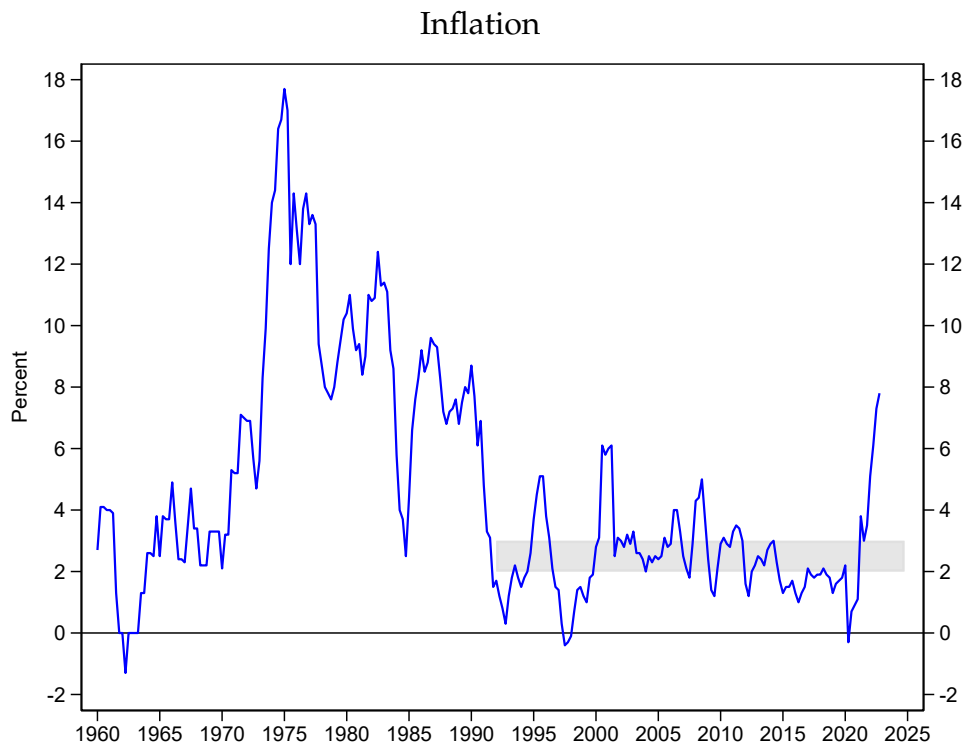
Unemployment

Inflation, as measured by the percentage change of the CPI over year to quarter shown. Shaded area reflects 2–3% inflation goal. Unemployment is the quarterly average of monthly data.

Figure 2
A comparison with other advanced economies

Inflation
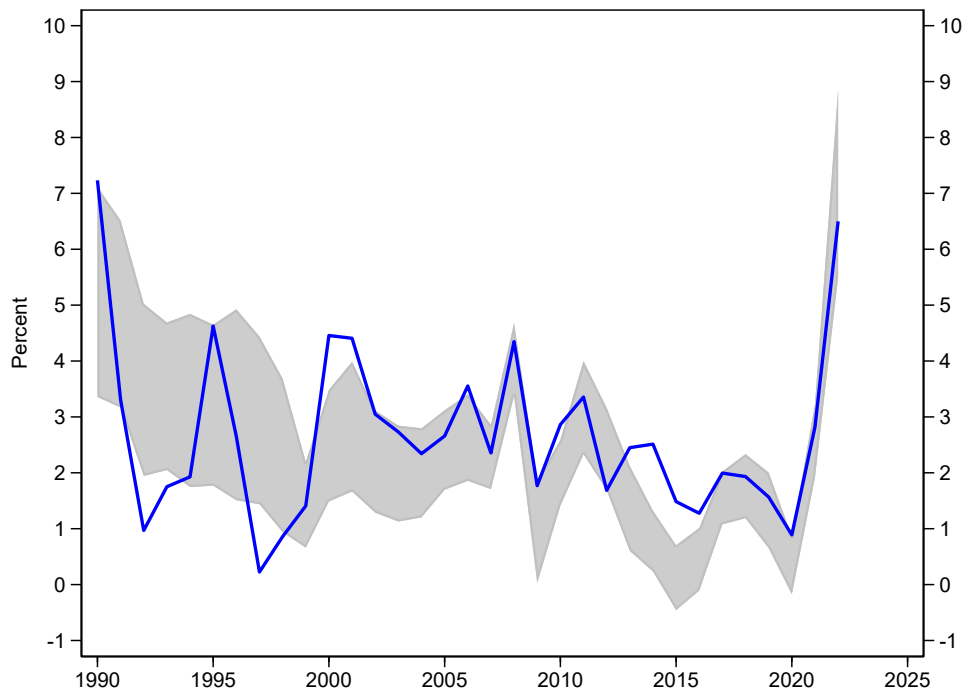
Unemployment
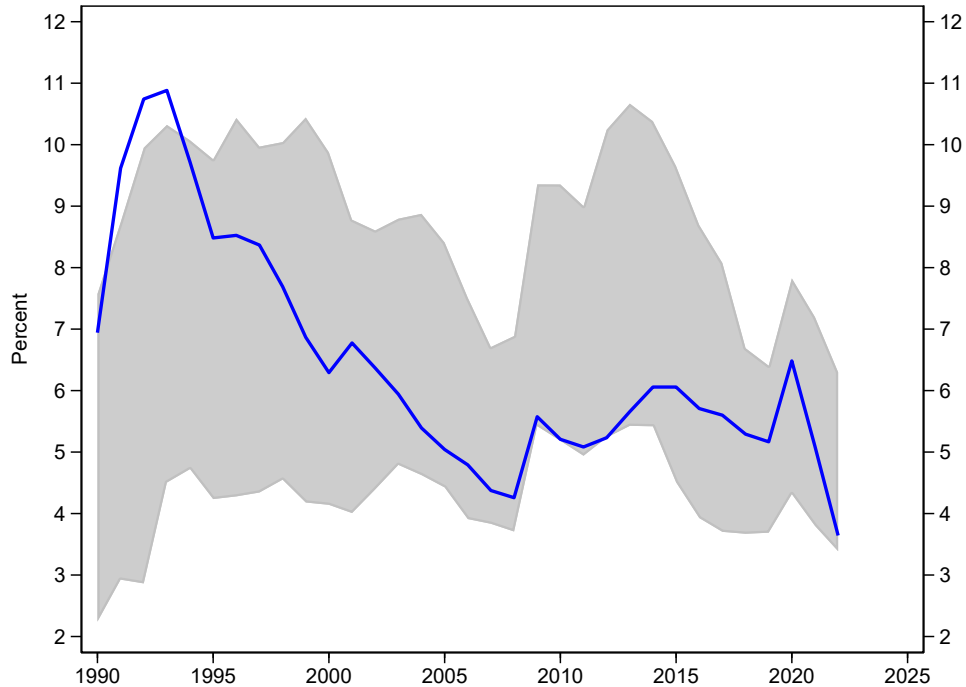
Australia in blue. Shaded area reflects intequartile range of all advanced economies, as classified in IMF WEO, October 2022. Annual data, 2022 data reflect partial forecasts. Inflation is the growth rate in the average consumer price index.

Figure 3
RBA projections since 2007

Inflation
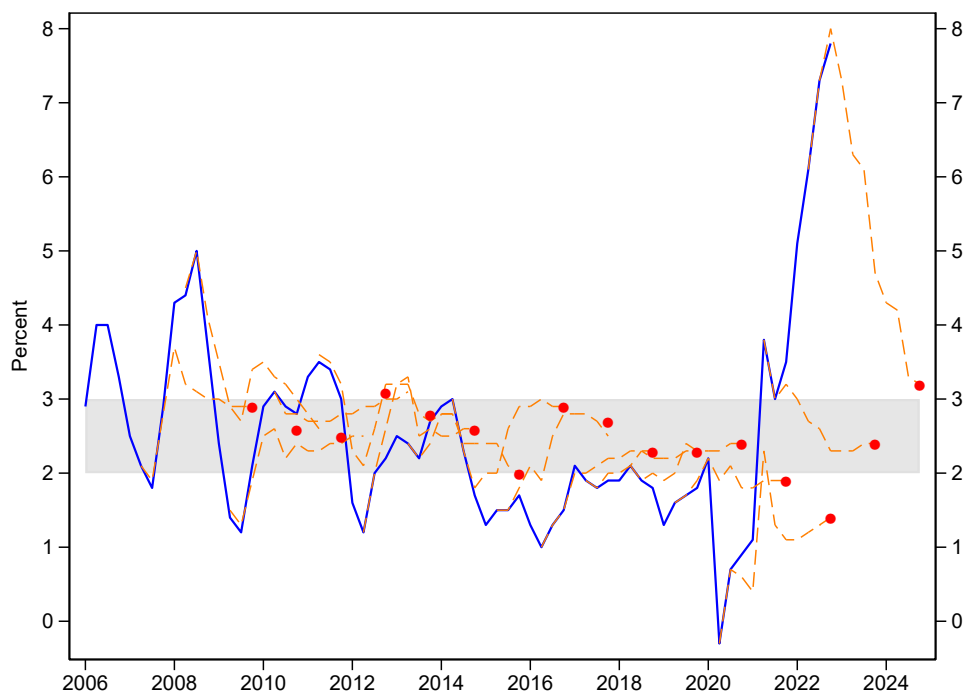
Unemployment

RBA projections in Q4 of each year, from 2007 to 2022 in dashed lines. For inflation, red marks indicate end-of-horizon projection (8-quarters ahead). Blue lines show realized inflation and unemployment rates.

Figure 4
Inflation expectations and RBA inflation projections

Inflation expectations
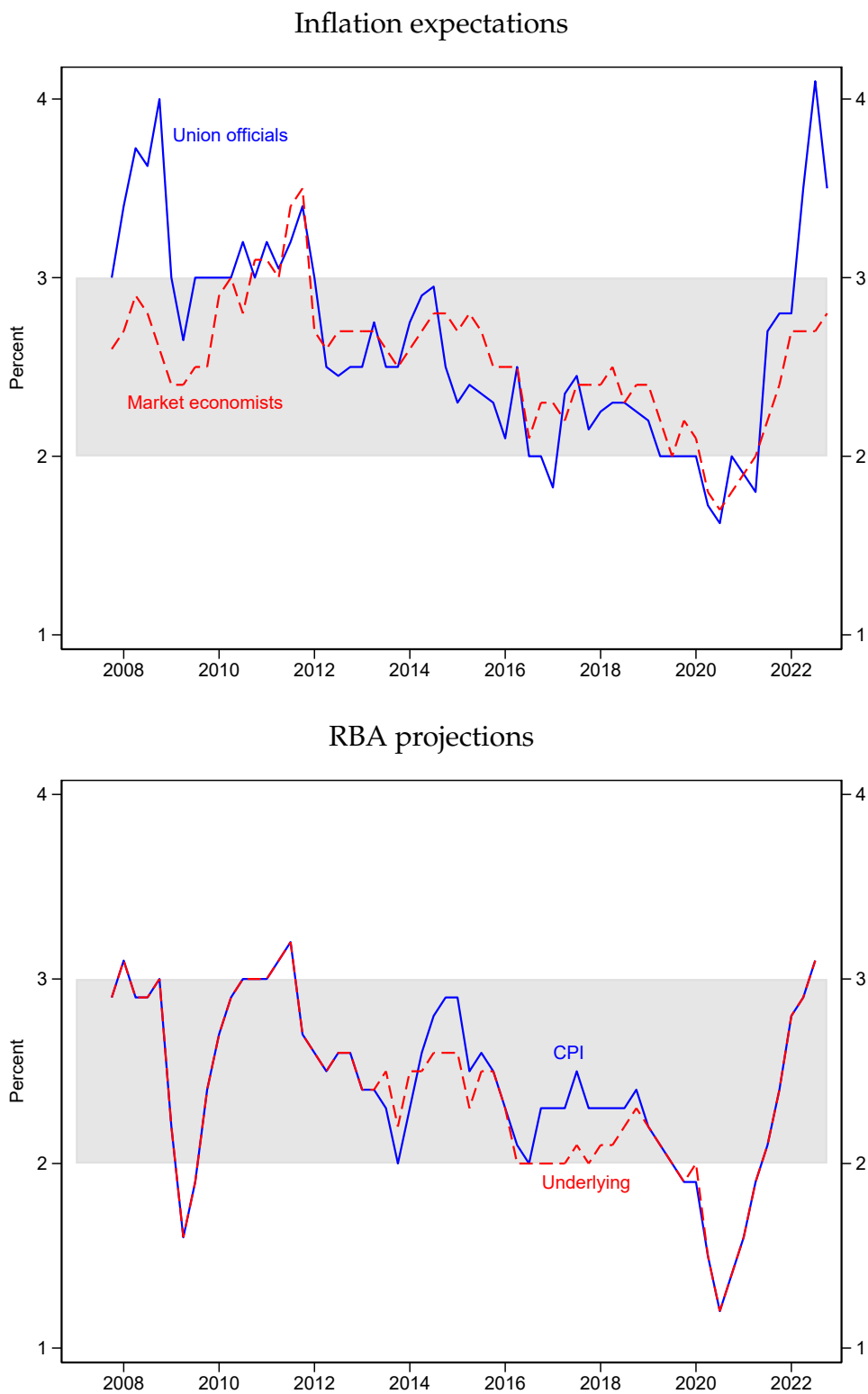
RBA projections

RBA projections for CPI (blue) and underlying (red) inflation, 8 quarters ahead. inflation expectations, 2 years ahead, survey median. Data plotted in the quarter the survey/projection is completed.

Figure 5
Three encounters with the ZLB: Policy rates

FRB, ECB, BOJ, SNB
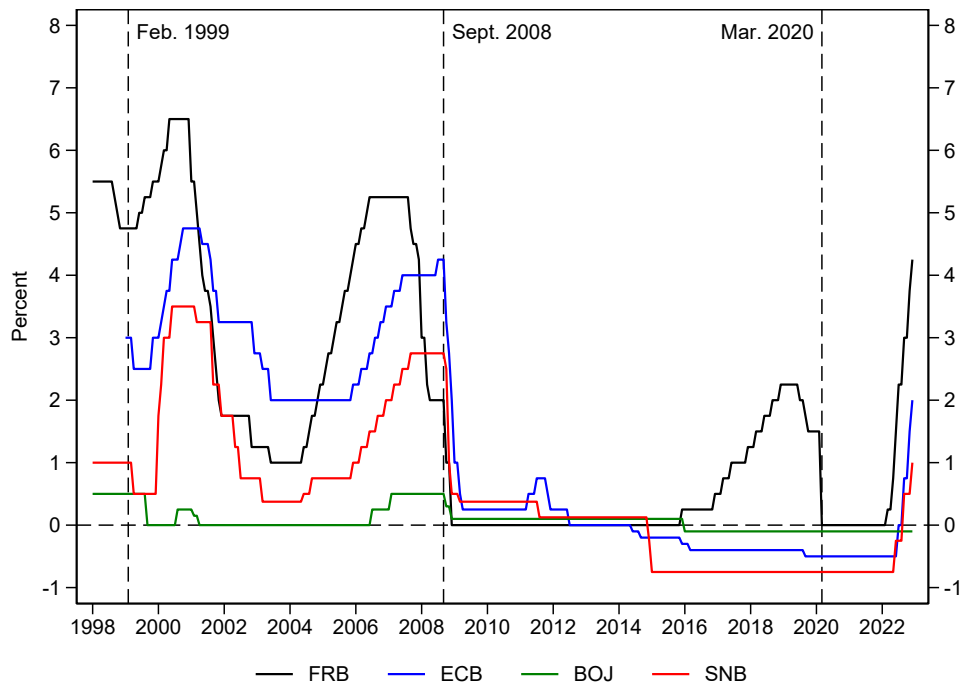
BOC, RBNZ, RBA
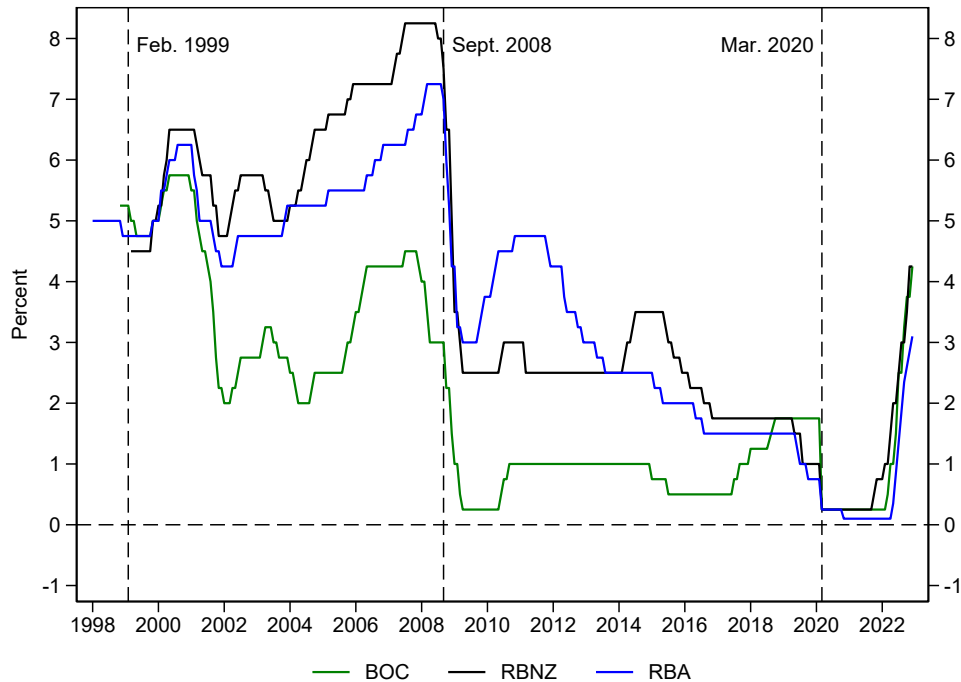
Key policy rate at the end of month. For FRB, upper limit of federal funds target range is plotted starting December 2008. For ECB, rate on deposit facility is plotted starting October 2008.

Figure 6
Three encounters with the ZLB: Size of CB balance sheets

FRB, ECB, BOJ, SNB
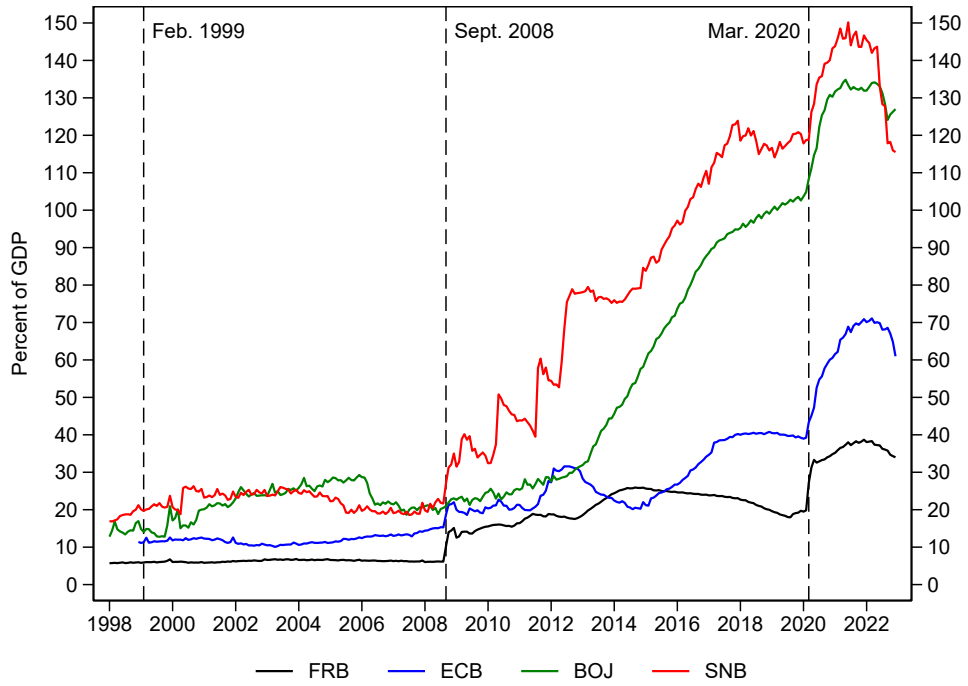
BOC, RBNZ, RBA
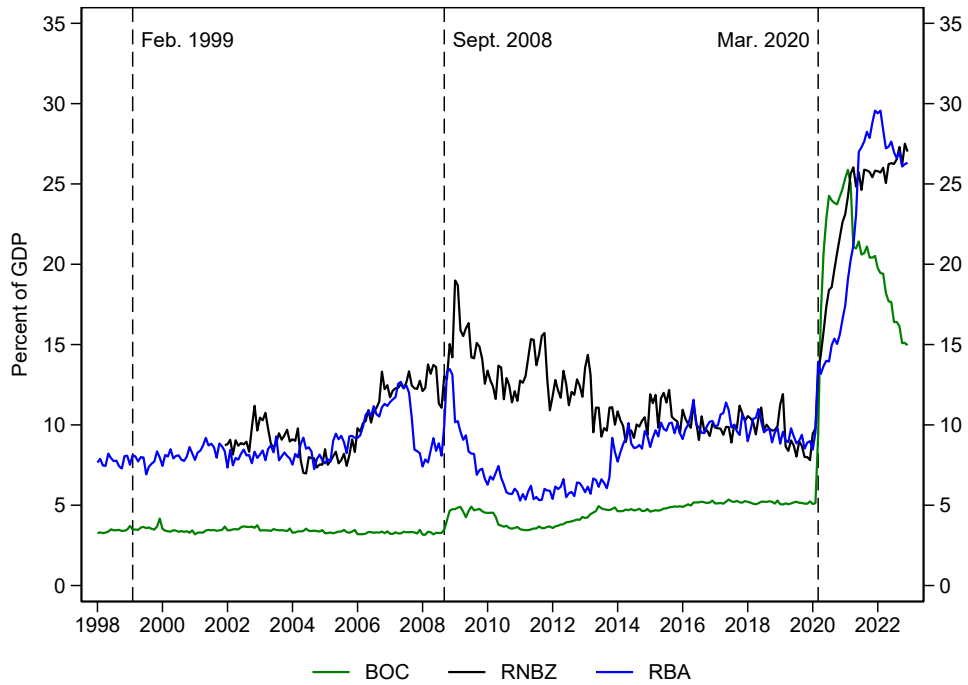
Balance sheet as percent of trailing 4-q moving average of GDP.

Figure 7
Policy response to pandemic

Policy rate
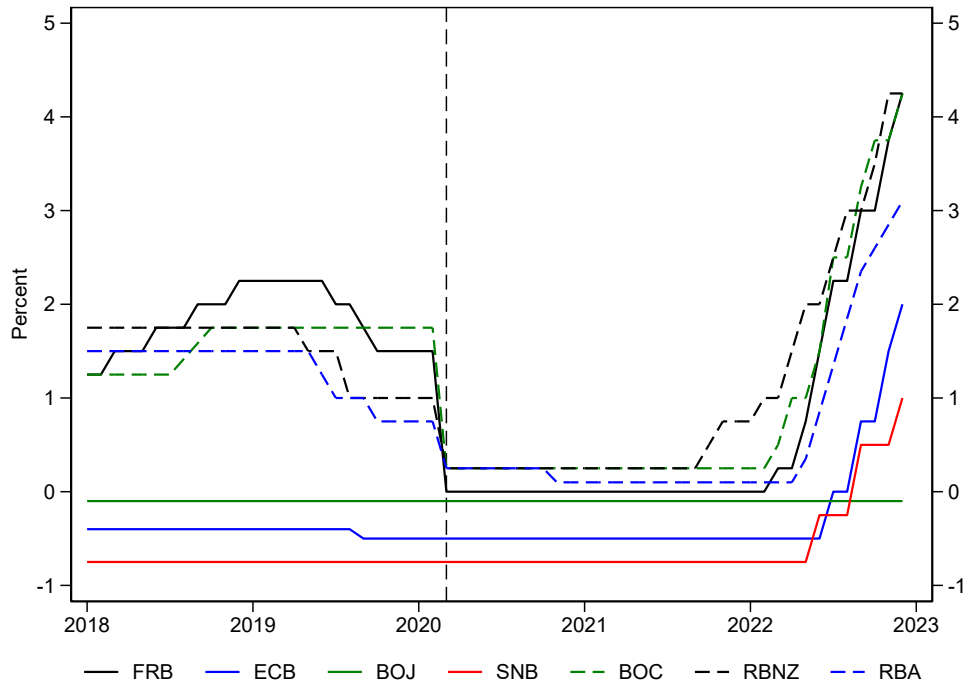
Balance sheet
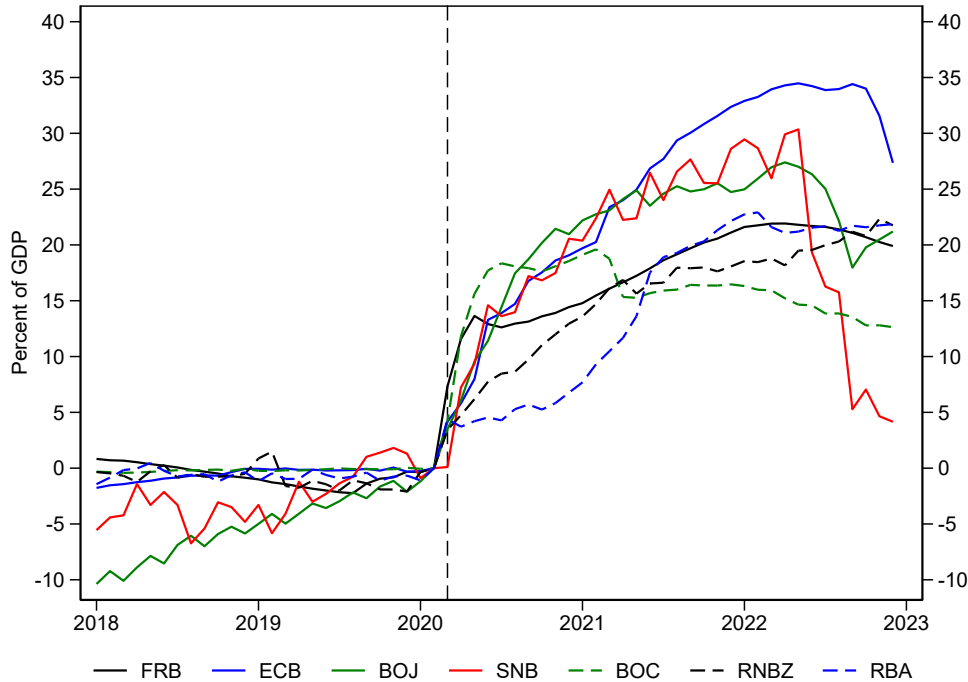
Balance sheet size as percent of 2019 GDP, relative to size in February 2020.

Figure 8
Domestic vs foreign assets in balance sheet

SNB
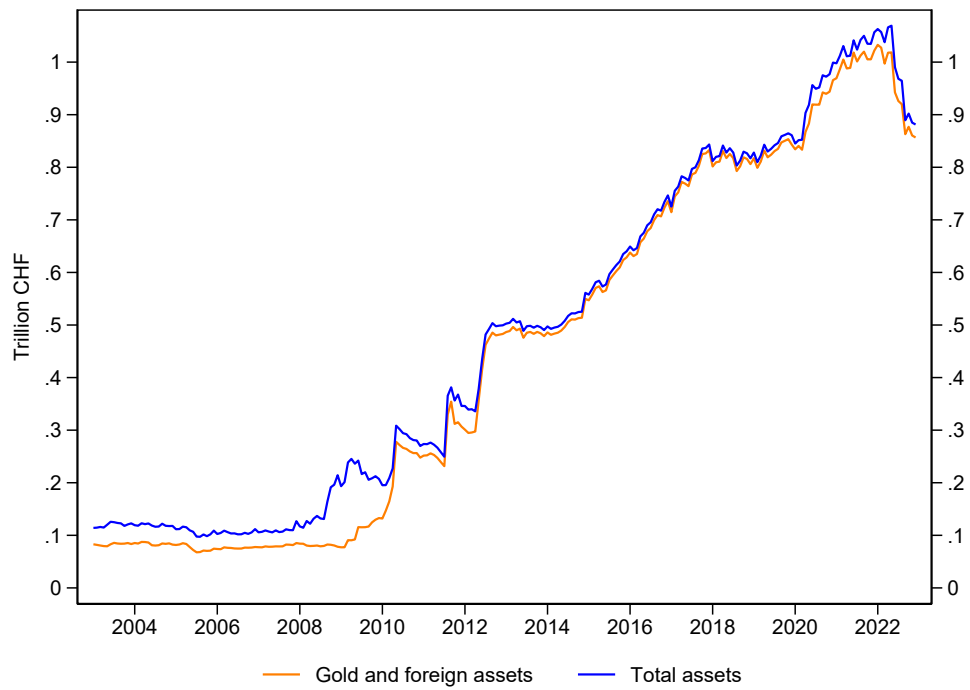
RBA
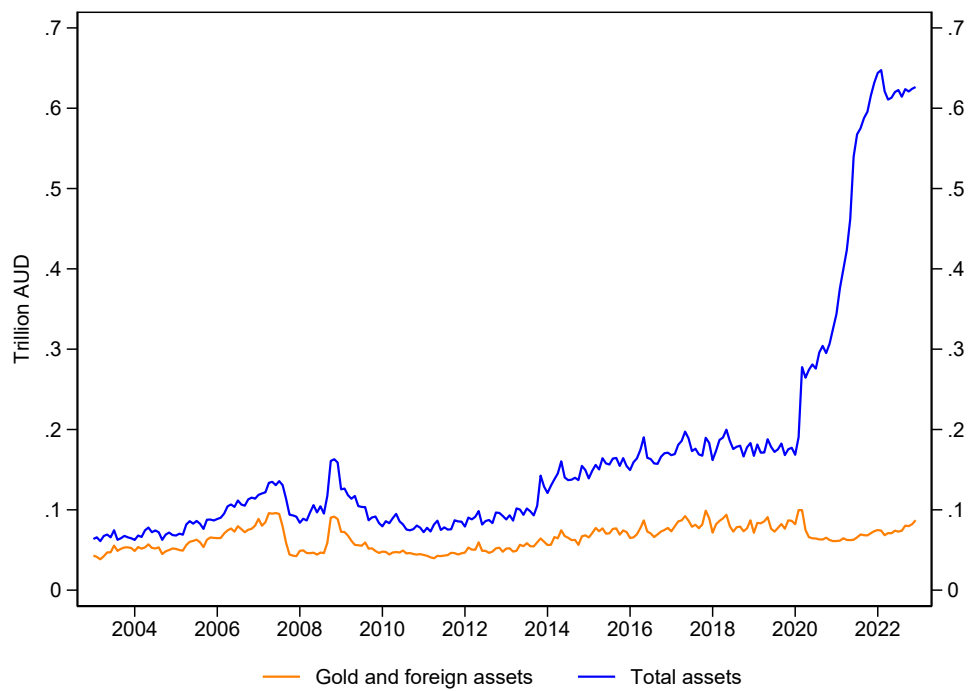
Figure 9
RBA policy rate and yield target: 2020-2021
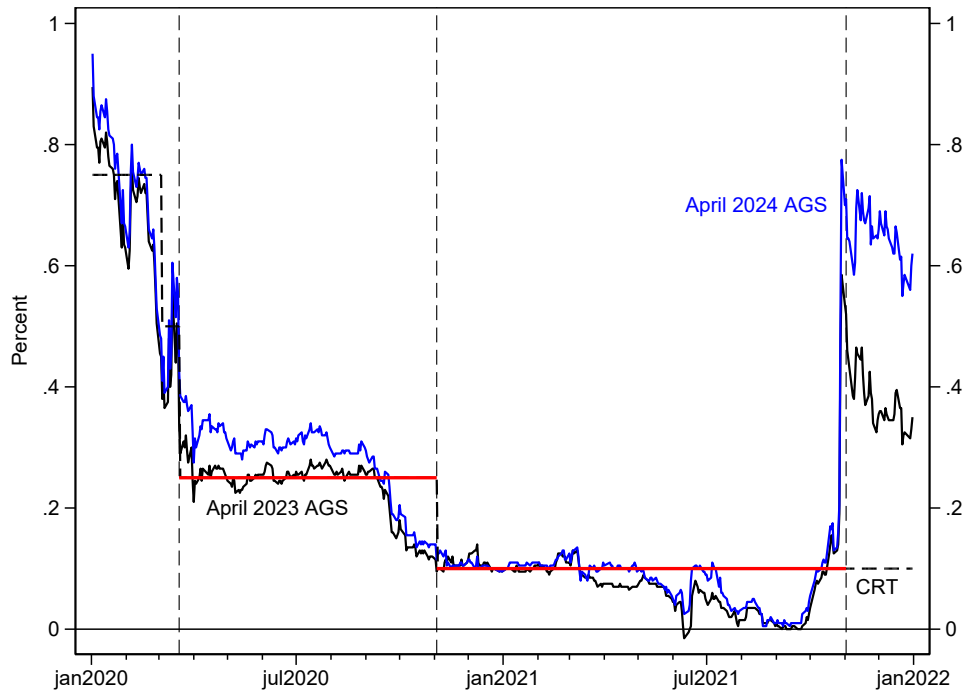
Dashed lines denote dates of policy rate (CRT) and yield target decisions. April 2023 and 2024 AGS are the yields of the securities targeted.

Figure 10
The pandemic through the lens of RBA's projections

Inflation
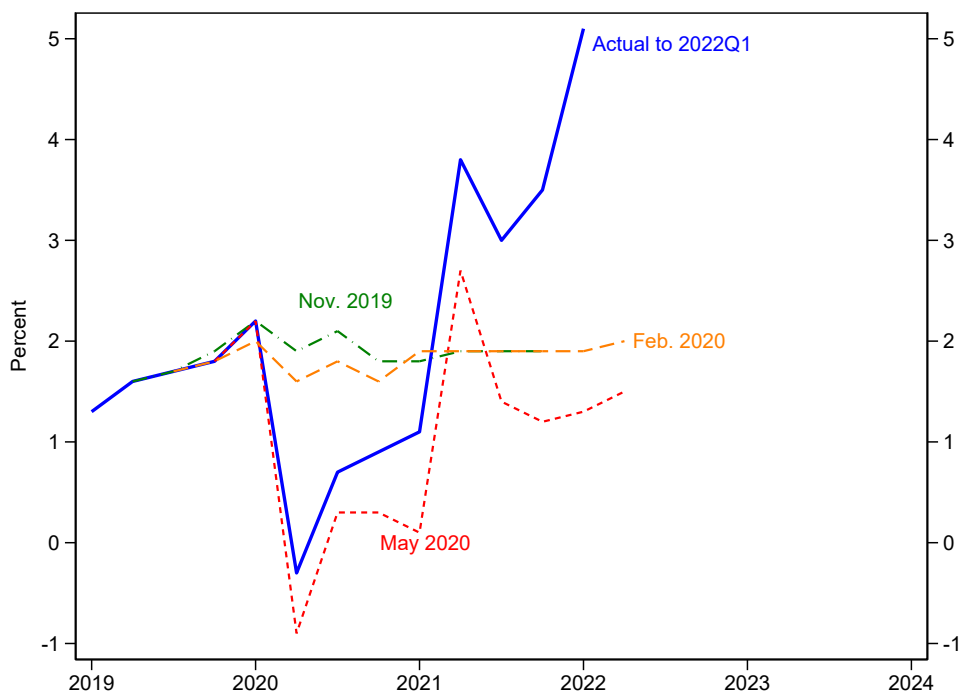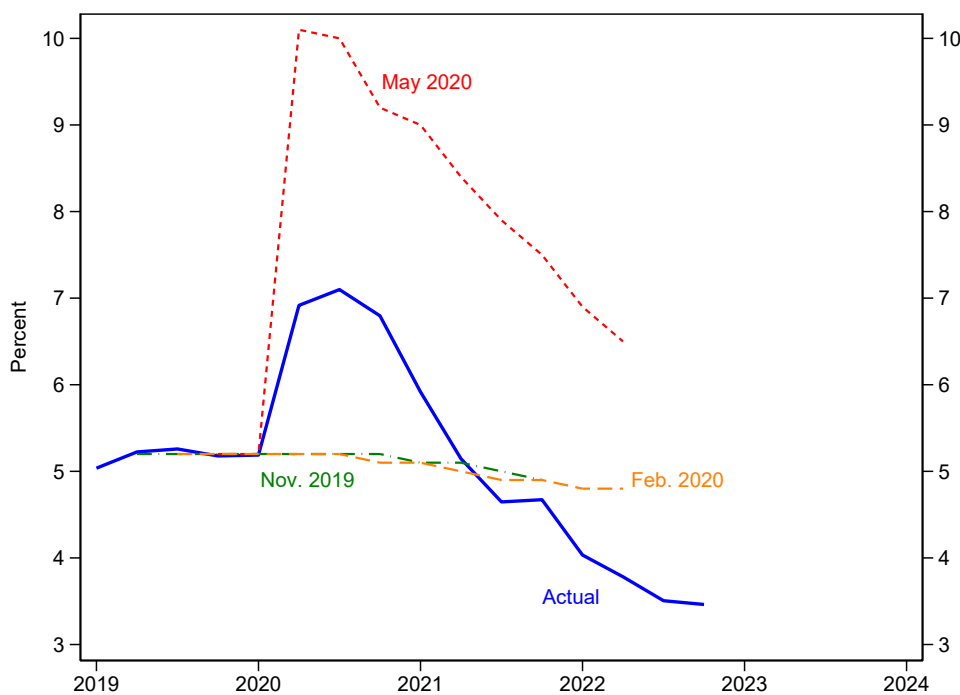
Unemployment

Dashed lines show RBA projections published on dates shown.

Figure 11

Introduction of yield target: Special meeting on 18 March 2020
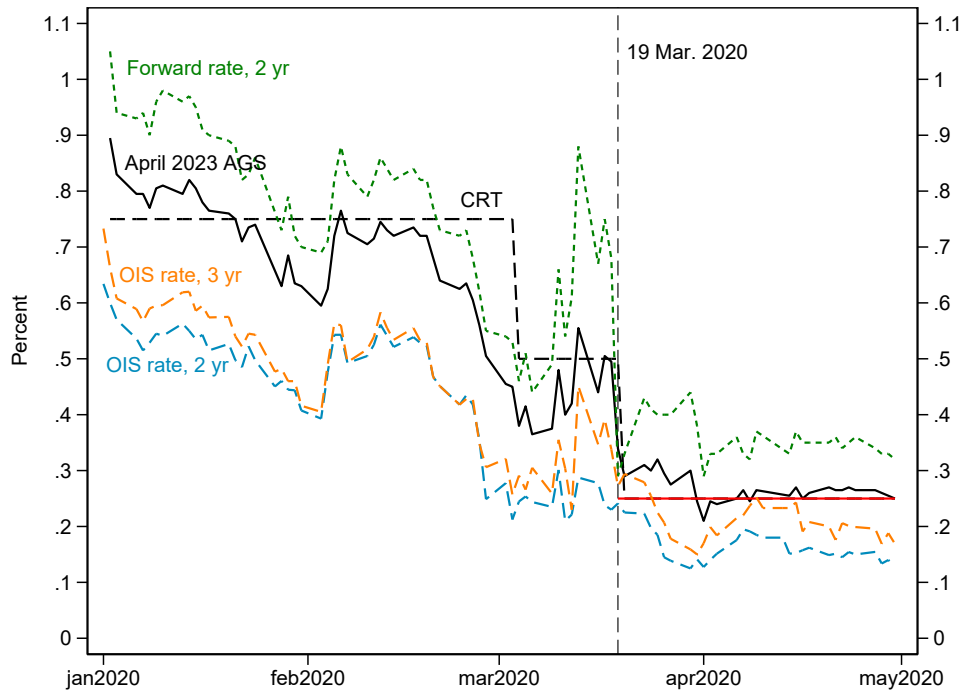
Figure 12
**The post-pandemic recovery: 3 November 2020**

Inflation
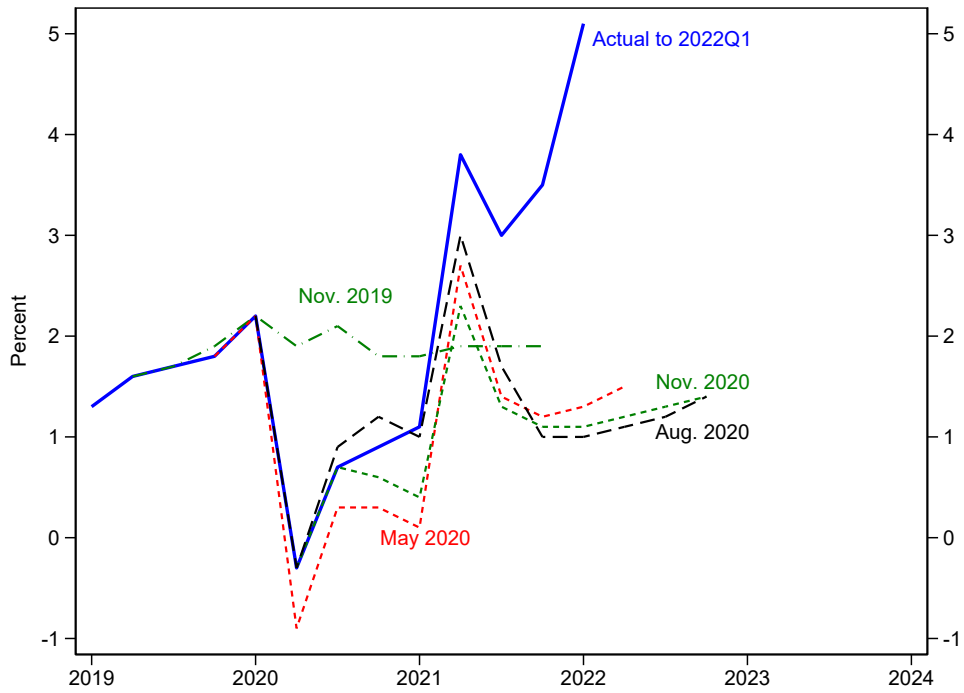
Unemployment
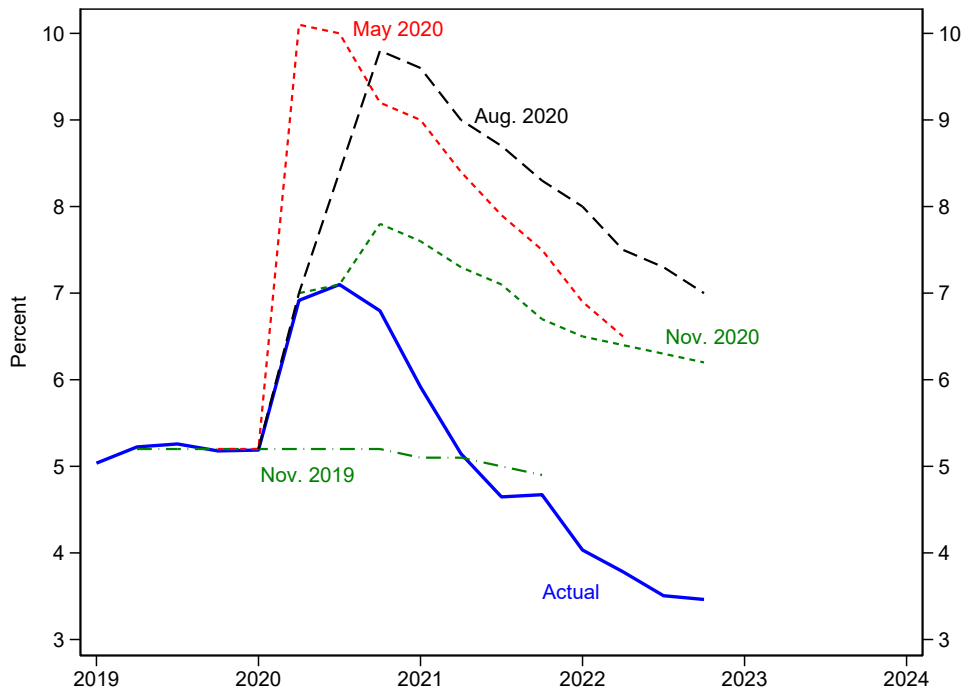
Dashed lines show RBA projections published on dates shown.

Figure 13
Embracing zero
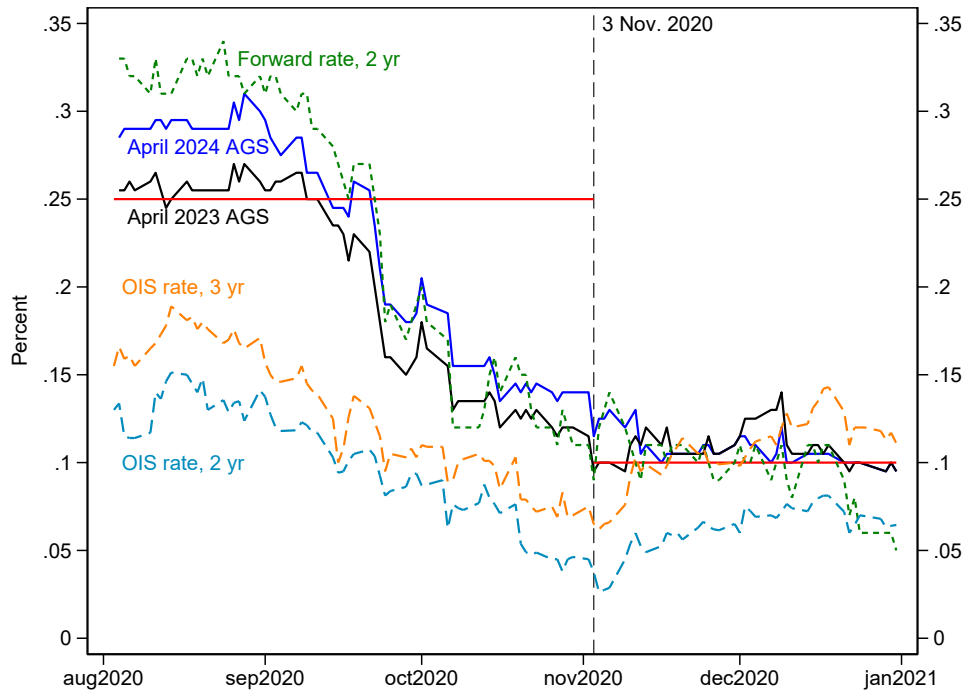
Figure 14
The post-pandemic recovery: 2 February 2021

Inflation
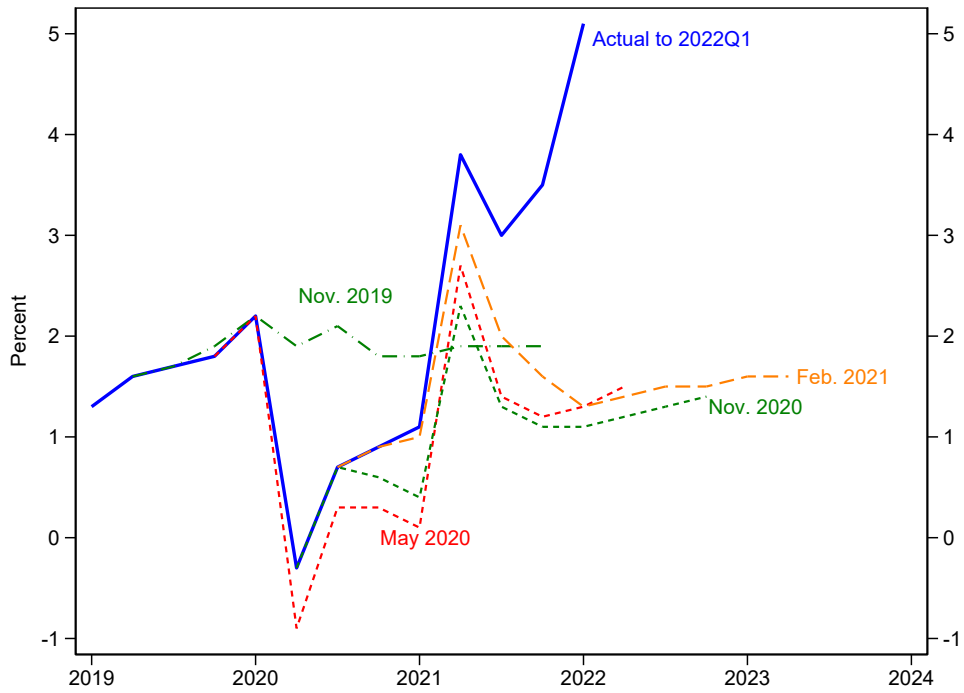
Unemployment
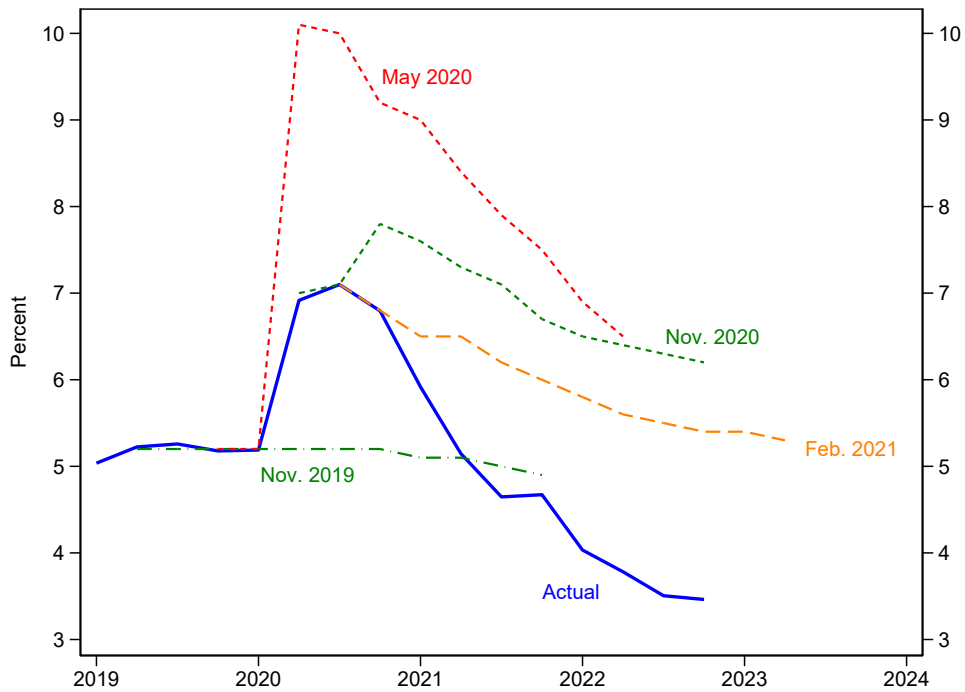
Dashed lines show RBA projections published on dates shown.
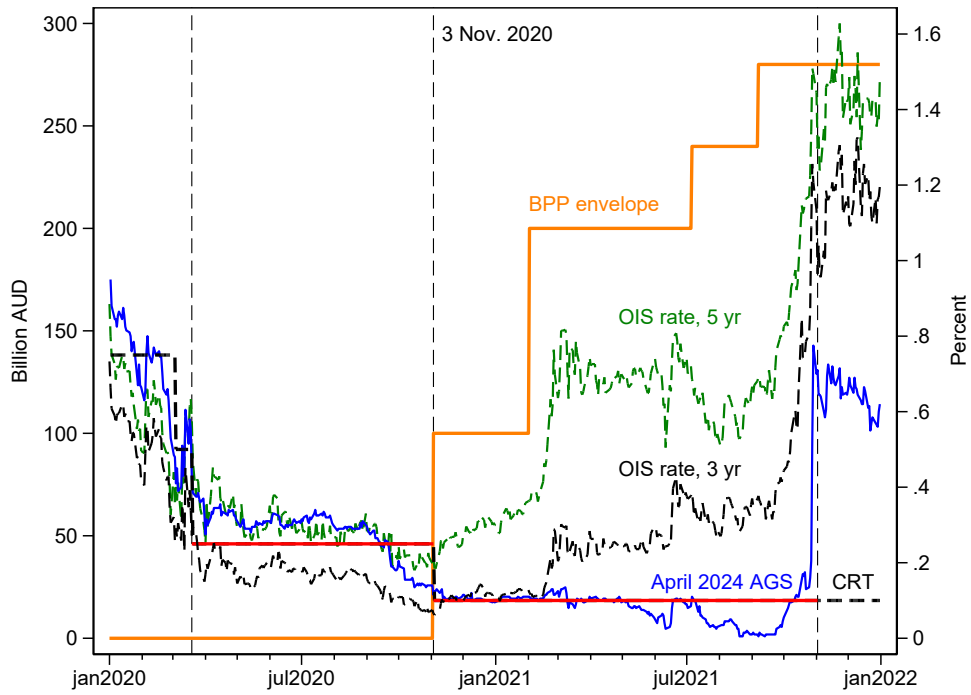
Figure 15
**The post-pandemic recovery: 4 May 2021**

Inflation
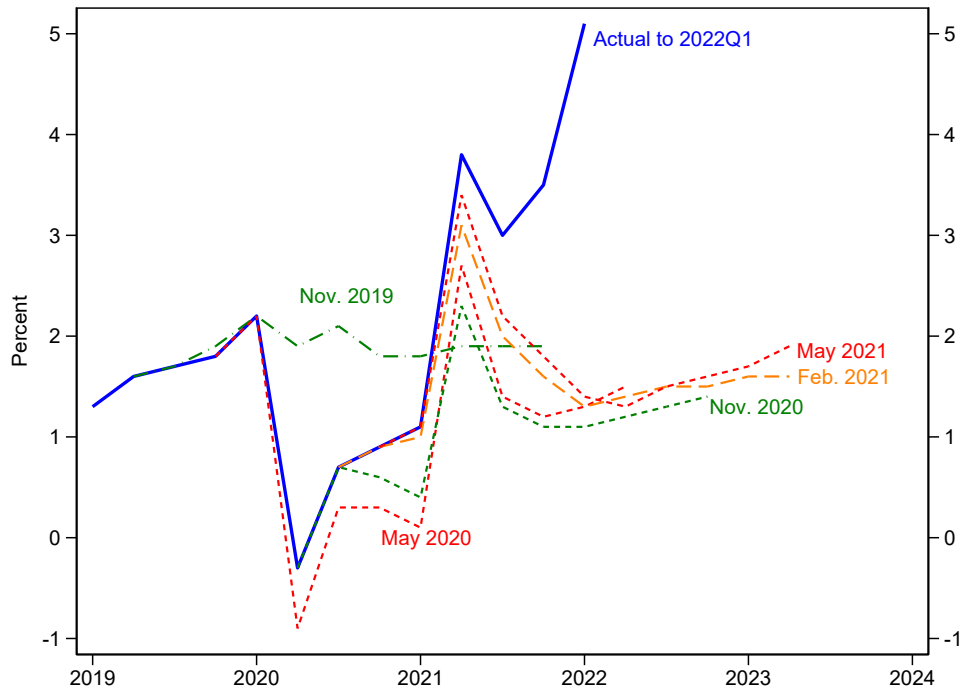
Unemployment
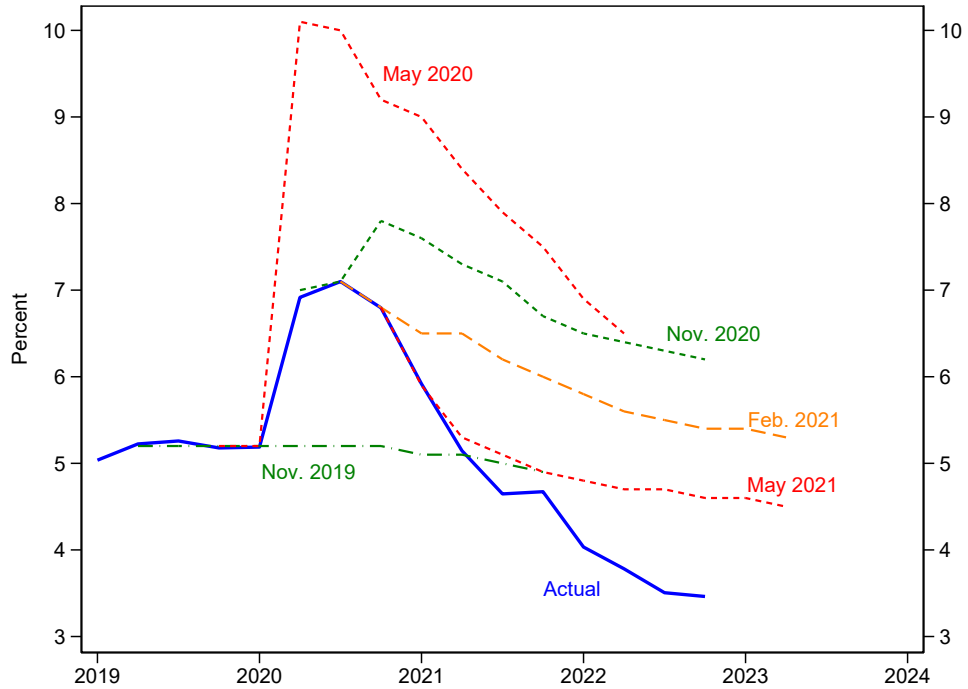
Dashed lines show RBA projections published on dates shown.

Figure 16
The post-pandemic recovery: 3 August 2021

Inflation
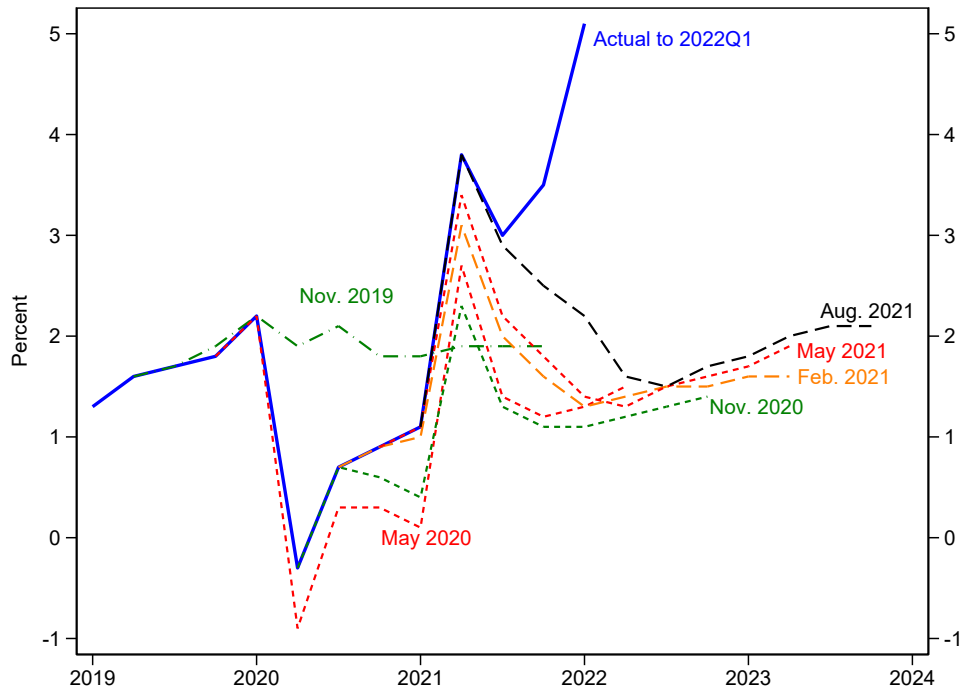
Unemployment
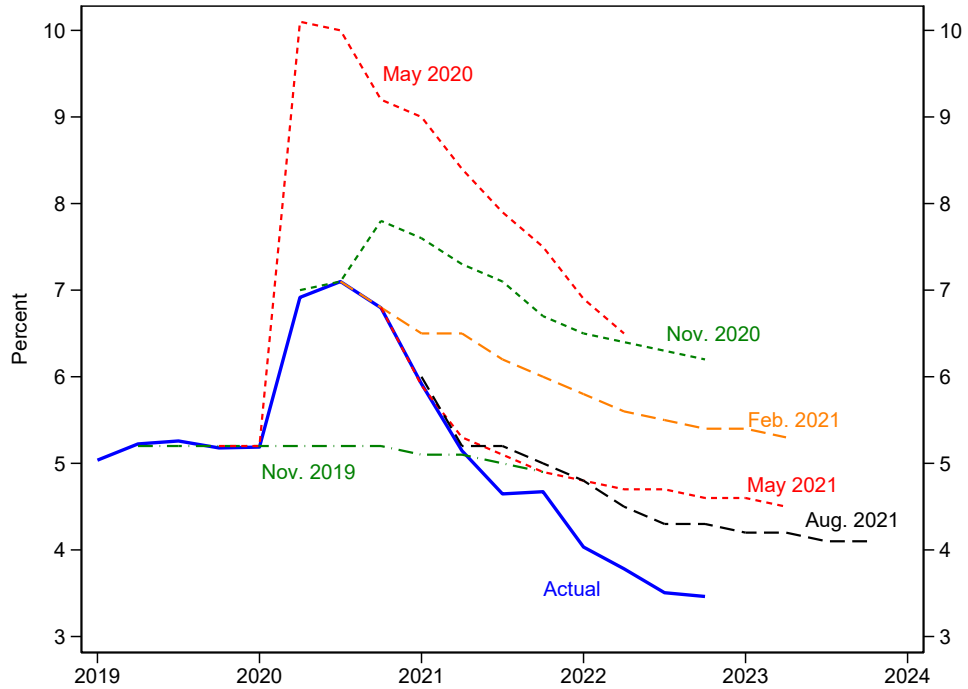
Dashed lines show RBA projections published on dates shown.

Figure 17
Abandonment of yield target
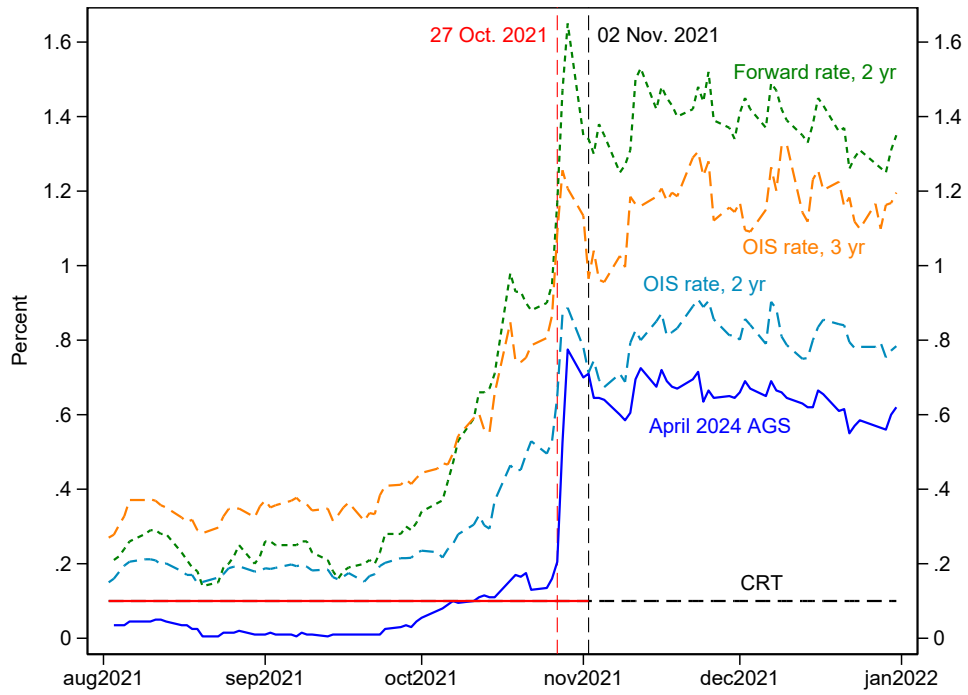
Figure 18
The post-pandemic recovery: 2 November 2021

Inflation
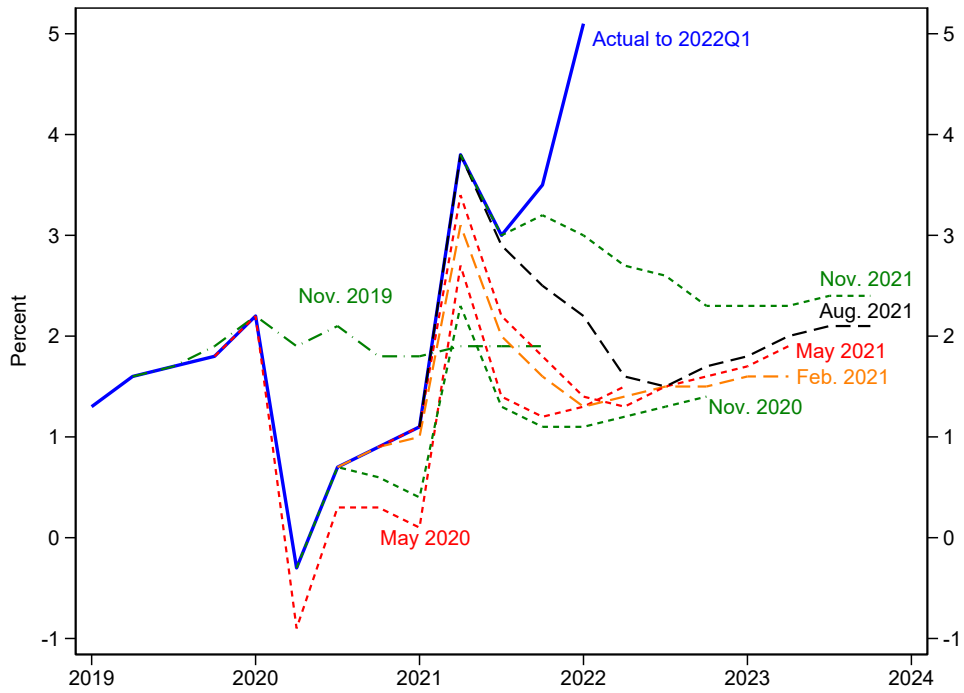
Unemployment
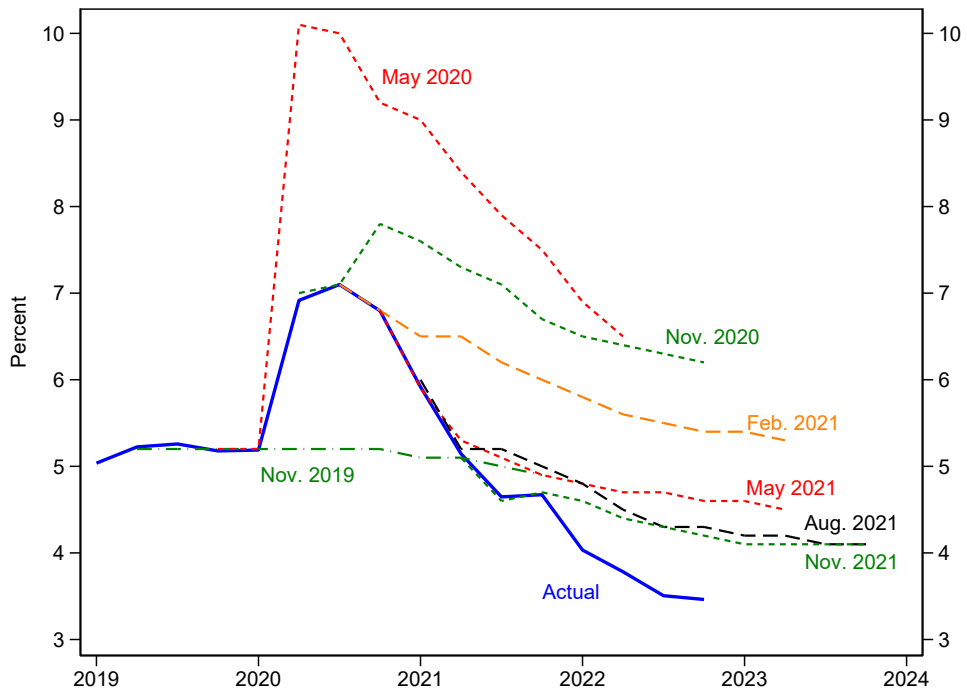
Dashed lines show RBA projections published on dates shown.

Figure 19
The post-pandemic recovery: 1 February 2022

Inflation
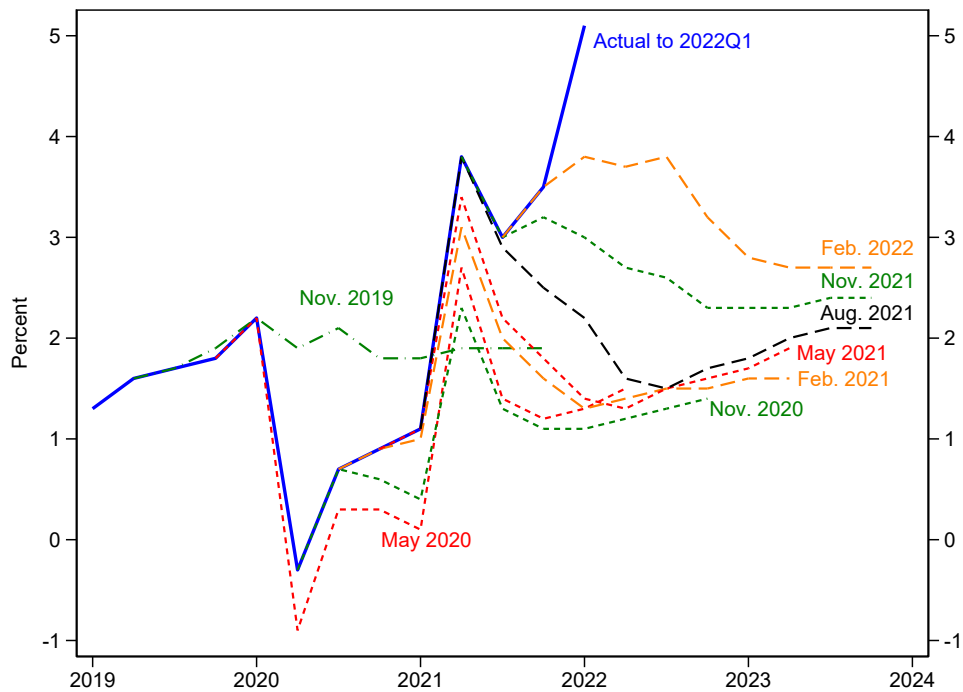
Unemployment
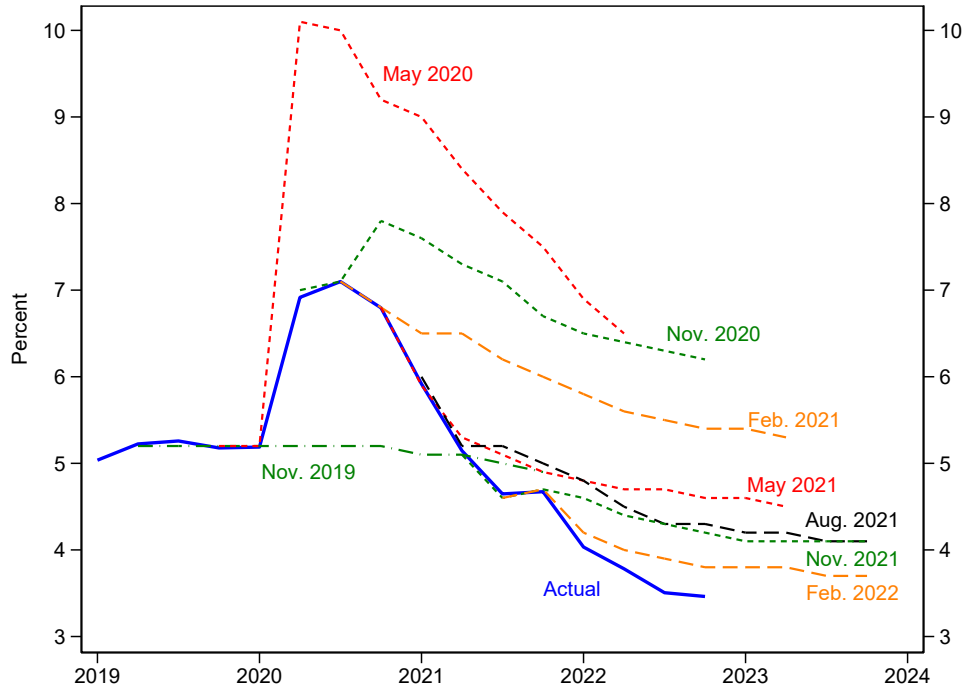
Dashed lines show RBA projections published on dates shown.

Figure 20

**The bond purchase program and the yield target: 2020-2021**

BPP envelope denotes size of total announced purchases (left axis). The program was introduced on 3 Nov. 2020, and expanded on 2 Feb., 6 July and 7 Sept. 2021.

Figure 21
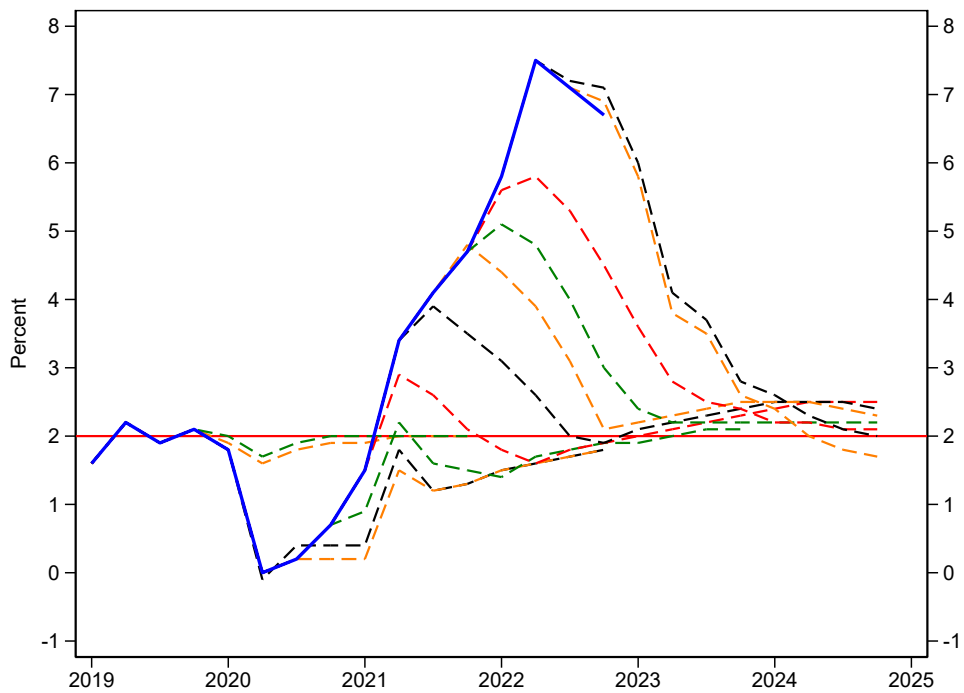**Evolution of RBA's inflation and unemployment projections**
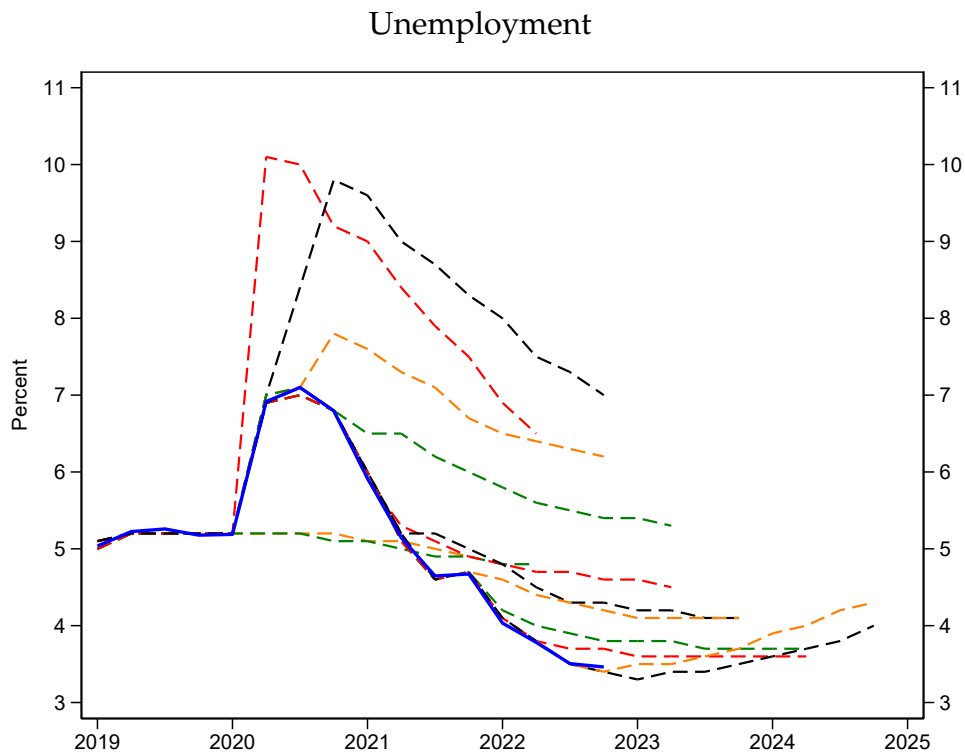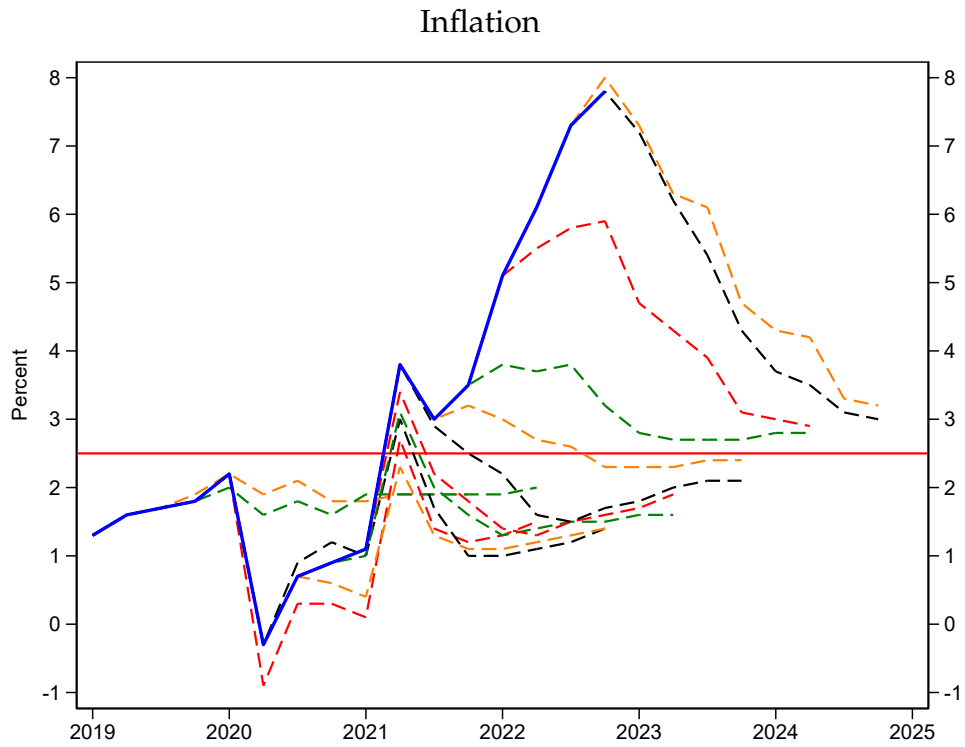
Inflation

Unemployment

Actual shown in blue to 2022Q4. Projections as published in Q1 (green), Q2 (red), Q3 (black) and Q4 (orange).

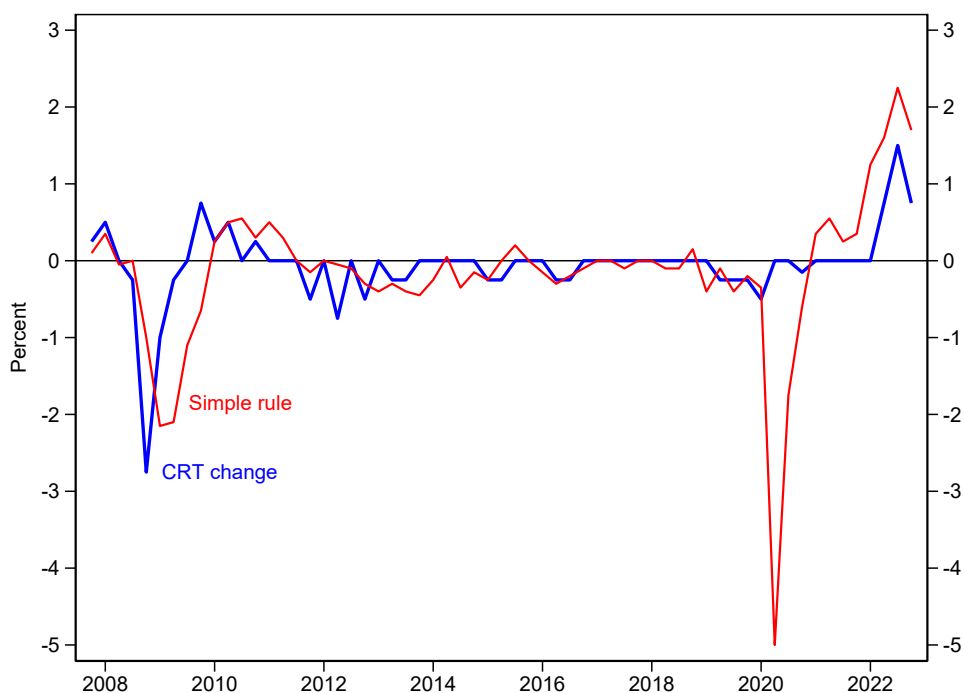Figure 22
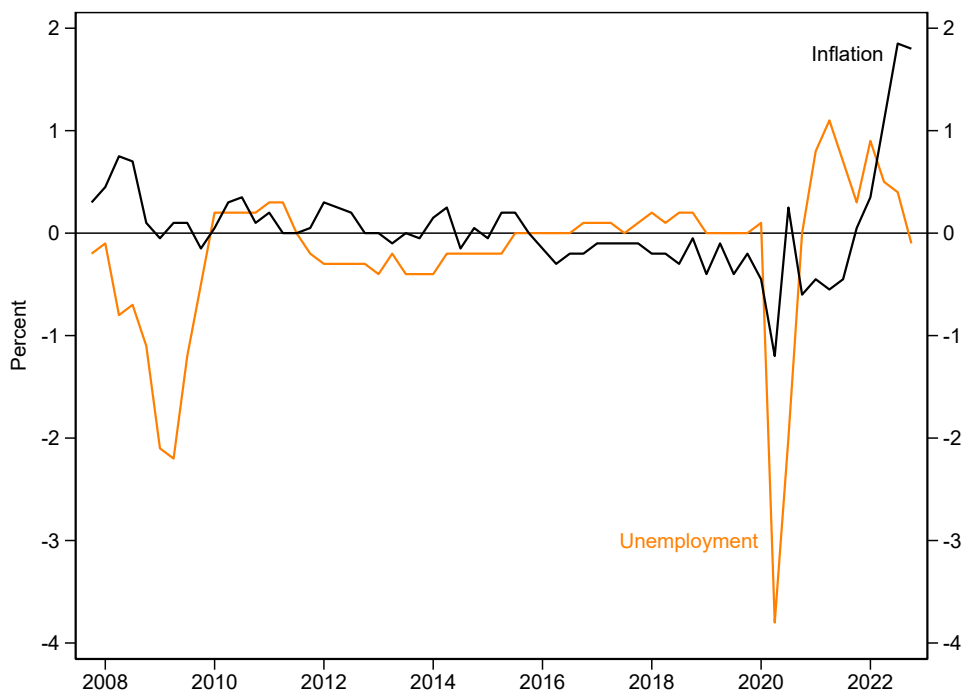**Evolution of inflation projections: RBNZ and BOC**

RBNZ
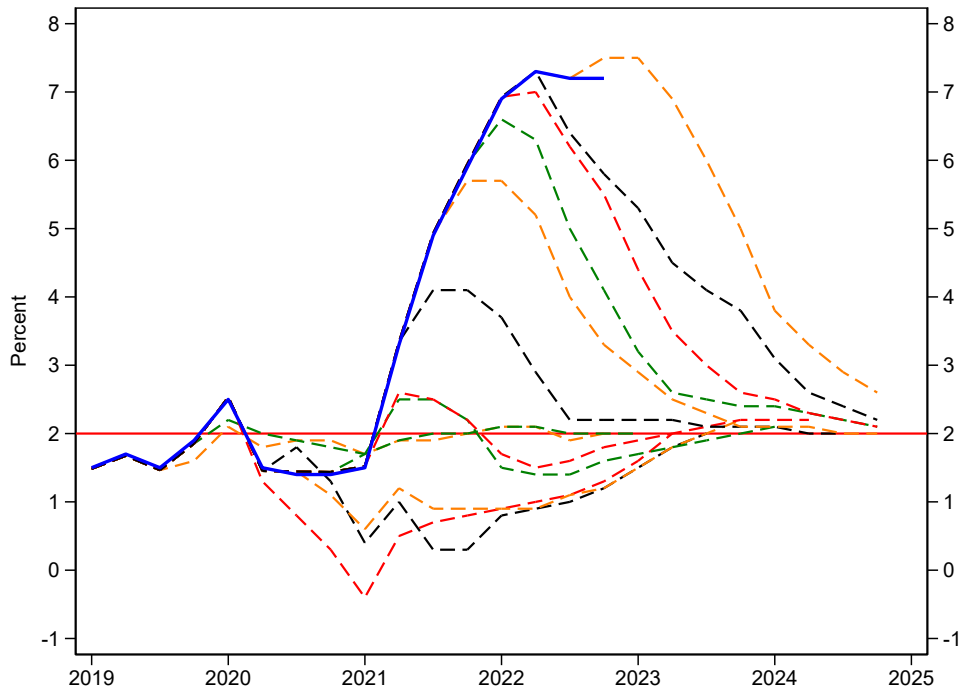
BOC

Actual shown in blue to 2022Q4. Projections as published in Q1 (green), Q2 (red), Q3 (black) and Q4 (orange).

Figure 23
Policy robustness: Simple rule prescriptions

Quarterly change in policy rate

Contribution of rule components

Forecast based difference rule: $\Delta i = 0.5(\pi_{t+3|t} - 2.5) - (u_{t+3|t} - u_{t-1})$
Sum of components (bottom panel) yields rule prescription (top panel).