Beyond the cycle: Growth and interest rates in the long run

A speech delivered via live webinar
On 29 January 2025
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* With thanks to Anna Hamer-Adams, Ben Harris and Daniel Wills for their work on this speech.

Reserve Bank of New Zealand
Te Pūtea Matua

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Introduction

Thanks for tuning in.

Inflation has returned to around 2%, bringing welcome relief to New Zealanders following an inflation surge not seen since the inflation-targeting era began 35 years ago. Returning inflation to target has been achieved through an extended period of restrictive monetary policy that has reduced excess demand in the economy.

The Monetary Policy Committee (MPC) is confident that remaining persistent domestic inflation pressures will abate, given spare capacity in the economy over 2025.

While necessary, the disinflation process has been challenging. Revised GDP data released at the end of last year show that economic growth was stronger than previously measured over 2022 and 2023. However, it also revealed that the economy slowed more dramatically through the middle of 2024.

The MPC will assess the implications of these GDP revisions, alongside all the latest data, during our upcoming deliberations for the next *Monetary Policy Statement*, to be released on February 19.

Today, I want to go beyond the business cycle to consider longer-term structural issues in the economy and how they influence monetary policy.

I will discuss how 'potential output' shapes the path for economic activity, as the macroeconomic disruptions from COVID-19 fade. I'll also highlight how potential output links to inflation and average per capita incomes. I'll outline the drivers of potential output growth, and very briefly consider our prospects for improving productivity growth.

In the second part of the speech, I'll discuss our assessment of the neutral interest rate, which shapes our expectations of where the Official Cash Rate (OCR) is likely to settle, in the absence of future shocks. I'll also talk about what drives changes in the neutral rate over time.

I'll end with a discussion of what it all means for the outlook for economic growth and interest rates as we look forward into 2025 and beyond.

Key insights from the speech include:

- In the absence of future shocks, economic activity in New Zealand will tend towards the level of potential output, as pandemic-related disruptions fade. Likewise, without future shocks, the OCR will tend towards the neutral interest rate.
- Over the next few years, with declining inward migration and weak productivity growth, potential output growth is likely to be modest. This will set a modest 'speed limit' on how fast the economy can grow without generating excess inflation pressure.
- Unlocking higher investment and productivity growth is key to raising potential output growth and improving per capita incomes. This would also reduce the likelihood of negative recessionary economic growth during future periods of restrictive monetary policy.

- Reserve Bank estimates suggest that the neutral interest rate has fallen over recent decades, given weak productivity growth and aging populations. Our research suggests that this decline may be reversing and that the long-term nominal neutral interest rate currently lies between 2.5% and 3.5%.

Where will economic growth tend to in the long run?

New Zealand's 'potential output' sets the bar for sustainable growth in the economy through time and the degree of inflation pressures associated with growth.[1] Our estimate of potential output gives us an idea of where economic activity is likely headed, in the absence of future shocks, as the economic disruptions from COVID-19 die out.

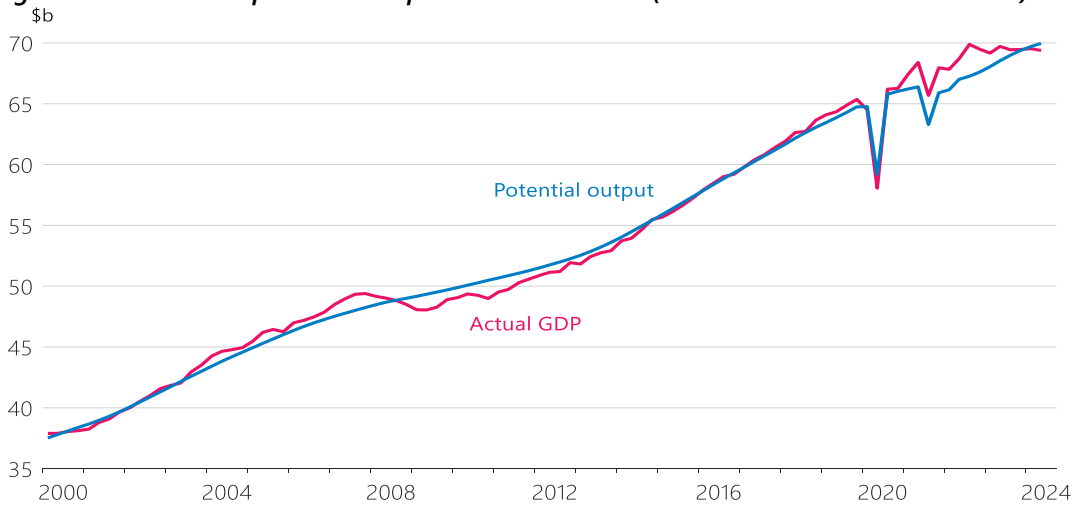
What is potential output?

Potential output is the level of goods and services the economy can sustainably supply without generating excess inflation or disinflation. It depends on the supply of inputs – capital and labour – and how productively they are combined to produce output. For example, if there are more people available to work, more capital to use, or better ways of doing things, then potential output increases.

Potential output is the level of output the economy will gravitate to in the long run, once economic volatility due to the business cycle or one-off shocks has played out.

We cannot directly measure potential output. Instead, we estimate it using techniques that separate out business-cycle volatility from the long-run trend.[2] Our central estimate of potential output weighs up these different estimates (Figure 1). There is considerable uncertainty as to where potential output is at any point in time.

Figure 1 – Actual and potential output in New Zealand (as at the November 2024 MPS)



Note: 'Actual GDP' is real, seasonally adjusted quarterly GDP. 'Potential output' is our estimate of potential output as in the November Monetary Policy Statement. Note that these data have not been updated to reflect the 2024Q3 GDP revisions.

Source: Statistics New Zealand and Reserve Bank of New Zealand estimates.

How New Zealand's potential output growth compares internationally

We can compare potential output growth across countries by looking at actual output growth over long stretches of time, as business cycle volatility will tend to cancel out. Over recent decades, up until COVID-19, annual GDP growth in New Zealand has often been above the OECD average, indicating relatively rapid potential output growth (Figure 2).

A closer look reveals that compared to other countries, potential output growth in New Zealand has been driven more by increases in labour input, rather than by productivity improvements (Figure 3). Growth in the capital stock has also contributed to potential output growth, although the amount of capital available per worker in New Zealand is low in comparison to other developed economies.[3]

Strong growth in labour input over recent decades reflects generally strong inward migration flows, in addition to increased participation in the labour market by New Zealanders. So, while growth in GDP and potential output has been above the OECD average, increased output has been spread across a fast-growing population working relatively longer hours per capita.

This 'labour-intensive' approach to growth can be seen in cross-country comparisons of GDP per capita. In short, there are two ways to increase GDP per capita: by working more hours per person (working harder) or by increasing output per hour worked (working smarter).

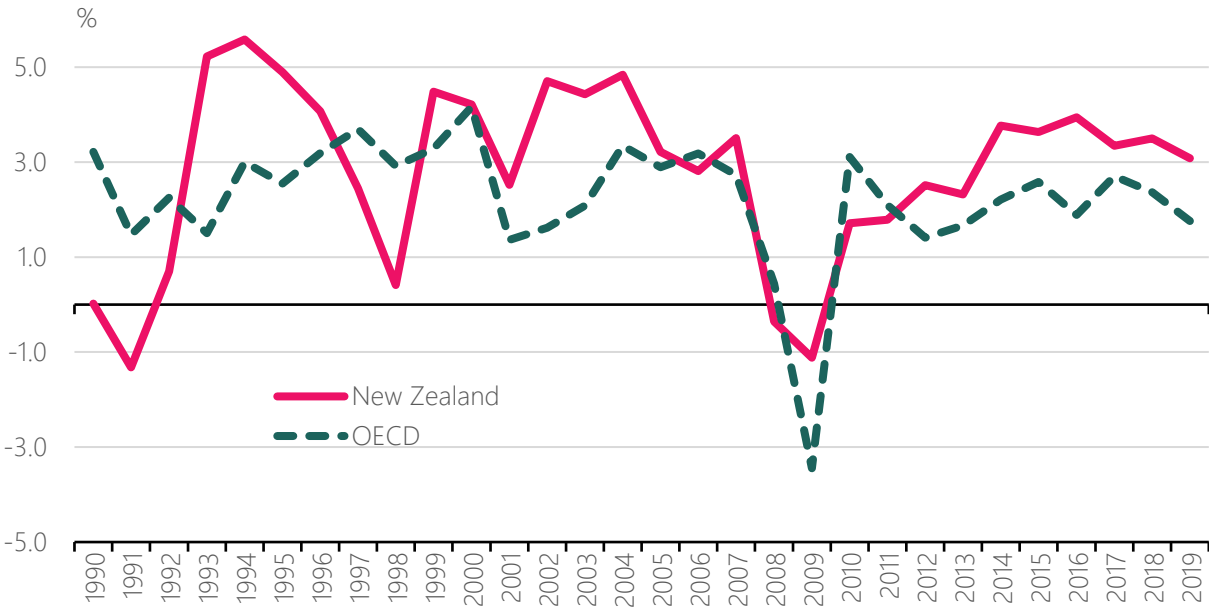
Since the early 2000s, GDP per capita in New Zealand has fallen from around 95% to just under 90% of the OECD average (Figure 4). This relative decline reflects declining labour productivity relative to the OECD average. Hours worked per capita has increased, but not by enough to offset declining productivity vis-à-vis the OECD average.

New Zealanders now work almost 20% more hours per person but produce around 25% less output per hour compared to the OECD average.[4]

This comparison is relative to the average across the OECD, a club of 38 countries that now includes several developing economies. Our productivity performance is even weaker compared to the more advanced OECD economies. For example, just before the COVID-19 pandemic, the value created from an hour of work in New Zealand was about 24% lower than in Australia and 39% lower than in the US.[5]

It is worth saying that New Zealand has not always been a productivity laggard. In 1950, our GDP per capita was around 25% above the OECD average.[6] At that time, colonial ties to the United Kingdom provided access to capital, expertise, and secure markets for agricultural exports at guaranteed prices. This allowed for specialisation and scale in an area of strong comparative advantage.

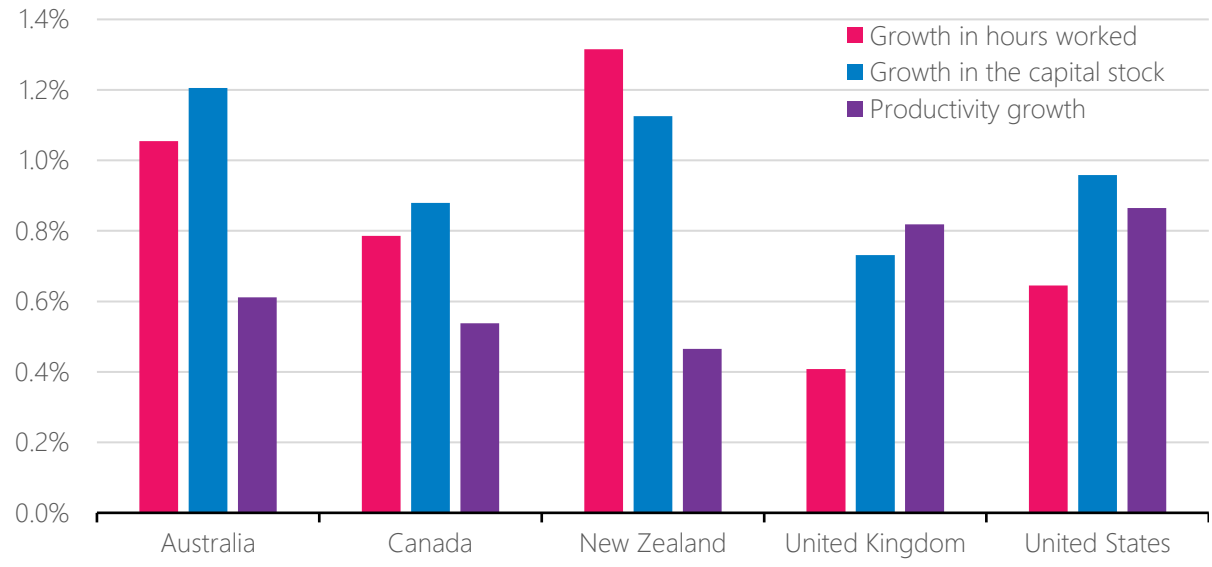
Figure 2 – Real GDP growth over history (1990 to 2019)



Note: Annual change in real GDP from 1990 to 2019. The OECD line shows real GDP growth as a weighted average of all OECD countries (using moving nominal GDP weights and purchasing power parities).

Source: OECD

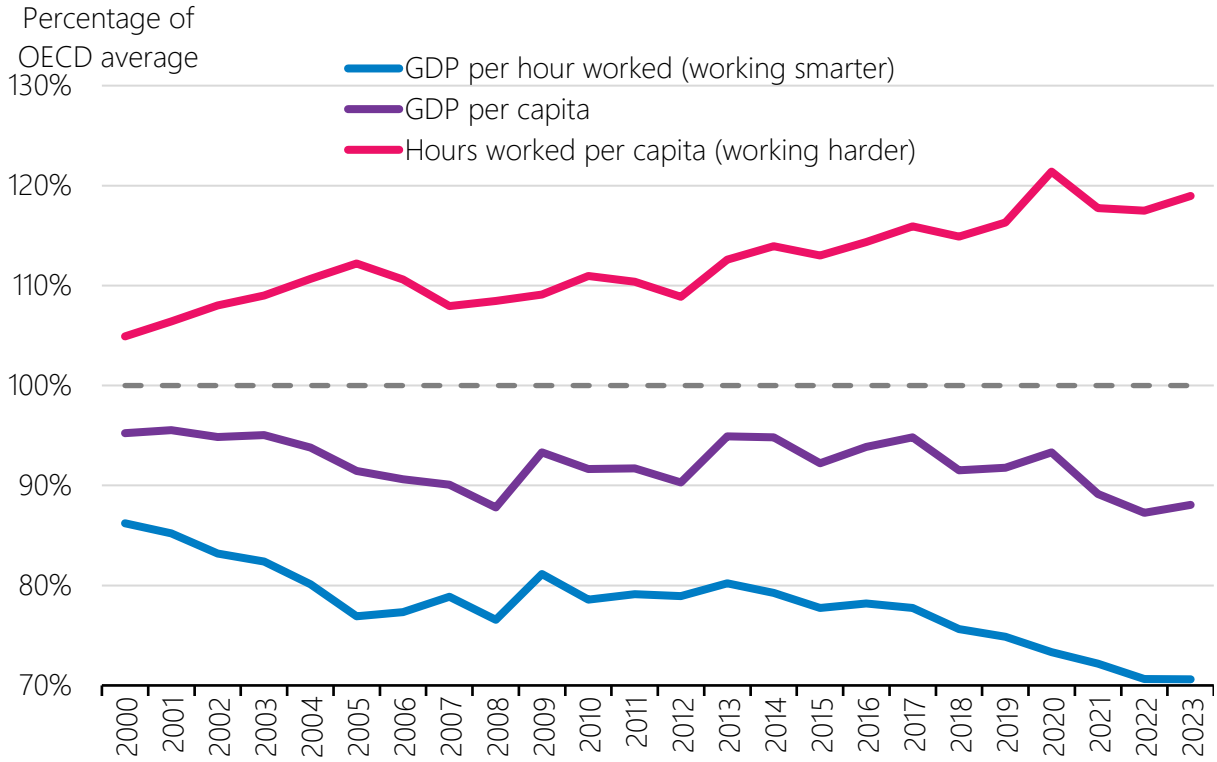
Figure 3 – Contributions to Real GDP growth (average 1990-2019)



Note: These bars show the average contributions of each factor to real GDP growth from 1990 to 2019. The average real GDP growth rate for each country is the aggregate of all factors contributions combined.

Source: OECD.

Figure 4 – New Zealand's GDP and hours worked relative to the OECD average



Note: New Zealand's GDP per hour worked (US dollars per hour, PPP converted, current prices), GDP per capita (US dollars per hour, PPP converted, current prices), and hours worked per capita relative to the OECD average. GDP per hour worked and hours worked per capita data is not available for the full sample period for Colombia, South Korea, Mexico and Türkiye, so these countries have not been included in the OECD average.

Source: OECD.

Potential output and inflation

Potential output growth can be thought of as the economy's 'speed limit' – the growth rate the economy can sustain over time without triggering inflation pressure. As productive inputs and productivity evolve, so too does potential output, and therefore the economy's speed limit.

In normal times, productive inputs and productivity evolve gradually, so shifts in potential output growth are typically slow and steady. In this context, it is changes in aggregate demand that drive changes in capacity pressures in the economy and, consequently, monetary policy interest rates.

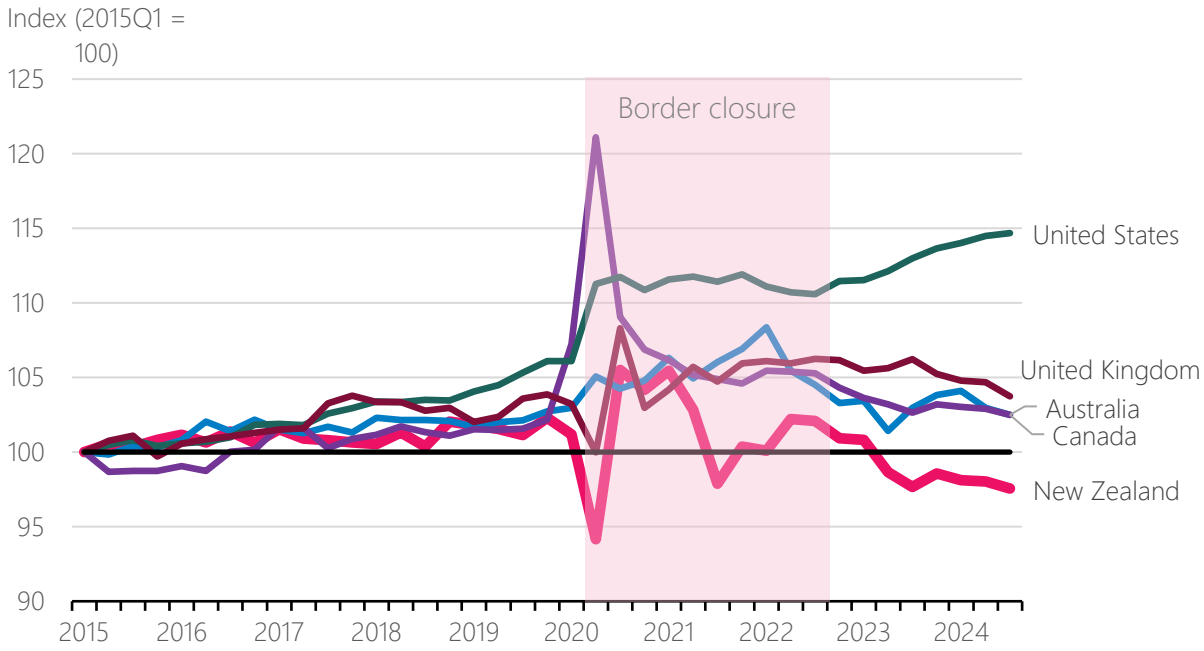
Over the pandemic, however, 'supply shocks' were much more volatile. For example, because of our heavy reliance on imported labour, the border closure resulted in an abrupt weakening in potential output, even as productivity growth temporarily increased (Figures 1 and 5).

Once the border reopened, a pent-up surge in inward migration underpinned a temporary lift in potential output growth. However, productivity growth went negative at this time and potential output growth dropped well below its long-run average as migration normalised.

These abrupt changes in potential output complicated the task of monetary policy. To bring inflation back to target, GDP growth in New Zealand had to fall below the economy's reduced 'speed limit' to lower excess demand and inflation pressure. This meant a period of weak and recessionary growth was necessary to return inflation to target within a reasonable timeframe.

In contrast, economies with stronger productivity growth – particularly the United States – have reduced inflation pressure while sustaining considerably higher economic growth.

Figure 5 – Labour productivity by country



Note: Quarterly labour productivity is calculated as GDP per hour worked in each country.

Source: Statistics New Zealand, Reserve Bank of Australia, Australian Bureau of Statistics, Statistics Canada, Office for National Statistics UK, US Bureau of Economic Analysis, US Bureau of Labour Statistics, Reserve Bank of New Zealand calculations.

Potential output and average incomes

What has our low productivity and labour-intensive approach to growth meant for Kiwi incomes? In broad terms, higher per capita incomes can be achieved by producing more output per person or by getting higher world prices for what is produced *via* terms of trade improvements.

Let's start with the good news. Since 2000, increasing prices for our exports – particularly for dairy and other agricultural products – coupled with weaker import prices, has resulted in a 40% terms of trade improvement.[7] By moving to higher-priced exports and lower-priced imports, we improved our incomes relative to the OECD average.

Now for the not so good news. Despite improvement due to terms of trade effects, modest growth in GDP per capita – mainly reflecting increased hours worked per capita – has kept average incomes in New Zealand below the OECD average (Figure 6).

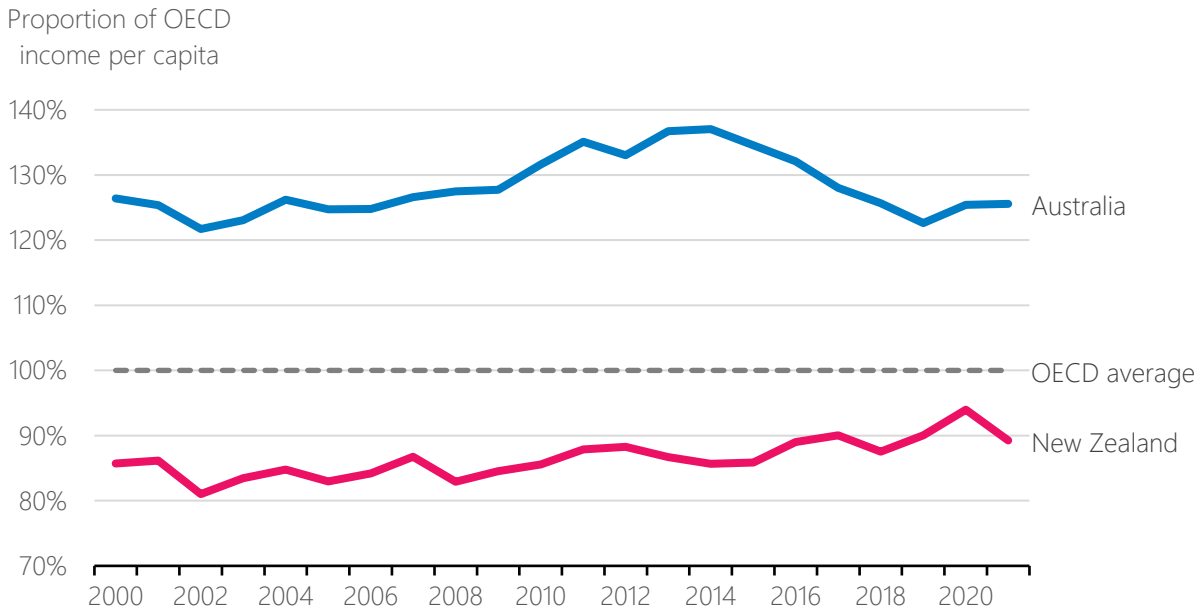
Other factors have also supported Kiwi incomes over recent decades, in addition to terms of trade improvements and working more hours per person. This includes a lower net international income deficit and low depreciation (given a capital-shallow economy).[8]

On balance, average incomes in New Zealand have improved only slightly compared to the rest of the OECD and remain below the OECD average.

This has not always been the case. In the 1950s, average incomes in New Zealand where among the highest in the OECD. Since then, New Zealand's GDP per capita has fallen from 2nd to 20th across a core group of OECD economics (Figure 7). Much of this relative decline occurred during the late 1960s and 1970s as preferential access to markets in the United Kingdom was ending and the realities of our unhelpful economic geography started to hit home.

As a result, New Zealand is no longer a high-income OECD economy.

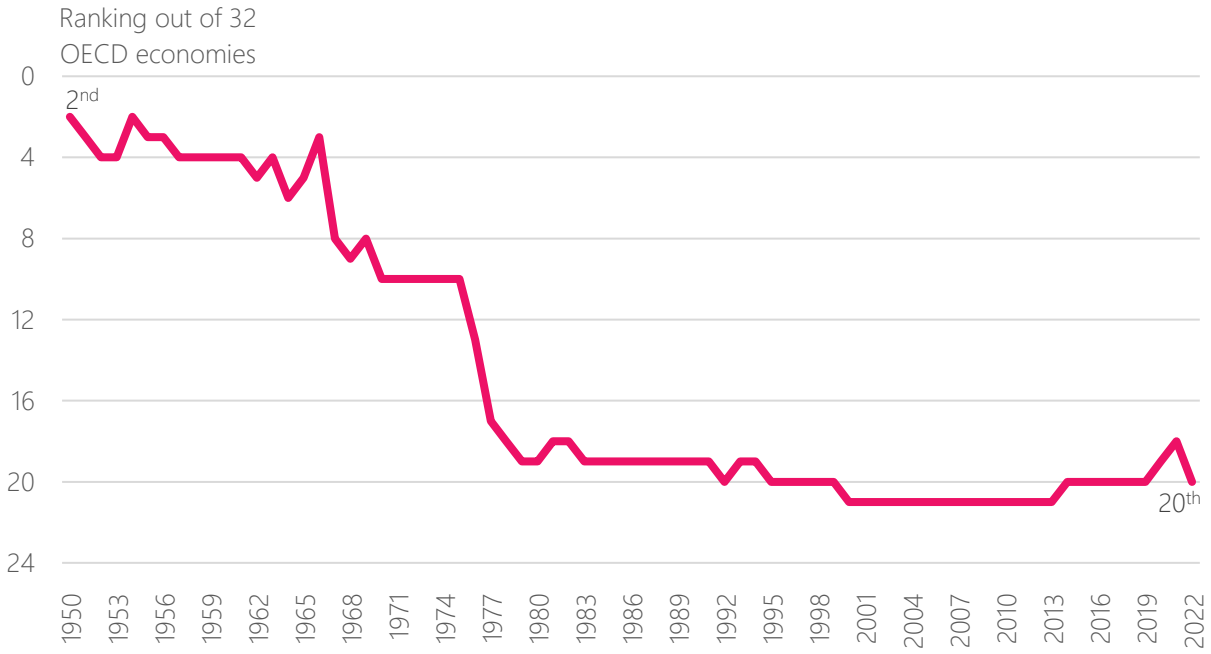
Figure 6 – Disposable income per capita relative to OECD average



Note: Average disposable income per capita relative to the OECD average. The OECD average excludes Chile, Colombia, Iceland, Israel, Costa Rica, Mexico and Türkiye due to data not being available for the full period.

Source: OECD.

Figure 7 – New Zealand's real GDP per capita ranking across OECD economies



Note: This chart shows the ranking of New Zealand's real GDP per capita out of 32 OECD countries in 2011 dollars. Data was not available for some OECD countries (Estonia, Czechia, Latvia, Lithuania, Slovakia, and Slovenia) for the full period and so these countries have been excluded from the sample.

Source: Maddison Project Database.

What is the outlook for potential output growth?

Over the next three years, we currently expect potential output growth to range between 1.5% and 2% per year. This is a lower economic 'speed limit' than in the recent past.[9] This subdued outlook stems from expected ongoing weakness in productivity growth and lower net immigration.

Of course, this is only a forecast (from our November *Monetary Policy Statement*), and New Zealand's potential output growth will depend on policy settings and private-sector decisions regarding investment, productivity, and migration.

Notably, New Zealand's productivity is now well below the OECD average and that of more advanced economies (Figure 4 above). This 'productivity gap' implies significant opportunity for New Zealand businesses to adopt existing technology and to 'catch up' to the productivity levels of businesses in leading economies.

Of course, that is more easily said than done. Reforms aimed at improving New Zealand's productivity performance would have to mitigate some deeply entrenched structural issues that have held back productivity growth.[10]

First, for a small economy, New Zealand is poorly connected internationally. For example, our export intensity is among the lowest across small economies and has weakened further in recent years (Figure 8). Foreign direct investment into the economy is also typically below the OECD average as a share of GDP.

This 'international disconnect' limits the diffusion of new technologies into the country. Combined with small and insular domestic markets, it also limits scale, competition, innovation, and the efficient allocation of resources, all of which are fundamental to improving productivity.

Second, the flip side of our economy being labour-intensive is that it is capital shallow. While non-residential business investment as a share of GDP has only been slightly below the OECD average, it has been thinly spread across a rapidly growing workforce.

Financial flows into owner-occupied housing have been prioritised over investing in productive businesses.[11] There has also been an emphasis on paying dividends, rather than on fostering growth, with high dividend flows offshore given extensive foreign ownership in core sectors.[12]

The New Zealand equity market is also very small relative to the size of the economy and many significant New Zealand businesses are structured as co-ops or partially government owned, all of which makes third-party investment challenging.[13]

Third, investment in 'knowledge-based capital' also appears to be relatively weak across New Zealand businesses. Improving productivity requires investment in R&D, education and skills, organisational know-how, and managerial capability. These are all areas where New Zealand tends to lag.

Can productivity growth be improved?

Thanks to work by the now defunct Productivity Commission and others, we do have a reasonable sense of what a pro-productivity reform agenda would look like. In short, such an agenda would emphasise strengthening international connections, fostering capital deepening (including infrastructure), enhancing competition in underperforming services sectors, and driving more effective innovation.[14]

The challenge is to continuously inform and improve policy and policy coordination in line with our growing understanding of the reasons for low productivity. Setting appropriate policies for the long-term would also help enable investment and co-investment at scale by local and global partners.

The Reserve Bank has an important role to play in all this. Most obviously, by maintaining low and stable inflation, monetary policy is critical in supporting investment and productivity.

Some of our other areas of responsibility are also key. Our financial stability objective ensures that deposit takers, insurers, and financial market infrastructure are safe, sound, and efficiently managed. A stable financial system fosters certainty, enables access to credit, and enhances efficient capital allocation and effective financial risk management. Ultimately, this supports productivity through more informed borrowing, saving, and investment decisions.

We are advancing key initiatives to deliver these outcomes as part of an inclusive and competitive financial system. This includes implementing the Deposit Takers Act to deliver a modern, consistent, and transparent prudential regime, upgrading the regulation of financial market infrastructure, and reviewing insurance supervision to ensure efficient regulation and effective risk management.

We are also advancing initiatives in the payments space to foster competition, innovation, and productivity, including exploring a central bank digital currency. As part of the Council of Financial Regulators, we are enhancing the payments system to support open banking, digital identity, and next-generation payments.

Additionally, we are addressing market failures in the financial system, such as limited access to capital for Māori businesses and barriers to private investment in climate change mitigation and adaptation.[15]

The last point I'll make on improving productivity and potential output is that it is not solely the responsibility of the government and public sector. Ultimately, lifting productivity is largely up to the private sector and there are many ways New Zealand businesses can improve their performance (eg, adopt and adapt e-commerce). Individuals can also contribute to better productivity by shopping around for the best deal, particularly across businesses in the services sector.

Figure 8 – New Zealand's exports have fallen as a share of GDP (1992 to 2022)

Countries above the diagonal line saw exports grow as a share of GDP since 1992, while those below saw a decline.

Note: Each point represents a country's goods and services exports as a proportion of GDP in 1992 and 2022.

Source: World Bank.

Potential output growth and the neutral interest rate

Just as potential output growth determines where GDP growth will gravitate to in time, the neutral interest rate guides where the OCR will tend towards in the long run.[16] The nominal neutral interest rate is the level of the OCR consistent with inflation being sustainably at target and the economy running at its potential output.

When the OCR is above neutral, monetary policy restrains demand and inflation pressures. Below neutral, it is stimulatory.

Without future shocks, the neutral interest rate indicates where the OCR is likely to settle to keep inflation at the 2% target midpoint.

Like potential output, the neutral interest rate cannot be directly measured. Instead, we estimate it using five different techniques and average the results to form our baseline measure.[17] We add expected inflation in 10 years' time to get an estimate of the long-run nominal neutral rate, which is then used to assess the policy stance associated with any given level of the OCR (Figure 9).

What drives changes in the neutral rate?

The neutral interest rate reflects the balance between total savings and investment over time. For example, increased demand for investment funding or a lower savings rate would put upward pressure on the neutral interest rate.

How much people save is shaped by factors such as income and life expectancy, with aging populations tending to save more for retirement.[18] Of course, tax and savings policies – for example, the extent of compulsion – can also influence savings.[19] Investment decisions depend on expected returns, investment preferences, and needs such as climate change mitigation and adaptation.[20]

As well as being a key component of potential output growth, productivity growth also influences the neutral interest rate. For example, an improvement in productivity would add upward pressure to the neutral rate by encouraging investment through the prospect of higher expected returns. Higher productivity may also lead people to anticipate higher lifetime income and save less as a result.

The neutral interest rate shifts over time as the balance between savings and investment changes.[21] Between 2008 and 2019, our central estimate indicates that the neutral OCR fell by two percentage points (Figure 9).

Forthcoming Reserve Bank research identifies global factors and New Zealand's slowing productivity growth as key drivers of the decline in the neutral rate, whereas New Zealand's rapid population growth has exerted upward pressure (Figure 10).[22]

With substantial cross-border financial flows, this research finds the neutral rate in New Zealand is heavily influenced by global trends. Over the 1990s, the world neutral rate fell because of increasing savings and cheaper investment goods. The downward trend continued after the Global Financial Crisis, given fiscal consolidation and greater demand for safe assets along with aging workforces.[23]

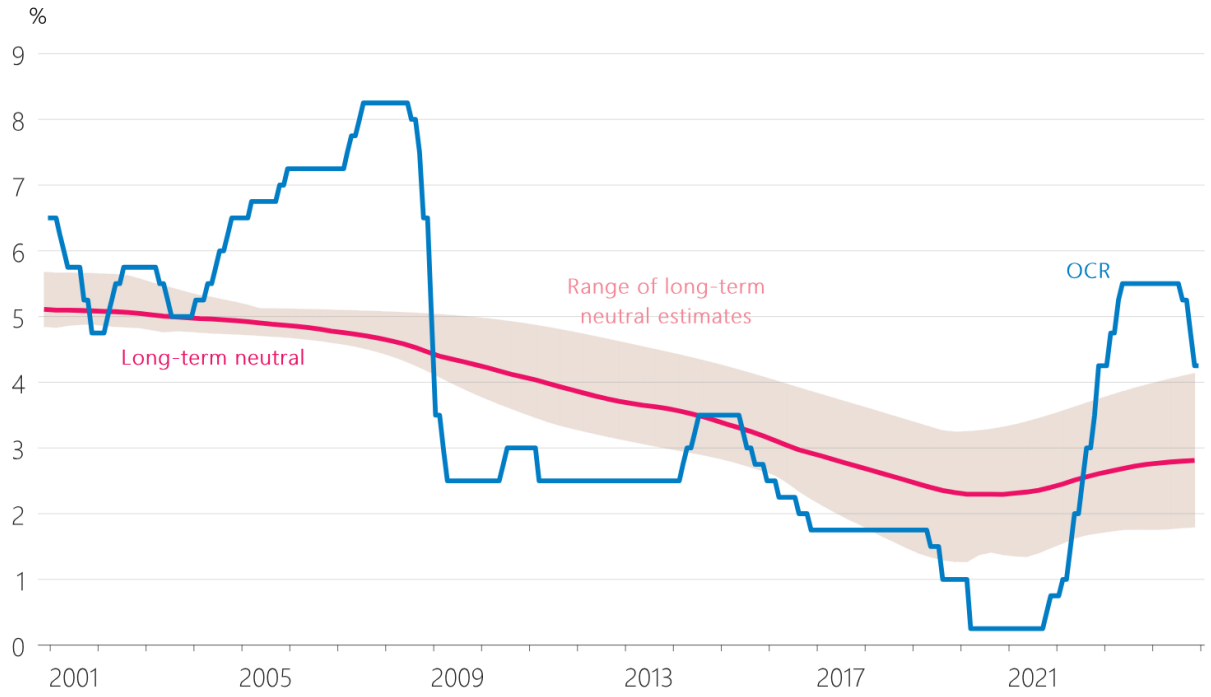
Domestically, sluggish productivity growth may have reduced businesses' incentives to invest and led households to save more than otherwise for retirement, further weighing on the New Zealand neutral rate.[24] Rapid population growth only partially offset these effects, with more young households (who tend to save less than older households).

This slow decline in the neutral rate has recently stalled and may have even reversed (Figure 9). But the jury is still out on whether this increase will continue in future.[25]

On the one hand, the main drivers of low neutral rates – such as aging, longer-lived populations and weak productivity growth – are unlikely to change soon. An increasingly fragmented and slower-growing world economy may also discourage investment. On the other hand, the global and domestic neutral interest rates could increase further given increased investment in mitigating and adapting to climate change or in defence.

While prediction is difficult, absent another large negative economic shock, a return to the ultra-low interest rates seen during the early stages of the COVID-19 pandemic seems unlikely anytime soon.

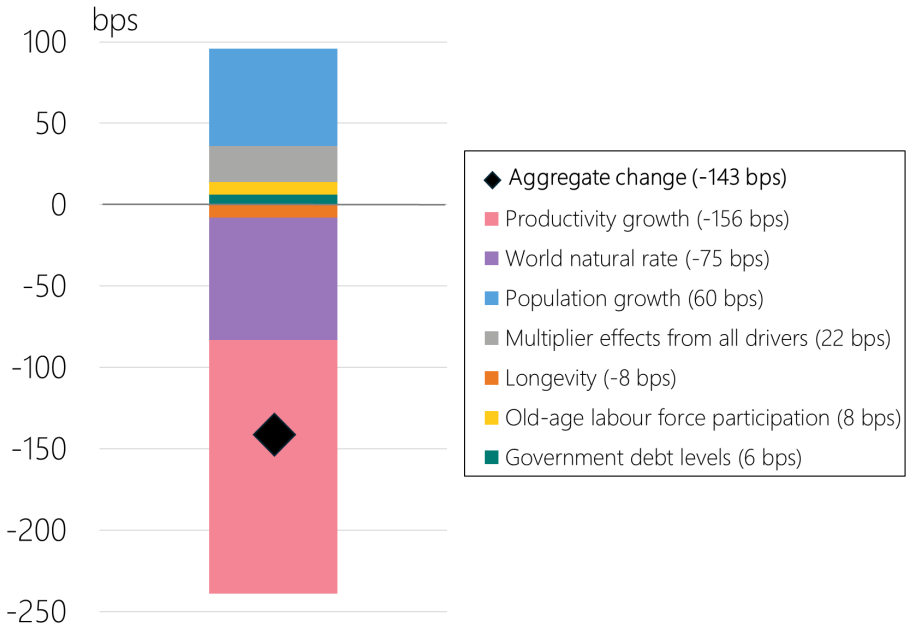
Figure 9: The Reserve Bank's neutral interest rate suite



Note: These lines show the nominal official cash rate (OCR) against the long-term nominal neutral interest rate. The shaded area shows the range of Reserve Bank estimates of the long-term neutral interest rate.

Source: Reserve Bank of New Zealand estimates.

Figure 10: Decomposition of changes in the 'natural' interest rate since 2000



Note: This chart shows the change in the natural interest rate between 2000 and 2024 and the cumulative drivers of the change. The black diamond shows the total change in natural rate.

Source: Kirkby, Lockyer and Coleman (forthcoming).

What does it all mean for monetary policy and the growth outlook?

So, what does all this mean for economic growth and interest rates?

I have outlined how slow potential output growth recently may have meant a lower growth speed limit with which to reduce inflation than in some peer economies. Looking ahead, as I mentioned earlier, this low 'speed limit' is likely to persist.

We do expect GDP growth to pick up over the next two years in response to less restrictive interest rates. However, this is a cyclical pick-up in growth. Our longer-term growth prospects remain modest, given weak expected potential output growth.

For the OCR, our current estimates of the nominal neutral OCR suggest that we are still north of neutral (Figure 9).[26] At 4.25%, the OCR is currently still restrictive, against Reserve Bank estimates of the long-term nominal neutral interest rate being between 2.5% and 3.5%. Easing domestic pricing intentions and the recent drop in inflation expectations help open the way for some further easing, as signalled in the November 2024 *Monetary Policy Statement*.

Given uncertainty, we will need to 'feel our way' as the OCR gets closer to our estimate of neutral. We will continually cross-check our estimate of the neutral interest rate by comparing the proximity of the OCR to neutral against what we are seeing in the real economy. For example, if our estimate of neutral is too low, then we would see economic activity and inflation pressures pick up by more than expected, as monetary policy setting will have been less restrictive than originally intended. We also update our estimate of neutral as part of every policy round.

Concluding remarks

To wrap up, understanding potential output is crucial for assessing whether the economy is running hot or cold and for gauging medium-term growth. As supply shocks become more frequent and volatile, potential output also plays an increasingly critical role in understanding inflation dynamics.

Historically, New Zealand's long-run growth has often outpaced the OECD average but has relied heavily on immigration and longer working hours per capita to make up for producing less per hour. In part, this reflects our small, distant, and capital-shallow economy, where capital per worker has lagged that in peer economies. The failure of capital-per-worker to increase to levels seen in more advanced economies has been a key factor holding back labour productivity.

Unlocking higher productivity growth and investment would raise the speed limit for sustainable long-run growth in New Zealand and make future periods of disinflation less recessionary. Improving productivity would also help address many other challenges we currently face, including with fiscal policy, health care, education, and infrastructure, and a more sustainable economy.[27]

For individuals, better productivity would mean more choices, higher long-term prosperity, and more leisure. Productivity growth doesn't solve everything – but it almost does.

At the current juncture, in the absence of further shocks, we expect output growth to tend towards the potential growth rate, and interest rates to ultimately settle around neutral.

However, the COVID-19 years have been a stark reminder that multiple shocks from a variety of sources can occur over a short space of time. Looking ahead, climate change, ongoing geopolitical risk and uncertainty, and possible corrections in global financial markets, will likely mean an increasingly volatile economic outlook.

As noted in the November *Statement*, having consumer price inflation close to the middle of its target band puts the MPC in the best position to respond to future inflation shocks.

Ngā mihi nui.

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1 Note that in this context "sustainable growth" means non-inflationary growth. It is not a reference to environmental sustainability.

2 We do this directly by looking at the components of potential output and indirectly by estimating the contribution of business-cycle dynamics to actual output and using that to back out an estimate of potential output. For details, see Lienert, A, and D Gillmore, (2015) 'The Reserve Bank's method of estimating potential output', Reserve Bank of New Zealand Analytical Note, AN2015/01.

3 For example, see Conway, P (2016) 'Achieving New Zealand's Productivity Potential', New Zealand Productivity Commission Research Paper 2016/1 and Mason, G (2013), 'Investigating New Zealand-Australia productivity differences: New comparisons at industry level'. New Zealand Productivity Commission Working Paper, 2013/02.

4 While New Zealanders work about 19% more *per person*, the average hours worked *per worker* is only slightly higher than the OECD average (as at 2023). This is due to New Zealand's relatively high labour force participation rate. GDP per hour worked data is in US dollars per hour, PPP converted, current prices as at 2023. Source: OECD. Note that GDP per hour worked data was not available for Türkiye, so has not been included in the OECD average.

5 GDP per hour worked (US dollars per hour, PPP converted, current prices) in 2019. Source: OECD.

6 Conway, P and Orr, A (2000) 'The process of economic growth in New Zealand' Reserve Bank of New Zealand Bulletin Vol. 63 No. 1.

7 Change in the terms of trade ratio for New Zealand's trade with all countries from 2000 to 2024. Source: Stats NZ.

8 See Grimes, A & Wu, S (2023) 'Sustainable consumption growth: New Zealand's surprising performance' *New Zealand Economic Papers*, *57*(3), 199-213. This paper gives a cross-country comparison of per capita real adjusted net national income. It focuses on income earned by nationals and accounts for natural resource depletion, capital depreciation, the terms of trade, and the real exchange rate. See also Galt, M (2023) 'Examining New Zealand's increased rate of income growth between the late 1990s and 2019,' New Zealand Treasury.

9 For example, in the February 2020 Monetary Policy Statement we projected potential output growth of 2.2% to 2.6% over the projection period.

10 For a detailed analysis of the reasons for entrenched weak productivity growth in New Zealand and the outline of a pro-productivity reform agenda, see Conway, P (2016) 'Achieving New Zealand's productivity potential' New Zealand Productivity Commission Research Paper 2016/1.

11 For example, the total value of land and housing in New Zealand is over seven times the value of all companies listed in the New Zealand stock exchange, and mortgage debt represents close to two-thirds of all domestic bank lending. Carvalho, P, Baker, B and Farquharson, A (2022) 'Housing as an Investment Asset in New Zealand', Reserve Bank of New Zealand Analytical Note AN2022/07.

12 New Zealand companies distribute significantly more of their post-tax earnings as dividends compared with the global average. For example, see Kernel Wealth (2024) 'Reinvesting Dividends for Long Term Financial Success' Kernel Wealth Research paper.

13 New Zealand Productivity Commission (2023) 'Productivity by the numbers' New Zealand Productivity Commission Research Paper.

14 For a broad overview of a policy reform agenda aimed at lifting productivity, see: Conway, P (2017) 'Productivity and Changing Technology', Victoria University of Wellington Policy Quarterly, August 2017; Conway, P (2018) 'Can the Kiwi Fly? Achieving Productivity Lift-off in New Zealand', New Zealand Productivity Commission research paper, June 2018; Coleman, A (2019) 'Taxing capital income in New Zealand: an International Perspective', University of Otago Economics Discussion Paper, January 2019.

15 For example, see: Reserve Bank of New Zealand (2022) 'Improving Māori Access to Capital' Reserve Bank of New Zealand Issues Paper.

16 For a discussion on the natural rate and the natural interest rate, see Obstfeld, M (2023) 'Natural and neutral real interest rates: Past and future', NBER Working Paper 31949, December 2023.

17 See: Castaing, A, Chadwick, M, Galimberti, J, Sing, M and Truong, E (2024) 'Estimates of New Zealand's Nominal Neutral Interest Rate', Reserve Bank of New Zealand Bulletin, April 2024.

18 Van Rensburg, M, Domican, S, and Kennedy, A (2021) 'The Economic impacts of an ageing population in New Zealand' New Zealand Treasury Long Term Fiscal Statement 2021 background paper.

19 See, for example, Chetty, R. (2015). 'Behavioral economics and public policy: A pragmatic perspective'. *American Economic Review*, *105*(5), 1-33.

20 In New Zealand, firms' investment decisions have been influenced by economic activity, financial conditions and uncertainty. Globally, there is evidence investment has been influenced by falling prices of investment goods and increasing market power. See Ratcliffe, J and Tong, E (2021) 'Minding our business: Drivers of New Zealand business investment over the last 20 years' Reserve Bank of New Zealand Analytical Note AN2021/3; Obstfeld, M (2023) 'Natural and neutral real interest rates: Past and future', NBER Working Paper 31949, December 2023.

21 McDermott, J (2013) 'Shifting gear – why have neutral interest rates fallen?', Speech to the New Zealand Institute of Chartered Accountants CFO and Financial Controllers Special Interest Group, Reserve Bank of New Zealand.

22 Kirkby, R, Lockyer, T, and Coleman, A (forthcoming). This work models the *natural* rate of interest – a concept closely related to and driven by similar factors as the *neutral* rate.

23 See: Cesa-Bianchi, A, Harrison, R, and Sajedi, R (2023) 'Global R*', Bank of England Staff Working Paper, October 2023; Obstfeld, M (2023) 'Natural and neutral real interest rates: Past and future', NBER Working Paper 31949, December 2023; Van Rensburg, M (2023) 'Long-run trends in New Zealand's real neutral interest rate' New Zealand Treasury Analytical Note, May 2023.

24 Pells, S (2020) 'Business investment in New Zealand: A literature review', Ministry of Business, Innovation and Employment CEU Working Paper 20/01; Ratcliffe, J and Tong, E (2021) 'Minding our business: Drivers of New Zealand business investment over the last 20 years', Reserve Bank of New Zealand AN2021/3.

25 See, for example, International Monetary Fund (2023) 'The Natural Rate of Interest: Drivers and Implications for Policy', International Monetary Fund World Economic Outlook, April 2023.

26 The neutral rate is not always the same as the endpoint of the OCR in our published projections because some shocks may take more than our forecast horizon of three years to fully work their way through the economy. See Reserve Bank of New Zealand (2022) 'Monetary Policy Statement November 2022', chapter 4.1 for further discussion.

27 Dominick Stephens, New Zealand's Challenging Fiscal Context, New Zealand Treasury, November 2024.